Agenda Item F.1
Situation Summary
June 2014

NATIONAL MARINE FISHERIES SERVICE REPORT

National Marine Fisheries Service (NMFS) West Coast Region (WCR) will briefly report on recent regulatory developments relevant to groundfish fisheries and issues of interest to the Council.

NMFS Northwest Fisheries Science Center (NWFSC) will also briefly report on groundfish-related science and research activities.

Council Task:

Discussion.

Reference Materials:

1. Agenda Item F.1.b, FR Notices: *Federal Register* Notices Published Since the Last Council Meeting.
2. Agenda Item F.1.b, NMFS Report: Draft Rulemaking Plan for 2014: Groundfish and Halibut.
3. Agenda Item F.1.c, FSC Report: National Marine Fisheries Service Report – Groundfish Science.

Agenda Order:

a. Agenda Item Overview — Kelly Ames
b. Regulatory Activities — Frank Lockhart
c. Fisheries Science Center Activities — Michelle McClure, John Stein
d. Reports and Comments of Advisory Bodies and Management Entities
e. Public Comment
f. Council Discussion

PFMC
05/27/14

Groundfish and Halibut Notices
3/18/14 through 5/27/2014

Documents available at NMFS Sustainable Fisheries Groundfish Web Site
http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/index.cfm

79 FR 15296: NOAA Fisheries proposes changes to chafing gear regulations for midwater trawl gear; public comment period closes April 18, 2014 - 3/19/14

79 FR 18827: 2014 Final Catch Sharing Plan for Pacific halibut fisheries – 4/4/14

79 FR 18876: Correction to the proposed rule for changes to chafing gear regulations for midwater trawl gear – 4/4/14

79 FR 19498: NOAA Fisheries announces inseason adjustments to the incidental Pacific halibut retention regulations for vessels fishing in the sablefish primary fishery, effective at noon on April 8, 2014 – 4/9/14

79 FR 21639: NOAA Fisheries announces change to the Pacific coast groundfish trawl Rockfish Conservation Area boundaries; effective April 17, 2014 – 4/17/14

79 FR 27196: Correction to the final rule announcing changes to the Pacific coast groundfish trawl Rockfish Conservation Area boundaries; effective May 13, 2014 – 5/13/14

79 FR 27198: Final rule for the 2014 Pacific whiting fishery, including harvest levels and allocations; effective May 13, 2014 – 5/13/14

79 FR 28455: Correction to the 2013-2014 Pacific coast groundfish fishery harvest specifications and management measures, effective May 16, 2014 – 5/16/14

Agenda Item F.1.b
NMFS Report
June 2014

Draft Rulemaking Plan for 2014

Groundfish and Halibut

In addition to a list of groundfish and halibut rules that have already been proposed and/or completed over 2014, NMFS is providing a list of rulemakings that are in progress over the remainder of 2014.

Completed rules:

1. Trawl Cost Recovery, Final Rule (12/11/2013, effective 1/10/2014)
2. Pacific Halibut Catch Sharing Plan, Proposed Rule (2/6/2014)
3. Observer/Catch Monitor, Proposed Rule (2/19/2014)
4. Whiting Fishery Allocations, Proposed Rule (2/28/2014)
5. Trawl Program Improvement and Enhancement (PIE 2) Rule, Correction (3/5/2014)
6. Trawl Chafing Gear, Proposed Rule (3/19/2014)
7. Pacific Halibut Catch Sharing Plan, Final Rule (4/4/2014)
8. Trawl Chafing Gear, Proposed Rule Correction (4/4/2014)
9. Inseason Action (4/9/2013)
10. Trawl Rockfish Conservation Area (RCA), Final Rule (4/17/2014)
11. Whiting Fishery Allocations, Final Rule (5/13/2014)
12. Trawl Rockfish Conservation Area (RCA), Correction (5/13/2014)
13. 13-14 Specifications, Trawl Allocations, Correction (5/16/2014)

In Progress:

1. Chafing Gear Rule Timing: Final rule – summer 2014 Effective – summer 2014 Includes: changes to chafing gear requirements Sectors affected: limited entry (LE) trawl (IFQ/MS/C/P)	**6. Whiting Clean-up Rule** Timing: Proposed Rule – fall 2014 Final rule – December 2014 Effective – January 1, 2015 Includes: whiting IFQ must have 50% whiting by weight, disposition of maximized retention catch, only midwater in RCA north of 40°10' N. lat. Sectors affected: LE trawl (IFQ/MS/C/P)
2. Observer/Catch Monitor Rule Timing: Final rule – summer 2014 Effective – summer 2014 Includes: permitting for new observer providers, observer safety, minor revisions Sectors affected: LE trawl (IFQ/MS/C/P)	**7. Whiting Season Date Rule** Timing: Proposed Rule – winter 2014/2015 Final rule – spring 2015 Effective – ~ May 2015 Includes: IFQ whiting season date starts May 15 Sectors affected: LE trawl (IFQ, MS, C/P)
3. Seabird Rule Timing: Proposed Rule – summer 2014 Final rule – 2014 Effective – 2014 Includes: mandatory streamer lines Sectors affected: LE and open access (OA) fixed gear	**8. AMP pass-thru Rule** Timing: Proposed Rule – fall 2014 Final rule – December 2014 Effective – January 1, 2015 Includes: pass through of the AMP QP to QS owners Sectors affected: LE trawl (IFQ)
4. 2015/2016 Harvest Specifications and Management Measures, Amendment 24 Timing: Proposed Rule – fall 2014 Final rule – December 2014 Effective – January 1, 2015 Includes: groundfish harvest levels, allocations, commercial trip limits, bag limits, etc. Sectors affected: Tribal, LE trawl, LE fixed gear, OA, and recreational	**9. Pacific Halibut Catch Sharing Plan, 2015** Timing: Proposed Rule – December 2014 Final rule – March 2015 Effective – March 2015 Includes: changes to commercial and recreational halibut fisheries for Area 2A Sectors affected: LE and OA fixed gear
5. Sablefish Rule Timing: Proposed Rule – fall 2014 Final rule – winter 2014/2015 Effective – April 1, 2015 Includes: Registering a LE trawl and fixed gear permit to a vessel at same time (joint registration), sablefish-endorsed LE fixed gear ownership issues, electronic fish tickets Sectors affected: LE trawl (IFQ), LE fixed gear, OA	

Agenda Item F.1.c
FSC Report
June 2014

NATIONAL MARINE FISHERIES SERVICE REPORT -- GROUNDFISH SCIENCE

Topics for presentation during the NMFS Science Center Report for Groundfish include:

- **2014 Groundfish Bottom Trawl Survey.** The first pass of the groundfish survey began sampling at sunrise on May 24, with the expectation of completing 752 tows before the survey concludes in October. During the initial leg of the survey, fishing will occur from Newport, OR to the U.S.-Canada border aboard two chartered fishing vessels, the Last Straw and Noah's Ark. Each vessel will be staffed with a 3-person crew and a 3-person scientific party. The entire first pass is scheduled to end July 29 with demobilization in Newport.

- **Likely Mechanisms of the Humboldt Squid Range Expansion in the California Current.** With two separate modeling approaches using unique, long-term data based on in situ observations of predator, prey, and environmental variables, our analyses suggest that Humboldt squid are indirectly affected by OMZ shoaling through effects on a primary food source, myctophid fishes. Our results suggest that this indirect linkage between hypoxia and foraging is an important driver of the ongoing range expansion of Humboldt squid in the northeastern Pacific Ocean.

- **Programmatic Review of Stock Assessment Process.** As part of a national, 5-year series of programmatic reviews, the NW Fisheries Science Center will host an independent review of the California Current groundfish stock assessment process on June 10-13, 2014. Each of the Panel members will submit comments, along with an overview prepared by the Chair. As in past reviews, the NWFSC will prepare formal responses to the major recommendations of Panel members and develop a set of action items in each area as appropriate. Future Science Report to the Council will include an overview of the major themes in the review comments and the Center's response.

- **Economic Data Collection – 2013 Submissions.** In response to Council's request, participants now have the option to complete the EDC forms through a web form. As the use of web forms is optional, paper forms were mailed to participants in May along with instructions for online submission.The forms continue to ask about the number of crew/workers positions on a vessel or in a plant. In addition, a new question was added in order to obtain the number of employees (crew and workers) directly engaged in fishing and processing. The additional question asks for the total number of individuals employed during the year. This information will provide important information about total employment.

- **CIE Review of the Joint Hake-Sardine survey.** We will discuss findings and responses to the 2014 review of the joint hake-sardine survey by the Center for Independent Experts.

Science, Service, Stewardship

Agenda Item F.1.c
Supplemental Fisheries Science Center PowerPoint
June 2014

Groundfish Science Report

June 20, 2014

NOAA FISHERIES SERVICE

Science, Service, Stewardship

Groundfish EFH Tasking for September Council Meeting

NOAA FISHERIES SERVICE

NOAA FISHERIES SERVICE

NWFSC/SWFSC Groundfish EFH Tasking for September Council Meeting

- Specific tasks listed in briefing book, referenced by Council member
- Prioritizing tasks based on available resources for completion by the Council's Sept. action (scoping)

  For example:
  - Analyses of the effects of existing management measures on groundfish EFH
  - Preliminary analyses of proposals (e.g., mapping and cataloging impacts of proposals on fishing effort)

NOAA
FISHERIES
SERVICE

Theme 1: How do current EFH proposals relate to other factors?

- In relation to
  - Current trawling effort and availability
  - Catch
  - Each other
  - RCAs
- Conclusion: Straightforward GIS analysis, intended to be complete by September Council meeting.

NOAA FISHERIES SERVICE

Theme 2: What do we already know?

- What have been the effects of
  - Gear switches
  - RCA
  - Catch shares
- Conclusion: part 1
  - We will summarize existing studies addressing these issues
  - Complete analysis is mult-dissertation worthy
- Conclusion: part 2
  - Preliminary analysis of Amend. 20 as part of BiOp

NOAA FISHERIES SERVICE

Theme 3: Do mid-water trawls really hit the bottom?

- Concern that the true effect of mid-water trawling on bottom habitats is not accurately characterized

- Conclusion: Tabulation of bottom-dwelling organisms (as proxy for hitting bottom) in hauls from catch data
  - For September Council meeting

NOAA FISHERIES SERVICE

Theme 4: Did you guys use those EFH boundaries anyway?

- Issues
  - Any mistakes?
  - Did EFH factor into decision-making?

- Conclusion:
  - List of wrongly/poorly placed boundaries (e.g. Potato Bank)
  - Table of decisions/etc. using EFH
  - Policy side to deal with these

NOAA FISHERIES

NWFSC

SWFSC

Center for Independent Experts (CIE) Panel Review of the Joint Pacific Sardine and Hake (SaKe) acoustic--trawl surveys

January 21-24, 2014

Seattle WA

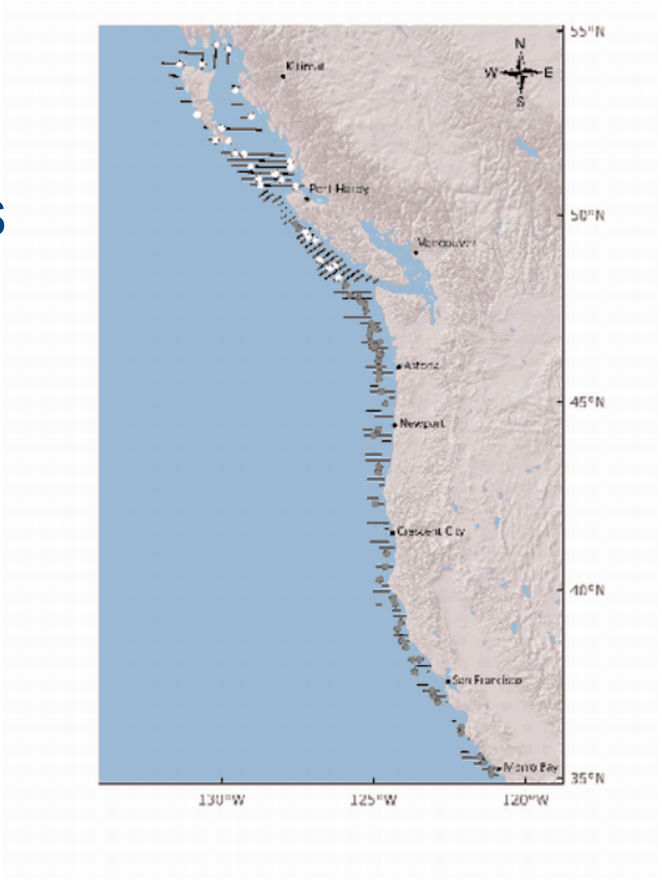

Figure 2. Acoustic transect lines and locations of midwater and bottom trawls during the 2011 integrated acoustic and trawl (IAT) survey of Pacific hake in U.S. and Canadian waters off the Pacific coast. Gray circles represent trawls conducted by the NOAA Ship *Bell M. Shimada*; white circles

Michelle McClure, Fishery Resource Analysis and Monitoring Division, NWFSC
Dale Sweetnam, Fisheries Resources Division, SWFSC
June 20, 2014

CIE Review of the Joint Hake-Sardine survey Terms of Reference:

1. Evaluate the historic, independent sardine and hake surveys
2. Evaluate the current joint SaKe survey
3. Evaluate the tradeoffs of transitioning from independent surveys to a joint sardine-hake survey.
4. Evaluate the potential of the SaKe survey to provide status and trend info for hake and CPS
5. Evaluate the costs and benefits of :
    - Separate and joint hake and sardine surveys
    - Biennial v. Annual
    - Ecosystem v. no ecosystem information.

- Provide recommendations to increase the efficacies and efficiencies (e.g., through advanced technologies) the survey

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NWFSC

SWFSC

SaKe Methodology Review Panel

Chair
Dr. Gary Melvin
Research Scientist
Department of Fisheries and Oceans, Canada

Independent reviewers
Dr. François Gerlotto
Directeur de Recherches de l[1]IRD, France

Dr. George Rose
Professor and Director
Centre for Fisheries Ecosystems Research
Fisheries and Marine Institute of Memorial University of Newfoundland, Canada

Dr. Jon Helge Vølstad
Leader, Fishery Dynamics Research Group, Principal Research Scientist
Institute of Marine Research, Norway

NOAA FISHERIES

NWFSC
SWFSC

- Conclusion 1: Joint survey is strongly supported
  - Hake and CPS assessment support
  - Basis for ecosystem studies
  - Climate response
- Response: All right, then
  - Centers continue to develop and implement joint efforts

NOAA FISHERIES

NWFSC
SWFSC

- Conclusion 2: A development phase is needed before “annual production”
  - 5 years
  - Techniques/methodologies
  - Resource development
- Response: yes!
  - 2014 – survey and development year
    - Net testing – interchangeability
    - Acoustic development
  - Integrate experiments with surveys

NWFSC
SWFSC

- Conclusion 3: Improve coordination
  - Between Centers
  - With Canada and Mexico
- Response: Long-term and ongoing efforts
  - Working group for planning and design
  - Better coordination on data storage and processing
  - Work to expand international (i.e. biologically-appropriate) coverage

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SWFSC

- Conclusion 4: Research Areas
  - Transect spacing, direction of survey, simultaneous use of 2 vessels
  - Development and validation of geostatistical techniques
  - Migration behavior and rates
  - Target strengths and species id
- Response: Prioritizing and Pursuing
  - Multiple review efforts (SRG, Program Review, CIE)

NOAA FISHERIES

NWFSC
SWFSC

- General Issues Raised
  - Possibly oversampling (transect density)
  - Length of time of survey
  - Understanding ecosystem dynamics is as important as biomass estimates
  - Juvenile indices
  - 2nd vessel (Lasker) to provide additional opportunities
  - Climate change

NOAA FISHERIES

NWFSC
SWFSC

- A joint survey with oceanographic sampling provides "a grand opportunity to work towards a true ecosystem-based survey that provides advice for stock assessment of the main commercial species plus the ecosystem information needed to fully understand productivity changes… that are currently occurring or coming at us soon."

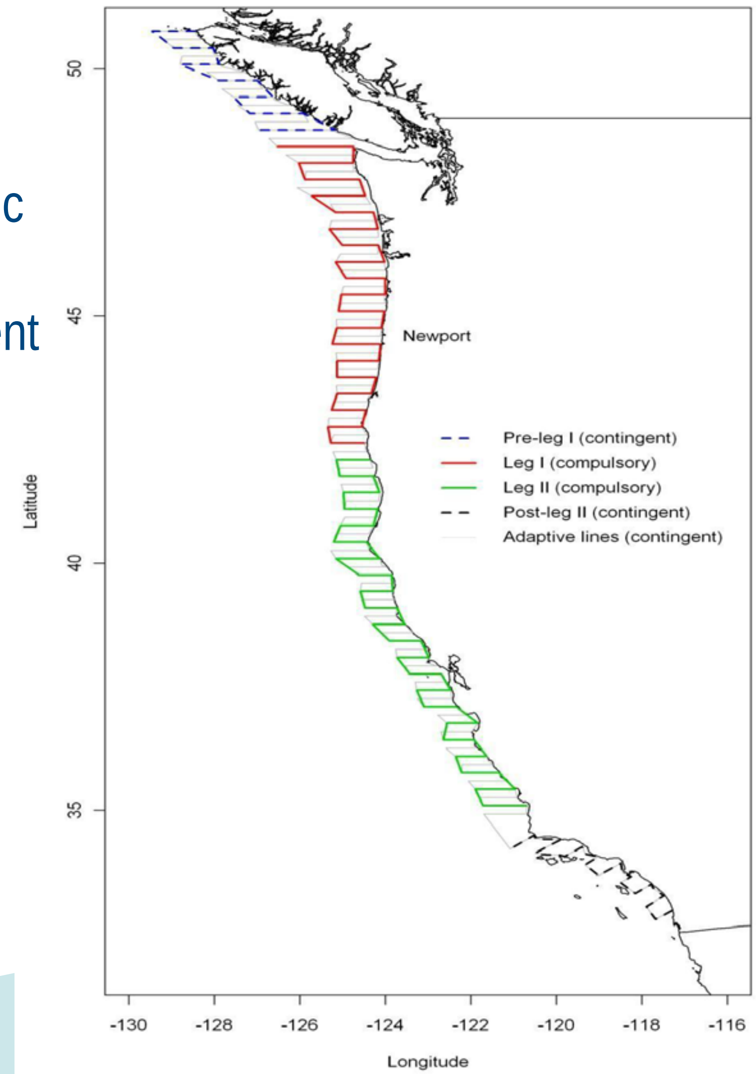
-George Rose

2014 Summer SaKe Survey and beyond

NOAA FISHERIES

SWFSC

- Survey Dates June 24-September 14, 2014
- First two legs are a Synoptic Acoustic-Trawl survey of CPS in the California Current Ecosystem
- Last two legs are hake specific research investigating survey methods, life history, and associated ecosystem



Moving Forward / Moving Parts

NOAA FISHERIES
SWFSC

- This year
  - Survey + research
  - Planning meeting aimed at addressing issues
- Moving Parts
  - Results of methodological tests
  - Ship time
  - Other resources
  - Standardization of data
  - Interoperability of data and equipment

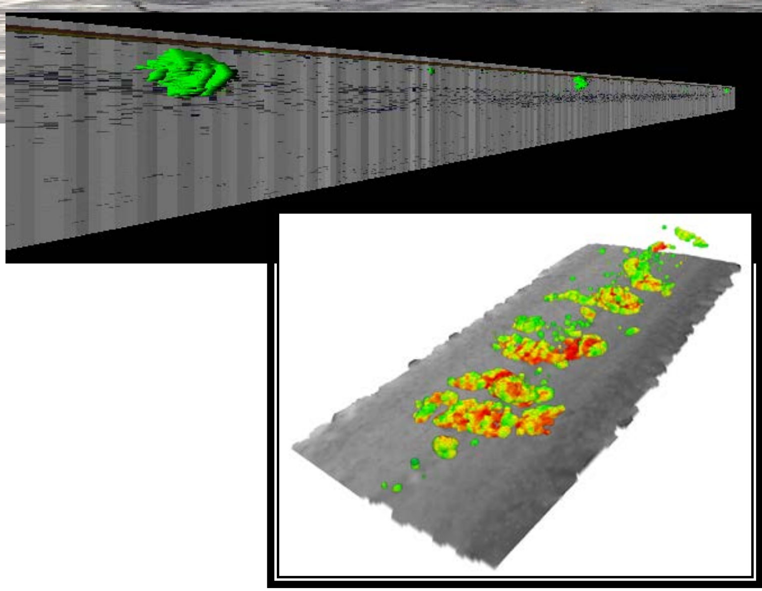
New FSV to address
California Current ecosystem questions

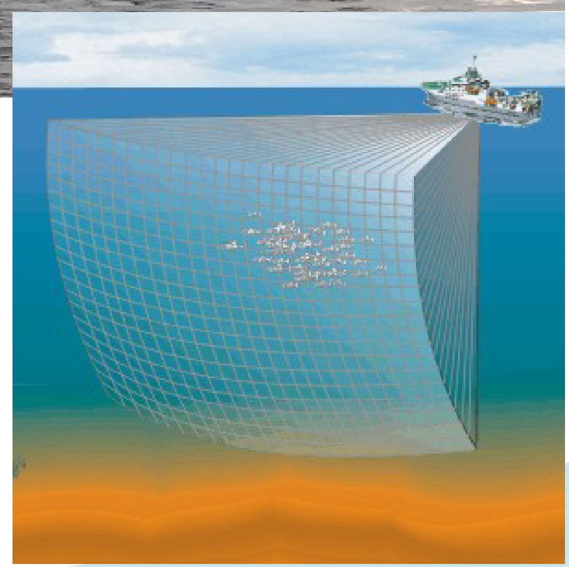
The Lasker is the fifth in a series of Oscar Dyson-class ships (208 ft; 63m) home ported in San Diego

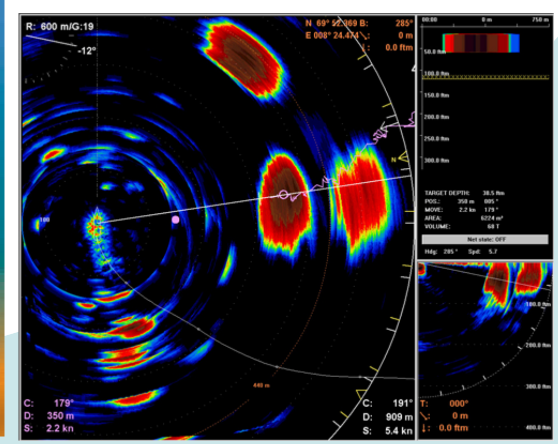
Equipped with technologies for fisheries and oceanographic research, including advanced navigation systems, acoustic sensors.

- Five-frequency split-beam echosounders
- Scanning, Multi-beam and Imaging Sonars

The ship is engineered to produce less noise than other survey vessels.







Agenda Item F.2
Situation Summary
June 2014

ELECTRONIC MONITORING REGULATORY PROCESS

The Council adopted a range of alternatives and options for an electronic monitoring (EM) program in November 2013, and at the April 2014 Council meeting the Council provided guidance on further development of an EM program. On May 7 and 8, the Groundfish Electronic Monitoring Policy Advisory Committee (GEMPAC) and Technical Committee (GEM Committees) met in Seattle, Washington to discuss potential revisions and additional options for Council consideration (Agenda Item F.2.b, GEMPAC Report). Council staff presented a framework for developing a cost analysis for an EM program. In addition, the GEM Committees heard from the only two west coast observer providers about how they may be affected by the development of an EM program to assist the GEM Committees and Council staff in the development of EM options and the impact analysis.

The GEMPAC report provides recommended definitions, revisions, and additional options to the Council's adopted alternatives, and a summary of observer provider comments. A new detailed listing of alternatives that includes the GEMPAC's recommendations is provided in the Council's draft analytical document titled "Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program" (Agenda Item F.2.a, Attachment 1). The draft Council decision document, which will ultimately evolve into a National Environmental Policy Act-compliant document, provides background on the development of the EM program, alternatives and options, and initial draft impact and cost analyses. In addition, Pacific States Marine Fisheries Commission submitted its final 2013 field study report for Council consideration (Agenda Item F.2.b, PSMFC Report). The NMFS Fisheries Science Center provided a net revenue analysis on the topic of EM (Agenda Item F.2.b, NMFS Report).

Under this agenda item, the Council is scheduled to refine alternatives, assign focused analysis, and select any preliminary preferred alternatives that may be appropriate for the different fishery sectors. The Council is currently scheduled for final decision making on a regulatory program recommendation to the NMFS at the September, 2014 Council meeting. At that time, the Council may make final decisions on individual fishery sectors, as opposed to needing to make a final decision for all sectors simultaneously.

Under a separate agenda item (F5, Final Exempted Fishing Permit (EFP) Approval for 2015-2016), the Council is scheduled to consider for final approval electronic monitoring EFP applications. The Council may want to consider the implications of the applications and how the projects could assist the Council in their development of EM program policies.

<u>Council Action</u>:

Consider Refining Alternatives and Adopting Preliminary Preferred Alternatives, as Appropriate, for Public Review

Reference Materials:

1. Agenda Item F.2.a, Attachment 1: Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program.
2. Agenda Item F.2.b, GEMPAC Report: GEMPAC Report to Council.
3. Agenda Item F.2.b, PSMFC Report: PSMFC Final 2013 Report.
4. Agenda Item F.2.b, NMFS Report: Net Revenue Analysis for Electronic Monitoring on the West Coast.

Agenda Order:

a. Agenda Item Overview — Brett Wiedoff
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action**: Consider Refining Alternatives and Adopting Preliminary Preferred Alternatives, as Appropriate, for Public Review

PFMC
06/03/14

Agenda Item F.2.a
Attachment 1
June 2014

Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program

Abstract: Participants with a Pacific Coast groundfish limited entry trawl permit that have a quota share (QS) permit and operate using individual fishing quota under the catch share program (Shorebased IFQ program) are subject to 100 percent observer coverage. Some participants have experienced difficulties in securing observers in a timely or consistent manner. In addition, program participants will be responsible for the full cost of observer coverage in the near future. Therefore, Electronic Monitoring (EM) (i.e., video monitoring) is being explored as flexible and economical substitute for human observers.

This draft decision document analyzes the effects of establishing an EM program for catcher vessels using bottom trawl, midwater trawl, and fixed gear (i.e., longline and pots) in the Shorebased IFQ program. The proposed EM program would be established to monitor vessels for compliance with individual fishing quotas (IFQ), individual bycatch quotas (IBQ), or groundfish allocations assigned to QS permit holders. The program would be voluntary and includes eligibility requirements to use EM, individual vessel monitoring plans, equipment and installation requirements of a video monitoring system, video data processing protocols, and compliance measures. Under the proposed action, the regulatory requirement of 100 percent human observer coverage on all IFQ fishing trips would be maintained. The proposed EM program is not intended to meet the needs for biological data or monitoring of other scientific information; however, human observers would continue to collect this information at an appropriate level to support scientific needs. Therefore, on EM trip, the vessel could be randomly chosen by NMFS to carry an observer for the purpose of collecting scientific information. However, if a vessel qualifies and chooses to fish using an EM system on an IFQ trip, the vessel would be exempted from the requirement for a human observer on the trip form compliance monitoring but would still be subject to random observer placement for scientific data collection.

The alternatives considered would maintain the full accountability of IFQs, IBQs, and groundfish allocations managed under the Shorebased IFQ program. This document analyzes the effects that an EM program would have on the socioeconomic, biological, and physical environments. No additional allocations of fish resources would be required, and fishing operations (area fished, effort, or gear used) are not expected to change under the proposed action. Impacts to the biological and physical environment are expected to be similar to those realized under the current Shorebased IFQ program.

TABLE OF CONTENTS

List of Tables

List of Figures

GLOSSARY

Electronic Technology(ies) **–** Any electronic tool used to support catch monitoring efforts both on shore and at sea, including electronic reporting (e.g., e-logbooks, tablets, and other input devices) and electronic monitoring (Vessel Monitoring Systems, electronic cameras, and sensors on-board fishing vessels).

Electronic Monitoring (EM) **–** The use of technologies – such as vessel monitoring systems or video cameras – to passively monitor fishing operations through observing or tracking. Video monitoring is often referred to as EM.

Electronic Reporting (ER) **–** The use of technologies – such as smart phones, computers and tablets – to record, transmit, receive, and store fishery data.

Fishery-dependent Data Collection Program **-** Data collected in association with commercial, recreational or subsistence/customary fish harvesting or subsequent processing activities or operations, as opposed to data collected via means independent of fishing operations, such as from research vessel survey cruises or remote sensing devices.

Full Retention **–** A type of fishery where total catch is retained and brought to shore, without discards. This is a generic definition, used in the Policy Directive for illustrative purposes only. There are multiple stages in the fishing process where intentional and unintentional discards can occur. Such variations (e.g., maximum retention, operational discards, prohibited species catch, etc.) require specific definition in each fishery for regulatory compliance and/or enforcement purposes.

Maximized Retention **–** A type of fishery where total catch is retained and brought to shore, except for minor operational amounts of catch lost by a catcher vessel. A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species).

Optimized Retention **-** A vessel is generally required to retain all catch share species and may be allowed to discard certain species.

CHAPTER 1 INTRODUCTION

The groundfish fishery in the Exclusive Economic Zone (EEZ), offshore waters between 3 and 200 nautical miles (nm), off the coasts of Washington, Oregon, and California (WOC) is managed under the Pacific Coast Groundfish Fishery Management Plan (FMP), while the nearshore areas are managed by the states and tribes. The Pacific Coast Groundfish FMP was prepared by the Pacific Fishery Management Council (Council) under the authority of the Magnuson Fishery Conservation and Management Act (subsequently amended and renamed the Magnuson-Stevens Fishery Conservation and Management Act). The FMP has been in effect since 1982.

Actions taken to amend FMPs or to implement regulations to govern the groundfish fishery must meet the requirements of several Federal laws, regulations, and executive orders. In addition to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), these Federal laws, regulations, and executive orders include: National Environmental Policy Act (NEPA), Regulatory Flexibility Act (RFA), Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), Coastal Zone Management Act (CZMA), Paperwork Reduction Act (PRA), Executive Orders (E.O.) 12866, 12898, 13132, and 13175, and the Migratory Bird Treaty Act.

NEPA regulations require that NEPA analysis documents be combined with other agency documents to reduce duplication and paperwork (40 CFR§§1506.4). Therefore, this EA will ultimately become a combined regulatory document to be used for compliance with not only NEPA, but also E.O. 12866, RFA, and other applicable laws. NEPA, E.O. 12866, and the RFA require a description of the purpose and need for the proposed action as well as a description of alternative actions that may address the problem.

- Chapter One describes the purpose and need of the proposed action.
- Chapter Two describes a reasonable range of alternative management actions that may be taken to meet the proposed need.

- Chapter Three contains a description of the socioeconomic, biological, and physical characteristics of the affected environment.
- Chapter Four examines changes in the socioeconomic, biological, and physical environments resulting from the alternative management actions.
- Chapter Five addresses consistency with the FMP and other applicable laws.
- Chapter Six is the regulatory impact review and regulatory flexibility analysis.
- Chapter Seven is a list of individuals who help prepare this document.
- Chapter Eight provides a list of references for this document.

1.1 Summary of the Proposed Action

The proposed action is to create the regulatory framework for an electronic monitoring program, to monitor the fisheries for compliance with IFQ and groundfish allocations under the Shorebased IFQ program (See Appendix E of the Pacific Coast Groundfish FMP). The EM program would include a video monitoring system for catch accounting that is adequate to maintain the integrity of the IFQ program and ensure that resource management objectives are being met. The proposed EM program would monitor vessels for compliance with individual fishing quotas (IFQ), individual bycatch quotas (IBQ), or groundfish allocations assigned to QS permit holders. The program would be voluntary and includes eligibility requirements to use EM, individual vessel monitoring plans, equipment and installation requirements of a video monitoring system, video data processing protocols, and compliance measures. The requirement for 100 percent observation of trips would be maintained; therefore, vessels will be required to have either a human observer or an EM system to operate in the Shorebased IFQ program.

This action is intended to implement a voluntary program that would allow participants under the IFQ program to use EM rather than human observers via long-term Federal regulations. If approved, the action is intended to be implemented in 2016.

1.2 Purpose and Need for the Proposed Action

There is a need to adequately monitor the IFQ program for compliance in an economical and flexible manner yet meet the goals and objectives of national policies and standards, the Pacific Coast Groundfish FMP, the trawl rationalization program, and all applicable laws and acts including the Magnuson-Stevens Act (MSA) and Endangered Species Act (ESA). NMFS and the Council identified that electronic monitoring (EM) may be a viable option to monitor IFQ fisheries for compliance.

The purpose of the proposed action is to meet the following regulatory objectives:

1. Reduce total fleet monitoring costs to levels sustainable for the fleet and agency;
2. Reduce observer costs for vessels that have a relatively lower total revenue;
3. Maintain monitoring capabilities in small ports;
4. Increase national net economic value generated by the fishery;
5. Decrease incentives for fishing in unsafe conditions;
6. Use the technology most suitable and cost effective for any particular function in the monitoring system; and
7. Reduce the physical intrusiveness of the monitoring system by reducing observer presence.

1.3 Decision to be Made

From the information in this document, the Council may refine alternatives, assign focused analysis, and select any preliminary preferred alternatives that may be appropriate for the different fishery sectors. The Council is currently scheduled for final decision making on a regulatory program recommendation to the NMFS at the September, 2014 Council meeting. At that time, the Council may make final decisions on individual fishery sectors, as opposed to needing to make a final decision for all sectors simultaneously.

1.4 Management of the Pacific Coast Groundfish Fishery and the Trawl Rationalization Program

1.4.1 History of Management

The west coast groundfish trawl fishery is jointly managed by state and Federal authorities under the MSA, which was passed in 1976 to "Americanize" U.S. fisheries. In addition to establishing eight regional fishery management councils, the MSA extended U.S. fishery management authority in territorial waters from 12 miles out to 200 miles from the shore. This created the EEZ, which, including U.S. Federal territorial waters, extends from 3 to 200 miles off shore. For the west coast (California, Oregon, and Washington), the Council coordinates Federal management of fisheries in the Federal EEZ with state management of fisheries occurring in state waters (i.e., between the shoreline and 3 miles offshore).

The groundfish fishery as a whole comprises several different sectors, defined by fishing gear, species targeted, and regulatory context. The list of current trawl target species includes flatfish, roundfish, thornyheads, and a few species of rockfish. Primary flatfish target species include petrale sole and Dover sole. Roundfish target species include Pacific whiting, Pacific cod, and sablefish. Some rockfish species, especially Pacific ocean perch and widow rockfish, were important trawl targets until the mid 1990s. However, seven rockfish species are currently declared overfished pursuant to the MSA. The need to rebuild these stocks to a healthy size has led to a variety of harvest constraints on groundfish fisheries, and rockfish are generally no longer a target of these fisheries.

The groundfish trawl fishery is subject to a Federal license limitation program (referred to as LE), implemented in 1992; currently there are 178 extant groundfish LE trawl permits. For purposes of analysis in this document, the LE trawl fishery is divided into the shoreside and at-sea midwater trawl fishery (catcher vessels only and does not include at-sea motherships or catcher/processors), mid-water non-whiting trawl fishery, fixed gear fishery (includes longline with hook-and-lines and longline with pots), and bottom trawl.

At its November 2008 meeting, the Council recommended trawl rationalization through an IFQ program for the shoreside fishery and co-ops for the whiting mothership and catcher-processor sectors (hereafter referred to as Shoreside IFQ program). Following the November 2008 meeting, the Council worked on critical trailing actions needed to complete Amendment 20. These actions covered topics such as eligibility to own IFQs, accumulation limits, a set-aside for adaptive management, and miscellaneous clarifications. The Council completed the critical trailing actions at its June 2009 meeting and adopted the related FMP amendment language. The initial allocation of canary quota shares was modified at the November 2009 Council meeting. The Council's final recommendations on Amendments 20 and 21 were submitted to the Secretary of Commerce for approval on May 7, 2010. On August 9, 2010, NMFS issued a letter approving the bulk of both Amendments 20 and 21. The final regulations to initiate implementation of Amendments 20 and 21 were published in the *Federal Register* on October 1, 2010 (the initial allocation rule). A proposed rule for a separate set of regulations required for implementation (the components rule) was published on August 31, 2010. The components rule was finalized December 2010 and implemented January 11, 2011. Since implementation, the Council has recommended a number of adjustments to the trawl catch share program (see Trailing Amendments and Actions on Trawl Rationalization [Catch Shares]).

The Shoreside IFQ program for the limited entry bottom trawl fleet and two distinct cooperative programs for the at-sea hake mothership and catcher-processor trawl fleets. The bottom trawl fleets traditionally operates from the U.S./Canadian border to Morro Bay, California. The at-sea hake fleet operates off the coasts of Oregon and Washington. Observer data is used to account for any IFQ discarded catch, including the mandatory discarding of Pacific halibut. Observer data, in combination with landings data, enable fishermen to track their individual fishing quotas and allow managers to monitor the progress of the fishery. The program requires that each vessel acquire quota pounds (QP) to cover its catch (including discards) of nearly all groundfish species.[1] Proper functioning of the program requires some form of at-sea monitoring to ensure that discards are enumerated for each vessel. The catch share program specified that this monitoring function be achieved through 100% at-sea observer coverage (compliance monitoring).

1.4.2 Applicable Federal Permits, Licenses, or Authorizations Needed in Conjunction with Implementing this Proposal

The Shorebased IFQ Program applies to qualified participants in the Pacific Coast Groundfish limited entry fishery and includes a system of transferable quota shares (QS) for most groundfish species or species groups, individual bycatch quota (IBQ) for Pacific halibut, and trip limits or set-asides for the remaining groundfish species or species groups. A QS permit would be required to participate in the proposed EM program. NMFS will issue a QS permit to eligible participants and will establish a QS account for each QS permit owner to track the amount of QS or IBQ and quota pounds (QP) or IBQ pounds owned by that owner. NMFS will establish a vessel account for each eligible vessel owner participating in the Shorebased IFQ Program, which is independent of the QS permit and QS account. In order to use QP or IBQ pounds, a QS permit owner must transfer the QP or IBQ pounds from the QS account into the vessel account for the vessel to which the QP or IBQ pounds is to be assigned. Harvests of IFQ species may only be delivered to an IFQ first receiver with a first receiver site license. A Pacific Coast groundfish limited entry permit is required to establish a vessel account and, amongst other requirements, a limited entry permit would be required to participate in the EM program.

1 Exceptions were made for some species rarely caught in the trawl groundfish fishery.

1.4.3 Background on Decisions to Consider EM

1.4.3.1 Why is 100% Monitoring Needed for this Fishery?

Prior to the trawl rationalization program, the West Coast groundfish observer program monitored approximately 20 percent of the trips taken on groundfish trawl vessels. The trawl rationalization program relies on the monitoring of all trips. One hundred percent monitoring is required to provide for the individual accountability on which the program relies, to fully achieve the potential program benefits, and to prevent the complexity and challenging enforcement circumstances which would arise if some vessels were monitored and others were not.

The trawl fishery is a multispecies fishery in which the allowable harvest levels for some stocks (potentially including overfished species) constrain total harvest. If a vessel were not monitored on a particular trip, the elimination of individual accountability would generate an incentive to alter fishing behavior and target stocks that are more difficult to catch without encountering high levels of constraining species. The trawl rationalization program has helped the fleet make tremendous gains in bycatch avoidance. During an unmonitored trip the incentive to avoid bycatch would be minimal. Alternative regulations would have to be developed for unmonitored trips, adding to regulatory complexity. Those regulations would have to assume high bycatch rates for constraining species in order to ensure that the trawl allocations not be exceeded. The assumption of such high bycatch rates would increase vessel operation costs (require the vessel to use more quota) and diminish quota potentially available for the remainder of the fleet. To provide more opportunity, different bycatch rates could be created for different harvest areas. However, this would increase regulatory complexity with a greater number of management lines and assumed bycatch rates, make the calculation of trip catch more complex and time consuming, and potentially burden enforcement with determination of whether any tows on the trip crossed into the high bycatch area. This example assumes that area of catch is the only parameter affecting high bycatch rates of constraining species. Other parameters such as the sonar signal on which fishermen set their gear and the configuration and manner in which the gear is fished may also affect bycatch rates. For example, halibut excluders might be disabled on unmonitored trips in order to increase CPUE.

Finally, the Council is in the process of considering how to more fully achieve the potential benefits of the individual incentives provided by the trawl rationalization program by liberalizing a number of regulations governing trawl vessels (e.g. gear regulations). If some vessels were unmonitored, two sets of regulations might need to be maintained, one for monitored vessels the other for unmonitored vessels, further increasing regulatory complexity. For these reasons, 100 percent monitoring is required for effective function of the program.

1.4.3.2 Why Monitor With Observers?

Currently 100% monitoring is achieved through the use of observers on the vessels. The Council's final action on trawl rationalization included a provision allowing vessel observes to be supplemented with cameras (one of the most common forms of electronic monitoring), but not allowing the use of cameras to completely fulfill the monitoring function. At the time the Council took final action, the program had already been in development for over five years and consideration of camera monitoring may have further delayed implementation. The trawl rationalization program entailed a tremendous change to the fishery and, while the change was expected to be positive, there was concern about the potential for unexpected consequences. Even though cameras had been successfully used to monitor the whiting fleet on an experimental basis, the incentives provided by individual accountability also create an incentive to avoid detection, which was not present during the development of the camera monitoring program for the whiting fishery. The West Coast Groundfish Observer Program was successfully monitoring about 20 percent of the trips and, thus providing a familiar tool. While the incentives to avoid detection could also lead to behaviors frustrating the observer's role, a human observer has more ability than a camera system to detect and respond to contingencies and collect information useful to modifying the monitoring program. Thus, the decision to not include cameras as an alternative to observes was made in the context of uncertainties about the performance of the overall program and cameras and potential delays in program implementation that may have resulted from a more careful considering of the camera options.

1.4.3.3 Why Monitor With EM?

The circumstances, under which electronic monitoring was originally rejected, have changed. Fishery managers have now had two years of experience under the program, which has provided a better understanding of how the fishery performs and how fishermen operate under the program. This has reduced some of the uncertainty about potential unintended consequences. Now, increasing information is becoming available on the performance of electronic monitoring and there is time to more carefully consider the utility of electronic monitoring relative to human observers. There are a number of needs that an alternative to monitoring with observers may address. First, for vessels, the need to pay for vessel observers is one of the most expensive compliance costs associated with participation in the trawl rationalization program. For the first years of the program, NMFS has subsidized observer costs to help the fleet though the period of adjusting to the new management system. Overall fleet profits, and consequently the price of quota, will be below what they might otherwise be if less expensive monitoring is available. Second, small vessels may be disproportionately affected by observer costs. Vessels are billed for observers on a per day basis, and because smaller vessels may have a lower total revenue per day at sea observer costs reduce vessel net revenue disproportionately more than for larger vessels. On this basis, over time it might be expected that quota will migrate to larger vessels and there will be fewer smaller vessels in the fleet—assuming small vessels do not have other countervailing advantages. Third, because of the overhead involved with maintain observer availability in small, somewhat isolated ports with relatively low demand for observers, at least one observer company has indicated that it may pull out of at least one of the small ports on the West Coast. In addition some observer companies may not be willing to provide observers for safety reasons. Thus, over time, smaller ports may be disadvantaged by the observer requirement, relative to larger ports. Fourth, if overall monitoring costs can be reduced (those borne by both private parties and the public), national net economic benefits may be increased. And finally, the observer fee system puts pressure on vessels to fish in unsafe conditions. Because vessels are billed on per day both for at-sea and for standby time, vessels may incur higher costs for standing down due to marginal weather conditions.

1.5 ESA Opinions and Thresholds for the Pacific Coast Groundfish Fishery

Six marine mammal species are known to have interacted with groundfish trawl gear: California sea lion, harbor seal, harbor porpoise, pacific white-sided dolphin, northern elephant seal, and Stellar sea lion (unidentified sea lions are also recorded, which could be either California or Stellar). Various seabird species have been observed taken in the groundfish trawl fishery; none is ESA-listed.

On December 7, 2012, NMFS issued a Biological Opinion (Opinion) under the ESA on the continuing operation of the Pacific Coast groundfish fishery. NMFS concluded that the fishery is not likely to jeopardize the continued existence of green sturgeon *(Acipenser medirostris),* eulachon *(Thaleichthyspacificus),* humpback whales *(Megaptera novaeangliae),* Steller sea lions *(Eumetopiasjubatus),*and leatherback sea turtles *(Dermochelys coriacea).* We also conclude that the proposed action is not likely to destroy or adversely modify designated critical habitat of green sturgeon or leatherback sea turtles. Furthermore, NFMS concluded that the proposed action may affect, but is not likely to adversely affect the following species and designated critical habitat:

Sei whales *(Balaenoptera borealis),*
North Pacific Right whales *(Eubalaena japonica),*
Blue whales *(Balaenoptera musculus),*
Fin whales *(Balaenoptera physalus),*
Sperm whales *(Physter macrocephalus),*
Southern Resident killer whales *(Orcinus orca),*
Guadalupe fur seals *(Arctocephalus townsendi),*
Green sea turtles *(Chelonia mydas),*
Olive ridley sea turtles *(Lepidochelys olivacea),*
Loggerhead sea turtles *(Carretta carretta),*
Critical habitat of Southern Resident killer whales, and Critical habitat of Steller sea lions

On November 21, 2012, the US Fish and Wildlife Service (USFWS) issued an Opinion under the ESA on the continuing operation of the Pacific Coast groundfish fishery. USFWS concluded the fishery would not jeopardize the continued existence of short-tailed albatross *(Phoebastria albatrus),*and concurred that the fishery is not likely to adversely affect the marbled murrelet
(Brachyramphus marmoratus), California least tern (*Sterna antillarum browni),* southern sea otter *(Enhydra lutris nereis),* and the federally threatened bull trout *(Salvelinus confluentus)* and its designated critical habitat. The USFWS anticipates a yearly average of one short-tailed albatross could be taken as a result of the fishery. The incidental take is expected to be in the form of short-tailed albatross killed from longline hooks or trawl cables.

The most recent Biological Opinion covering the incidental take of ESA-listed salmon in groundfish fisheries was published in 2006 (NMFS 2006c). That document includes a detailed history of section 7 consultations on the groundfish fishery.

Salmon are caught incidentally in both the at-sea and shore-based segments of the whiting fishery and bottom trawl. This bycatch is closely monitored through an at-sea observer program and dockside sorting of shore deliveries. A salmon bycatch reduction plan has also been implemented in this fishery. NMFS issued a Supplemental Biological Opinion on March 11, 2006 concluding that neither the higher observed bycatch of Chinook in the 2005 whiting fishery nor new data regarding salmon bycatch in the groundfish bottom trawl fishery required a reconsideration of its prior "no jeopardy" conclusion. NMFS also reaffirmed its prior determination that implementation of the Groundfish PCGFMP is not likely to jeopardize the continued existence of any of the affected ESUs. The 1999 biological opinion concluded that the bycatch of salmonids in the Pacific whiting fishery were almost entirely Chinook salmon, with little or no bycatch of coho, chum, sockeye, and steelhead.

NMFS will continue to monitor and collect data to analyze take levels for all protected species.

1.6 Environmental Review Process and Public Scoping

The purpose of the environmental review process is to determine the range of issues that the NEPA document needs to address. The environmental review process is intended to ensure that problems are identified early and properly reviewed; issues of little significance do not consume time and effort; and that the draft NEPA document is thorough and balanced. The environmental review process should: identify the public and agency concerns; clearly define the environmental issues and alternatives to be examined in the NEPA document; eliminate non-significant issues; identify related issues; and identify state and local agency requirements that must be addressed. The following public review and scoping presented in this document is in reference to the development of an EM program for the Shoreside IFQ program.

In 2011, NMFS implemented a Council developed catch share program for the West Coast limited entry groundfish trawl fishery. The program requires that each vessel acquire quota pounds (QP) to cover its catch (including discards) of nearly all groundfish species.[2] Proper functioning of the program requires some form of at-sea monitoring to ensure that discards are enumerated for each vessel. The catch share program specified that this monitoring function be achieved through 100% at-sea observer coverage. Electronic monitoring (EM) is being explored as a potential technically and economically viable substitute for the use of human observers in the function of compliance monitoring for the catch share program.

At the November 2012 Council meeting, the Council directed that an EM workshop be held. The workshop was held February, 2013. The purpose of the workshop was to begin developing the policy context and identify necessary elements for a thorough Magnuson-Stevens Act (MSA) process to use EM in the West Coast groundfish trawl catch share program.

The Council decided at the April, 2013 Council meeting to move forward with consideration of the possible use of EM for the trawl catch share program. At that time, the Council decided that

2 Exceptions were made for some species rarely caught in the trawl groundfish fishery.

the primary focus of integrating EM into the trawl catch share program would be to achieve the compliance monitoring required for individual accountability of catch and bycatch, as opposed to using EM to meet needs for biological data or other scientific information monitoring. A set of regulatory objectives and calendar from the February EM workshop report were adopted. Also, at the April meeting a set of recommendations on the 2013 EM field study was approved for forwarding to Pacific States Marine Fisheries Commission. A similar field study was conducted in 2012. Both studies focus on comparison of video and observer data.

At the June 2013 Council meeting, the Council established two EM committees to focus on the development of options for EM use in the trawl catch share program. In August 2013 both the Groundfish Electronic Monitoring (GEM) Policy Advisory Committee (GEMPAC) and the GEM Technical Advisory Committee met to further the Council scoping process. The GEMPAC report for their August meeting provides a draft set of EM program alternatives for Council consideration and were presented at the September 2013 Council meeting. The Council provided guidance to the GEMPAC for continued development of EM program alternatives.

The GEM Committees met again in October, 2013 to discuss the guidance provided by the Council. The GEMPAC refined the draft alternatives and developed a GEMPAC report with recommendations for Council consideration at their November, 2013 meeting. The Council decided to revise the alternatives with the modifications recommended in the Enforcement Consultants report and to move forward with an impact analysis of the draft alternatives. The Council is scheduled to hear an update on the analysis in April, 2014 and in June will review the full analysis to pick preliminary preferred alternatives. The Council is scheduled to pick its final preferred alternatives for an EM program at its September 2014, meeting with the expectation of implementing an EM program by January 2016.

Trawl Catch Share Program Electronic Monitoring (EM) Workshop Report
The Pacific Fishery Management Council held a workshop on the potential use of electronic monitoring (EM) in the trawl fishery catch share program, February 25-27, 2013. The full report is available at: http://www.pcouncil.org/wp-content/uploads/D7b_EM_WKSHOP_RPT_APR2013BB.pdf)

During the EM workshop there was a discussion of the potential regulatory requirements for an EM system and the need for regulatory flexibility, both with respect to technologies employed and processes. The needed flexibility would allow private industry to develop efficient and effective monitoring system and to continue to innovate as new technologies become available over time. It was suggested that rather than being prescriptive, regulations should specify performance standards which must be met. This recommendation is in line with Executive Order 12899, which requires that each agency "identify and assess alternative forms of regulation and shall, to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt."

1.6.1 Trawl Catch Share Program Electronic Monitoring (EM) Workshop Report

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1.6.2 NMFS Policy Directive

On May 3, 2013, NMFS released its Policy on Electronic Technologies and Fishery Dependent Data Collection to " adoption of electronic technology solutions in fishery-dependent data collection programs" (NMFS, 2013). A complete copy of this policy has been posted on the EM page of the Council web site (http://www.pcouncil.org/groundfish/trawl-catch-share-program-em/). The objective for this policy is stated as follows:

> It is the policy of the National Oceanic & Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NOAA Fisheries) to encourage the consideration of electronic technologies to complement and/or improve existing fishery-dependent data collection programs to achieve the most cost-effective and sustainable approach that ensures alignment of management goals, data needs, funding sources and regulations.

Appendix A contains NMFS policy directive, and the goals and objectives of the MSA, the trawl rationalization program, and the Pacific Coast Groundfish FMP.

1.6.3 Issues and Concerns Raised Through Scoping

In addition to the goals and objectives of the Pacific Coast Groundfish FMP and trawl rationalization program, several objectives were adopted by the Council at the June 2013 meeting during the public scoping process to develop an EM program for trawl catch share program compliance monitoring:

1. reduce total fleet monitoring costs to levels sustainable for the fleet and agency;
2. reduce observer costs for vessels that have a relatively lower total revenue;
3. maintain monitoring capabilities in small ports;
4. increase national net economic value generated by the fishery;

5. decrease incentives for fishing in unsafe conditions;
6. use the technology most suitable and cost effective for any particular function in the monitoring system; and
7. reduce the physical intrusiveness of the monitoring system by reducing observer presence; while,
8. maintaining current individual accountability for catch and preserving equitable distribution of monitoring coverage among members of the fleet,
9. supporting the collection of biological information necessary for managing the fishery, for stock assessments, and to meet other needs for scientific data, with no degradation relative to pre-trawl catch share program standards
10. taking into account agency budgets and abilities to support any new policy,
11. maintaining capabilities for ACL management (e.g. for non-quota species), and
12. following an implementation path most optimal for the fishery.

The first seven items in the above list are direct regulatory objectives, i.e. reasons for considering EM. Items eight through twelve in this list are considerations, i.e. the Council would not be undertaking this action in order to achieve items eight through twelve but rather in pursuing the first seven objectives will be bounded by items eight through twelve.

CHAPTER 2 **ALTERNATIVES**

2.1 Introduction

This chapter describes the alternative management actions that could be taken to establish an EM program.

Several approaches to monitoring participants for compliance in the shoreside IFQ program are defined and analyzed in this document. Components and options are listed in summary Table 2-1 and described in detail in this chapter. Table 2-1 provides the most current set of alternatives and options developed by the Council with revisions and additional options developed by the GEMPAC in May 2014. Preliminary preferred alternatives identified by some representatives of the GEMPAC are identified in the “Component” categories in the left-hand column.
In addition, fishery specific options are listed in Table 2-2 through Table 2-4.

Under the National Environmental Policy Act, a reasonable range of alternatives must be identified for a federal action, and includes the “no-action” alternative or status quo. The alternatives were developed to examine potential components and options for an EM program and are compared to the no-action alternative.

The EM program would need to account for discard events at sea, and provide sufficient information to identify fish species and enumerate the weight of fish discarded so that IFQ accounts and catch allocations can be debited. Under the proposed options for an EM program, vessels would need to apply for an exemption to use EM rather than a human observer and qualify for the exemption. It’s expected that participants would need to secure an EM provider, purchase or lease an approved EM system, and incur the cost for its maintenance and the video review. This information is analyzed in Section 4.3, under subsections on costs and impacts to different segments of the fishery and communities. Even if an exemption from required observer coverage is provided by NMFS for vessels that choose to use EM, observers would still need to be randomly deployed to collect scientific information such as biological data, bycatch estimates, and protected species interactions.

An EM program could be developed that is specific to each fishery that operates in the Shorebased IFQ program. Currently these fisheries are identified as shoreside and at-sea midwater trawl fishery (catcher vessels only and does not include at-sea motherships or catcher/processors), mid-water non-whiting trawl fishery, fixed gear fishery (includes longline with hook-and-lines and longline with pots), and bottom trawl.

Two major decision points must be made prior to selecting each component of an EM program: 1) what is the data source for the discard information - logbooks or video; and 2) which species may be discarded that would preserve the integrity of individual accounting in the IFQ system.

The choice may vary based on fishery, vessel operations, and the ability to accurately account for catch.

For example, it may be optimal to require the midwater trawl whiting fishery to continue fishing under a maximize retention regulatory environment, use logbooks as documentation for discards, then review a fixed percentage of the video to verify the discard documented in the logbooks (i.e., maximized retention with self-reporting and audit). For fixed gear (i.e., longline and pot), it may be optimal to allow discard of certain species because each fish is handled by the crew and video cameras could be used to document the species, length, and weight before it is discarded. Then, a review of all video images could be conducted to enumerate discards (i.e., optimized retention with video census). For bottom trawl, discard may be limited to certain species that can be identified on video, then audit the logbooks to verify events recorded in the logbooks are accurate and complete (i.e., optimized retention with self-reporting and audit). These potential combinations are described in more detail in Section 4.3, under subsections on costs and impacts to different segments of the fishery and communities.

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.2	**Compliance Monitoring Basic Provisions**			
2.2.1	Discard Documentation Technology	Observers	***Individual*** vessel Option to Use Cameras ***in lieu of human observer***	
2.2.1	Documentation Coverage	100%	100% of all IFQ trips must either have observer or cameras	
2.2.2	Video Reading Protocols	None	**Option A**: 100% (census). **Option B**: Subsample Video (% to review must be developed) GEMPAC recommended preliminary Preferred Alts: MDWT whiting representatives like Alternative 3, audit logbook at 10% review level but would like to see analysis for Alternative 2, Option B before final recommendation.	Audit logbook (intensity varies based on vessel's compliance history) GEMPAC recommended preliminary Preferred Alts: Fixed gear representatives like Alternative 3, logbook audit.

2.3	Discard Accounting - Individual or Fleet-wide	Observers/IFQ	**Accounting of discards are either accounted against IFQ, accounted against sector-wide, annual catch limit (ACL), or not accounted. Estimation of discard may be done through EM, WCGOP observer program, or not estimated.** **Option A**: One discard category and all discards are estimated using EM and counted against IFQ: • Dumped off deck (e.g., shoveled, picked out of net) • Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.). • Dropped off gear • Floating fish • Lost gear (not captured by EM ,estimate using WCGOP protocol) • Consumed/used as bait (not captured by EM) • Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls) **Option B**: Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage: Discard 1 IFQ Accounting: • Dumped off deck (e.g., shoveled, picked out of net) • Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.). • Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP Discard 2 Sector or ACL accounting: • Dropped off gear (use WCGOP estimates) • Floating fish (use WCGOP estimates) • Estimated from lost gear (estimate using WCGOP protocol) • Consumed/used as bait (not captured by EM, use WCGOP estimates) **Option C:** Split into two discard categories; Category 1 count against IFQ, no accounting for discard 2 category: Discard 1 IFQ Accounting: • Dumped off deck (e.g., shoveled, picked out of net) • Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.). • Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP Discard 2 No accounting: • Dropped off gear • Floating fish • Lost gear • Consumed/used as bait

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
			Council staff note: In order for option 3 to be valid it would have to comply with MSA national standards. All catch and discard must be accounted to estimate total mortality estimates and ensure annual catch limits are not exceeded.	
2.4	Definitions for Total Catch Accounting - Total Catch, Discard, Retained	Use WCGOP definitions	**NOTE: Under the IFQ and catch allocation system all catch must be accounted for to debit individual QS accounts and fishery allocations, regardless if it categorized as retained catch or discard.** **Total catch for trawl:** Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear, to include any organic or inorganic material confined within a trawl net as the net is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel. **Total catch for fixed gear:** Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear to include any fish hooked or in a pot as the gear is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel. **Discard for fixed and trawl gear:** Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost, or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls. **Retained catch for fixed gear and trawl:** Retained catch is any portion of the total catch that is delivered to a buyer or processor.	

2.5	Discard Requirements	Discard at will unless required to retain. • May discard any species unless regulations require you to retain them. • May discard catch share species, non-catch share species. • May discard non-groundfish • Allow discard of trash, mud coral, etc. • Require discards of prohibited species. • Require discards of ESA and MMPA species (protected species).	**Option A**: **Maximized Retention** - A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species) • No selective discard for catch share species, non-catch share groundfish species • No selective discard for non-groundfish species • Allow selective discard of trash, mud coral, etc. • Require selective discards of prohibited species (except whiting trips); • Require selective discards of ESA and MMPA species (i.e., protected species). • Non-selective discard for e.g., safety, "bleeding net", zipper accidentally opened, fish came off hook, gilled in net **Option B**: **Optimize Retention of Catch Share Species with Limited discards** - A vessel is generally required to retain all catch share species. • Allow selective discard of trash, mud coral, etc. • Require selective discards of prohibited species (except whiting trips); • Require selective discards of ESA and MMPA species (i.e., protected species). • Non-selective discard for e.g., safety, "bleeding net", zipper accidentally opened, fish came off hook, gilled in net **Potential Gear Specific Sub-options under Optimized Retention (must be verifiable under EM)**: Allowable Discards Midwater trawl non-whiting trips, bottomtrawl, and fixed gear trips may discard the following species if verifiable under the EM program: a) For catch share species Option a – Allow discard of flatfish Option b – Allow discard of lingcod and sablefish Option c – Allow discard of all non-rockfish groundfish (full retention of rockfish only) Option d – Allow discard if species that are verifiable with EM b) For non-catch share groundfish species Option c – Allow discard of all non-rockfish groundfish (full retention of rockfish only) Option d – Allow discard if species that are verifiable with EM c) For non-groundfish (Non-FMP and not prohibited species) Option e – Allow discard of all non-groundfish species Option d – Allow discard if species that are verifiable with EM **Option C** - **Discard At Will** (Status Quo) • May discard any species unless regulations require you to retain them • May discard catch share species, non-catch share species • May discard non-groundfish • Allow selective discard of trash, mud coral, etc. • Require selective discards of prohibited species (except whiting trips); • Require discards of ESA and MMPA species (i.e., protected species). **GEMPAC recommended preliminary Preferred Alts:** • Fixed gear and bottom trawl representatives prefer Optimized retention (option B) • Midwater trawl whiting representatives prefer Maximize retention (Option A)

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.6	Halibut Retention/Discard with Fishery Specific Options	Use WCGOP and IPHC protocols	**Option A**: Apply IPHC mortality rate for specific gear type: MDWT Whiting 100% mortality; MDWT non-whiting and BTW 90% mortality if discarded; Fixed gear longline 16% mortality if discarded; Fixed gear pot 18% mortality if discarded. **Option B**: WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet **Option C**: IPHC exemption to allow full retention (need to examine the feasibility of this option for fisheries other than MDWT whiting) **Option D**: Captain and crew provide assessment (training would be required) **Option E**: Use EM viability assessment (currently conducting study, need IPHC approval) **Option F**: Use vessel specific mortality rate (update rates periodically)	
2.7	Discard Species List Adjustments	None	**Options for a process to expand or change the species lists:** **Option 1**: NMFS to make determination and provide list to fishers through the NMFS EM Observer Exemption Process. **Option 2**: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure). **Option 3**: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.	
2.8	**Vessel Operation Provisions**			
2.8.1	Observer Exemption Process	None	NMFS to Develop Application and Approval Process	

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

<table>
<tr><th></th><th></th><th colspan="3">DETAILED COMPONENTS FOR All FISHERIES</th></tr>
<tr><th></th><th></th><th>1</th><th>2</th><th>3</th></tr>
<tr><th>Section Reference</th><th>Component</th><th>Status Quo: Human Observers Estimate Discard</th><th>Camera Recordings Used to Estimate Discard</th><th>Logbooks Used to Estimate Discard, with Camera Audits</th></tr>
<tr><td>2.8.2</td><td>Eligibility For Camera Use</td><td>N/A</td><td colspan="2">Vessel in good standing and has approved equipment and operational plan certifications.

<u>Initial eligibility criteria</u>:
1. Limited entry groundfish trawl permit
2. Quota share permit
3. No IFQ deficits
4. No civil penalties related to fishing activity exceeding a certain amount and timeframe
5. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP)
a. IVMP unique for each vessel
b. Multiple IVMPs included if submitted by group of vessels
6. Self-Governing Plan (if applicable, not required)
a. Data Delivery and Analysis (DDA) specifications
b. submitted by either a group of vessels or an individual vessel

<u>Continued eligibility</u>:
1. Participants must be in compliance with their IVMP
2. Demonstrate proper documentation of the discards in logbooks or on video
3. No civil penalties related to fishing activity exceeding a certain amount within the time period of EM use</td></tr>
</table>

2.8.3	Application Approval and Required Information	N/A	Requires application to NMFS to use EM, could include: 1. Operational Informational information. a. Installation by certified EMS Provider b. EMS service provider responsibilities c. Data Confidentiality Standards d. Data Storage and Delivery Standards e. EMS Coverage Requirements f. Monitoring Requirements g. Vessel Responsibilities 2. Data Sources a. Digital Camera(s) b. Winch Sensors c. Hydraulic Sensors d. Log Book e. VMS f. GPS 3. EM Data Standards a. Secure Watertight Control Box Data Storage b. Encrypted Data c. Storage Standards d. Date and Time Stamp and Counter e. Digital File Format f. Minimum Frame Rate g. Minimum Resolution h. Accepted Delivery Methods i. Time Frames j. Color Optics k. Lighting Standards l. Power Supply Standards

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.8.4	EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)	No plan required	**EM Operational Plan Required** Potential categories of information in an IVMP: a) Type of system b) Hardware c) Software d) Emergency protocols e) Back-up equipment use protocols f) Catch handling protocols g) Layout of vessel h) Screen shots of all camera views i) Number of cameras needed with placement specifications j) Care and maintenance of the EM system k) Types of sensors and data for sensors to capture l) Download/maintenance schedule m) Logbook format (electronic or paper) n) Tamper Resistant/Taper Evident o) Lighting Locations (Stern, Deck, Discard Shoot, etc.) p) Bridge Mounted Computer Interface/Monitors q) GPS Receiver r) Winch Sensors s) Hydraulic Pressure Transducers t) Power Supply / Backup u) Wire Runs v) Geo Fencing (NMFS supplied) w) System's Check Certification x) Data logger	

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.8.5	EM Vessel Operational Plan - IVMP Expiration	No plan required	**Option A – No Expiration** unless modifications are made • Approval of plans by NMFS • Plan modification provisions: (NMFS to decide how this is done) 1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes) 2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel) **Option B – Annual Expiration** or if modifications are made Same as Option A but with annual expiration ***Option C - Indefinite (example 2 or 3 year duration)*** ***Same as Option A but with Indefinite expiration***	
2.8.6	Declaration of EM Use	No declaration except for current VMS requirements	**Option A** - Annual Declaration Use EM all year **Option B** - Declaration for Intermittent Use For the coming year, participants must indicate in which months, if any, it will use EM and in which months, if any, it will use an observer. (e.g. quarterly) **Option C** -Trip by Trip Basis Vessel and the observer provider would need to work out when observers may be available on a per trip basis. **Exception for Emergency Situation for Option A and B** For example, camera broke so need an observer tomorrow, vice versa	

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.9	**Equipment and Protocol Provisions**			
2.9.1	EM Equipment Requirements	N/A	Options for specification of technology hardware, data formats, etc. including consideration for changes through time. ***Both Open Source or Proprietary should be allowed if they meet the performance criteria.***	
2.9.2	Data Transfer Process	Completed by observers	Video data transfer, electronic/paper logbook, and data logger information will be developed during implementation of the program. Some of this information would be disclosed in an IVMP. Includes secure transfer for data and chain of custody requirements. Options (not mutually exclusive) ***• Vessel operator*** • Crew • Shoreside catch monitor • PSMFC • EM Provider • ~~Enforcement~~ ***• Contractor (hired by processor, port, or fisher)***	
2.9.3	Data Confidentiality/Accessibility/Ownership (all data collected in the EM system)	Status quo	Only data according to Magnuson-Stevens Act is confidential. Describe confidentiality standards for fishery participants. Status quo protocols will be used for access, ownership, and public dissemination.	

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.9.4	Video and Data Processing and Analysis	N/A	Video reviewers (not mutually exclusive): **Option A** -NMFS **Option B** -PSMFC **Option C** - EM Provider ***Option D - Third Party***	
2.10	**WCGOP Scientific Observations**			
2.10.1	Payment for Scientific data collection/observations	Status quo however in near future industry will need to pay for all observer costs	**Option A**: Government funded, same as pre IFQ **Option B**: Industry Funded **Option C**: Combination of both Government and Industry [Need to discuss allocating costs] **GEMPAC Recommended Preliminary Preferred Alts**: Most industry representatives would like Option A	
2.11	**NMFS Processes**	N/A	Identify items for NMFS to work out and then conduct a formal deeming process with the Council (i.e., Observer Exemption Application, Application and Approval Process, EM Equipment Type-Approval, IVMP Review)	
2.12	**Spatial Variation for High Bycatch Areas**	Status quo for current are restrictions (e.g., Rockfish Conservation Areas)	**Option A** - No special provisions ~~**Option B** - fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM in high bycatch areas~~ ~~**Option C** - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required~~	

Table 2-1. Summary of EM program components and alternatives with options for all fisheries. NOTE: Section references in the table coincide with descriptions following the table. Key: Yellow highlights are new components with new options; Red, bold italicized text are original components with some new text or options.

		DETAILED COMPONENTS FOR All FISHERIES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.13	**Adaptive or Phased Implementation**	N/A	**Option A**. None, implement all fisheries at one time through regulatory implementation **Option B**. Use EFPs to test final Council policy, prior to full regulatory implementation. **Option C**. Phase in by sector/gear. **Option D**. Phase in retention options over time. **Options B-D are not mutually exclusive.**	

Fishery Specific Alternatives and Options

Several components in Table 2-1 are applicable to all fisheries and do not have options; therefore they are not presented in the fishery specific Tables 2-2 through 2-4. Fishery specific decision Tables 2-2 through 2-4 provide the alternatives and options that are germane to each fishery. Only components of the EM program that contain options are provide in the tables. These are the decision points for the Council for each fishery.

Table 2-2. Decision table for alternatives and options specific to midwater trawl whiting. NOTE: Section references in the table coincide with section descriptions in document.

		MIDWATER TRAWL WHITING ALTERNATIVES		
Section Reference	Component	1 **Status Quo: Human Observers Estimate Discard**	2 **Camera Recordings Used to Estimate Discard**	3 **Logbooks Used to Estimate Discard, with Camera Audits**
2.2.2	Video Reading Protocols	None	**Option A**: 100% (census). **Option B**: Subsample Video (must develop) GEMPAC recommended preliminary Preferred Alts: MDWT whiting representatives like Alternative 3, audit logbook at 10% review level but would like to see analysis for Alternative 2, Option B.	Audit logbook (intensity varies based on vessel's compliance history) GEMPAC recommended preliminary Preferred Alts: Fixed gear representatives like Alternative 3, logbook audit.
2.3	Discard Accounting - Individual or Fleet-wide	Observers/IFQ	**Accounting of discards are either accounted against IFQ, accounted against sector-wide, annual catch limit (ACL), or not accounted. Estimation of discard may be done through EM, WCGOP observer program, or not estimated.** (See Table 2-1, Section 2.3 for option details) **Option A**: One discard category and all discards are estimated using EM and counted against IFQ. **Option B:** Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage: **Option C**: Split into two discard categories; Category 1 count against IFQ, no accounting for discard 2 category. **Council staff note: In order for option 3 to be valid it would have to comply with MSA national standards. All catch and discard must be accounted to estimate total mortality estimates and ensure annual catch limits are not exceeded.**	

Table 2-2. Decision table for alternatives and options specific to midwater trawl whiting. NOTE: Section references in the table coincide with section descriptions in document.

		MIDWATER TRAWL WHITING ALTERNATIVES		
Section Reference	Component	1 **Status Quo: Human Observers Estimate Discard**	2 **Camera Recordings Used to Estimate Discard**	3 **Logbooks Used to Estimate Discard, with Camera Audits**
2.4	Definitions for Total Catch Accounting - Total Catch, Discard, Retained	Use WCGOP definitions	**NOTE: Under the IFQ and catch allocation system all catch must be accounted for to debit individual QS accounts and fishery allocations, regardless if it categorized as retained catch or discard.** **Total catch for trawl:** Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear, to include any organic or inorganic material confined within a trawl net as the net is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel. **Discard for fixed and trawl gear:** Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost, or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls. **Retained catch for fixed gear and trawl:** Retained catch is any portion of the total catch that is delivered to a buyer or processor.	
2.5	Discard Requirements	Maximized Retention	**Option A**: **Maximized Retention** - A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species). Sorting whiting at-sea requires discard of prohibited and protected species however this is generally not practiced. **GEMPAC Recommended Preliminary Preferred Alts:** • Midwater trawl whiting representatives prefer Maximize retention (Option A)	
2.6	Halibut Retention/Discard	Observers/100% mortality	**Option A**: Apply mortality rate for specific gear type: MDWT Whiting 100% mortality	

Table 2-2. Decision table for alternatives and options specific to midwater trawl whiting. NOTE: Section references in the table coincide with section descriptions in document.

Section Reference	Component	MIDWATER TRAWL WHITING ALTERNATIVES 1 **Status Quo: Human Observers Estimate Discard**	2 **Camera Recordings Used to Estimate Discard**	3 **Logbooks Used to Estimate Discard, with Camera Audits**
2.7	Discard Species List Adjustments	Use current regulatory requirements for discard	**Options for a process to expand or change the species lists:** **Option A:** NMFS to make determination and provide list to fishers through the NMFS EM Observer Exemption Process. **Option B:** Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure). **Option C:** Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.	
2.8.5	EM Vessel Operational Plan - IVMP Expiration	No plan required	**Option A –** No Expiration unless modifications are made **Option B –** Annual Expiration or if modifications are made **Option C** - Indefinite (example 2 or 3 year duration)	
2.8.6	Declaration of EM Use	No declaration except for VMS requirments	**Option A** - Annual Declaration Use EM all year **Option B** - Declaration for Intermittent Use For the coming year, participants must indicate in which months, if any, it will use EM and in which months, if any, it will use an observer. (e.g. quarterly) **Option C** -Trip by Trip Basis Vessel and the observer provider would need to work out when observers may be available on a per trip basis. **Exception for Emergency Situation for Option A and B** For example, camera broke so need an observer tomorrow, vice versa	

Table 2-2. Decision table for alternatives and options specific to midwater trawl whiting. NOTE: Section references in the table coincide with section descriptions in document.

		MIDWATER TRAWL WHITING ALTERNATIVES		
Section Reference	Component	1 **Status Quo: Human Observers Estimate Discard**	2 **Camera Recordings Used to Estimate Discard**	3 **Logbooks Used to Estimate Discard, with Camera Audits**
2.9.2	Data Transfer Process	Completed by observers	**Video data transfer, electronic/paper logbook, and data logger information will be developed during implementation of the program. Some of this information would be disclosed in an IVMP.** **Includes secure transfer for data and chain of custody requirements.** **Options (not mutually exclusive)** • Vessel operator • Crew • Shoreside catch monitor • PSMFC • EM Provider • Enforcement • Contractor (hired by processor, port, or fisher)	
2.9.4	Video and Data Processing and Analysis	N/A	**Video reviewers (not mutually exclusive):** **Option A -NMFS** **Option B -PSMFC** **Option C - EM Provider** **Option D - Third Party**	
2.10.1	Payment for Scientific data collection/observations	Status quo however in near future industry will need to pay for all observer costs	**Option A: Government funded, same as pre IFQ** **Option B: Industry Funded** **Option C: Combination of both Government and Industry [Need to discuss allocating costs]** **GEMPAC Recommended Preliminary Preferred Alts:** Most industry representatives would like Option A	
2.12	**<u>Spatial Variation for High Bycatch Areas</u>** GEMPAC recommends removing Options B &C from further consideration	Status quo for current are restrictions (e.g., Rockfish Conservation Areas)	**Option A** - No special provisions **Option B** - fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM in high bycatch areas **Option C** - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required	
2.13	**<u>Adaptive or Phased Implementation</u>**	N/A	**Option A**. None, implement all fisheries at one time through regulatory implementation **Option B**. Use EFPs to test final Council policy, prior to full regulatory implementation. **Option C**. Phase in by sector/gear. **Option D**. Phase in retention options over time. **Options B-D are not mutually exclusive.**	

Table 2-3. Decision table for alternatives and options specific to fixed gear (longline and pot). NOTE: Section references in the table coincide with section descriptions in document.

		FIXED GEAR ALTERNATIVES (LONGLINE AND POT)		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.2.2	Video Reading Protocols	None	**Option A**: 100% (census). **Option B**: Subsample Video (% to review must be developed)	Audit logbook (intensity varies based on vessel's compliance history)
2.3	Discard Accounting - Individual or Fleet-wide	Observers/IFQ	**Accounting of discards are either accounted against IFQ, accounted against sector-wide, annual catch limit (ACL), or not accounted. Estimation of discard may be done through EM, WCGOP observer program, or not estimated.** (See Table 1, Section 2.3 for option details) **Option A**: One discard category and all discards are estimated using EM and counted against IFQ. **Option B:** Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage: **Option C**: Split into two discard categories; Category 1 count against IFQ, no accounting for discard 2 category. **Council staff note: In order for option 3 to be valid it would have to comply with MSA national standards. All catch and discard must be accounted to estimate total mortality estimates and ensure annual catch limits are not exceeded.**	

Table 2-3. Decision table for alternatives and options specific to fixed gear (longline and pot). NOTE: Section references in the table coincide with section descriptions in document.

		FIXED GEAR ALTERNATIVES (LONGLINE AND POT)		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.4	Definitions for Total Catch Accounting - Total Catch, Discard, Retained	Use WCGOP definitions	**NOTE: Under the IFQ and catch allocation system all catch must be accounted for to debit individual QS accounts and fishery allocations, regardless if it categorized as retained catch or discard.** **Total catch for fixed gear:** Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear to include any fish hooked or in a pot as the gear is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel. **Discard for fixed and trawl gear:** Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost, or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls. **Retained catch for fixed gear and trawl:** Retained catch is any portion of the total catch that is delivered to a buyer or processor.	
2.5	Discard Requirements	Discard at will unless required to retain.	**Option A**: **Maximized Retention** - A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species) **Option B**: **Optimize Retention of Catch Share Species with Limited discards** - A vessel is generally required to retain all catch share species. **Potential Gear Specific Sub-options under Optimized Retention (must be verifiable under EM)** **Option C - Discard At Will** (Status Quo) **GEMPAC Recommended Preliminary Preferred Alts:** • Fixed gear and bottom trawl representatives prefer Optimized retention (option B)	

Table 2-3. Decision table for alternatives and options specific to fixed gear (longline and pot). NOTE: Section references in the table coincide with section descriptions in document.

		FIXED GEAR ALTERNATIVES (LONGLINE AND POT)		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.6	Halibut Retention/Discard with Fishery Specific Options	Use Observers and IPHC protocols for applying mortality	**Option A:** Fixed gear longline 16% mortality if discarded; Fixed gear pot 18% mortality if discarded. **Option B**: WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet **Option C**: IPHC exemption to allow full retention (need to examine the feasibility of this option for fisheries other than MDWT whiting) **Option D**: Captain and crew provide assessment (training would be required) **Option E**: Use EM viability assessment (currently conducting study, need IPHC approval) **Option F**: Use vessel specific mortality rate (update rates periodically)	
2.7	Discard Species List Adjustments	Use current regulatory requirements for discard	**Options for a process to expand or change the species lists:** **Option A**: NMFS to make determination and provide list to fishers through the NMFS EM Observer Exemption Process. **Option B**: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure). **Option C**: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.	
2.8.5	EM Vessel Operational Plan - IVMP Expiration	No plan required	**Option A – No Expiration unless modifications are made** **Option B – Annual Expiration or if modifications are made** **Option C - Indefinite (example 2 or 3 year duration)**	

Table 2-3. Decision table for alternatives and options specific to fixed gear (longline and pot). NOTE: Section references in the table coincide with section descriptions in document.

		FIXED GEAR ALTERNATIVES (LONGLINE AND POT)		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.8.6	Declaration of EM Use	No declaration	**Option A -** Annual Declaration Use EM all year **Option B -** Declaration for Intermittent Use For the coming year, participants must indicate in which months, if any, it will use EM and in which months, if any, it will use an observer. (e.g. quarterly) **Option C -**Trip by Trip Basis Vessel and the observer provider would need to work out when observers may be available on a per trip basis. **Exception for Emergency Situation for Option A and B** For example, camera broke so need an observer tomorrow, vice versa	
2.9.2	Data Transfer Process	Completed by observers	**Video data transfer, electronic/paper logbook, and data logger information will be developed during implementation of the program. Some of this information would be disclosed in an IVMP.** **Includes secure transfer for data and chain of custody requirements.** **Options (not mutually exclusive)** • Vessel operator • Crew • Shoreside catch monitor • PSMFC • EM Provider • Enforcement • Contractor (hired by processor, port, or fisher)	
2.9.4	Video and Data Processing and Analysis	N/A	**Video reviewers (not mutually exclusive):** **Option A -NMFS** **Option B -PSMFC** **Option C - EM Provider** **Option D - Third Party**	

Table 2-3. Decision table for alternatives and options specific to fixed gear (longline and pot). NOTE: Section references in the table coincide with section descriptions in document.

		FIXED GEAR ALTERNATIVES (LONGLINE AND POT)		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.10.1	Payment for Scientific data collection/observations	Status quo however in near future industry will need to pay for all observer costs	**Option A: Government funded, same as pre IFQ** **Option B: Industry Funded** **Option C: Combination of both Government and Industry [Need to discuss allocating costs]** **GEMPAC Recommended Preliminary Preferred Alts:** Most industry representatives would like Option A	
2.12	**Spatial Variation for High Bycatch Areas**	Status quo for current are restrictions (e.g., Rockfish Conservation Areas)	**Option A** - No special provisions **Option B** - fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM in high bycatch areas **Option C** - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required	
2.13	**Adaptive or Phased Implementation**	N/A	**Option A**. None, implement all fisheries at one time through regulatory implementation **Option B**. Use EFPs to test final Council policy, prior to full regulatory implementation. **Option C**. Phase in by sector/gear. **Option D**. Phase in retention options over time. **Options B-D are not mutually exclusive.**	

Table 2-4. Decision table for alternatives and options specific to bottom and non-whiting midwater trawl. NOTE: Section references in the table coincide with section descriptions in document.

		BOTTOM AND NON-WHITING MIDWATER TRAWL ALTERNATIVES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.2.2	Video Reading Protocols	None	**Option A**: 100% (census). **Option B**: Subsample Video (% to review must be developed)	Audit logbook (intensity varies based on vessel's compliance history)
2.3	Discard Accounting - Individual or Fleet-wide	Observers/IFQ	**Accounting of discards are either accounted against IFQ, accounted against sector-wide, annual catch limit (ACL), or not accounted. Estimation of discard may be done through EM, WCGOP observer program, or not estimated.** (See Table 1, Section 2.3 for option details) **Option A**: One discard category and all discards are estimated using EM and counted against IFQ. **Option B:** Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage: **Option C**: Split into two discard categories; Category 1 count against IFQ, no accounting for discard 2 category. **Council staff note: In order for option 3 to be valid it would have to comply with MSA national standards. All catch and discard must be accounted to estimate total mortality estimates and ensure annual catch limits are not exceeded.**	

Table 2-4. Decision table for alternatives and options specific to bottom and non-whiting midwater trawl. NOTE: Section references in the table coincide with section descriptions in document.

		BOTTOM AND NON-WHITING MIDWATER TRAWL ALTERNATIVES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.4	Definitions for Total Catch Accounting - Total Catch, Discard, Retained	Use WCGOP definitions	**NOTE: Under the IFQ and catch allocation system all catch must be accounted for to debit individual QS accounts and fishery allocations, regardless if it categorized as retained catch or discard.** **Total catch for trawl:** Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear, to include any organic or inorganic material confined within a trawl net as the net is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel. **Discard for fixed and trawl gear:** Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost, or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls. **Retained catch for fixed gear and trawl:** Retained catch is any portion of the total catch that is delivered to a buyer or processor.	

Table 2-4. Decision table for alternatives and options specific to bottom and non-whiting midwater trawl. NOTE: Section references in the table coincide with section descriptions in document.

		BOTTOM AND NON-WHITING MIDWATER TRAWL ALTERNATIVES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.5	Discard Requirements	Discard at will unless required to retain.	**Option A**: **Maximized Retention** - A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species) **Option B**: **Optimize Retention of Catch Share Species with Limited discards** - A vessel is generally required to retain all catch share species. **Potential Gear Specific Sub-options under Optimized Retention (must be verifiable under EM)** **Option C** - **Discard At Will** (Status Quo) **GEMPAC Recommended Preliminary Preferred Alts:** • Bottom trawl representatives prefer Optimized retention (option B)	
2.6	Halibut Retention/Discard with Fishery Specific Options	Use Observers and IPHC protocols for applying mortality	**Option A**:; MDWT non-whiting and BTW 90% mortality if discarded **Option B**: WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet **Option C**: IPHC exemption to allow full retention (need to examine the feasibility of this option for fisheries other than MDWT whiting) **Option D**: Captain and crew provide assessment (training would be required) **Option E**: Use EM viability assessment (currently conducting study, need IPHC approval) **Option F**: Use vessel specific mortality rate (update rates periodically)	
2.7	Discard Species List Adjustments	Use current regulatory requirements for discard	**Options for a process to expand or change the species lists:** **Option A**: NMFS to make determination and provide list to fishers through the NMFS EM Observer Exemption Process. **Option B**: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure). **Option C**: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.	

Table 2-4. Decision table for alternatives and options specific to bottom and non-whiting midwater trawl. NOTE: Section references in the table coincide with section descriptions in document.

		BOTTOM AND NON-WHITING MIDWATER TRAWL ALTERNATIVES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.8.5	EM Vessel Operational Plan - IVMP Expiration	No plan required	**Option A – No Expiration unless modifications are made** **Option B – Annual Expiration or if modifications are made** **Option C - Indefinite (example 2 or 3 year duration)**	
2.8.6	Declaration of EM Use	No declaration	**Option A -** Annual Declaration Use EM all year **Option B -** Declaration for Intermittent Use For the coming year, participants must indicate in which months, if any, it will use EM and in which months, if any, it will use an observer. (e.g. quarterly) **Option C -**Trip by Trip Basis Vessel and the observer provider would need to work out when observers may be available on a per trip basis. **Exception for Emergency Situation for Option A and B** For example, camera broke so need an observer tomorrow, vice versa	
2.9.2	Data Transfer Process	Completed by observers	**Video data transfer, electronic/paper logbook, and data logger information will be developed during implementation of the program. Some of this information would be disclosed in an IVMP.** **Includes secure transfer for data and chain of custody requirements.** **Options (not mutually exclusive)** • Vessel operator • Crew • Shoreside catch monitor • PSMFC • EM Provider • Enforcement • Contractor (hired by processor, port, or fisher)	

Table 2-4. Decision table for alternatives and options specific to bottom and non-whiting midwater trawl. NOTE: Section references in the table coincide with section descriptions in document.

		BOTTOM AND NON-WHITING MIDWATER TRAWL ALTERNATIVES		
		1	2	3
Section Reference	Component	**Status Quo: Human Observers Estimate Discard**	**Camera Recordings Used to Estimate Discard**	**Logbooks Used to Estimate Discard, with Camera Audits**
2.9.4	Video and Data Processing and Analysis	N/A	**Video reviewers (not mutually exclusive):** **Option A -NMFS** **Option B -PSMFC** **Option C - EM Provider** **Option D - Third Party**	
2.10.1	Payment for Scientific data collection/observations	Status quo however in near future industry will need to pay for all observer costs	**Option A: Government funded, same as pre IFQ** **Option B: Industry Funded** **Option C: Combination of both Government and Industry [Need to discuss allocating costs]** **GEMPAC Recommended Preliminary Preferred Alts:** Most industry representatives would like Option A	
2.12	**Spatial Variation for High Bycatch Areas**	Status quo for current are restrictions (e.g., Rockfish Conservation Areas)	**Option A** - No special provisions **Option B** - fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM in high bycatch areas **Option C** - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required	
2.13	**Adaptive or Phased Implementation**	N/A	**Option A**. None, implement all fisheries at one time through regulatory implementation **Option B**. Use EFPs to test final Council policy, prior to full regulatory implementation. **Option C**. Phase in by sector/gear. **Option D**. Phase in retention options over time. **Options B-D are not mutually exclusive.**	

2.2 Compliance Monitoring - Overview

All IFQ trips must be monitored in an adequate manner to provide the necessary data to debit QP accounts. In order to monitor the fisheries for compliance with the IFQ program, discard must either be monitored by a human observer or be captured on video for a video reviewer to verify the discard events.

2.2.1 Discard Documentation Technology and Documentation Coverage

Currently, all discard on IFQ trips must be monitored by a human observer in order to monitor the fisheries for compliance with the IFQ program. Observers participating in the IFQ program are referred to as IFQ program observers and are employed by private third-party companies. Vessels make arrangements with the third-party observer provider to secure an observer for a trip and pay the provider directly. The Northwest Fisheries Science Center trains, certifies, and equips IFQ program observers; ensures data quality; and stores, maintains, and analyzes data collected by observers. Under all alternatives, vessels would continue to have the option to use human observers for compliance monitoring and it’s expected that “third-party” observer providers would continue to provide this service to the vessels in the IFQ program.

Under the proposed action, discard must either be monitored by a human observer (Alternative1) or be captured on video for a video reviewer to verify the discard events. A voluntary EM program provides the industry an opportunity to choose either a human observer or EM to monitor their compliance with IFQs, IBQs, and catch allocations. Both catch and discard is debited from the QP or catch allocation. Catch that is landed would continue to be monitored shoreside with catch monitors that are employed as a “third-party” observer. At sea, discarded catch would be monitored by either a human observer or EM. The EM program would need to account for discard events and provide sufficient information to identify fish species and enumerate the weight of fish discarded so that QP accounts and catch allocations can be debited in a timely manner. Under these alternatives, and in support of the current requirement of the IFQ program, 100% observations of all IFQ trips must be observed through either EM or human observers.

2.2.2 Video Reading Protocols

A discard monitoring method that would adequately account for discard in each fishery is necessary and likely the most critical component of an EM program. The data source to accurately account for discard is either a human observer, logbook, or video data.

2.2.2.1 Alternative 1 - No Action

The No Action Alternative or status quo (Alternative 1) defines the default management structure if no Federal action was taken. Under Alternative 1, the current mandatory 100% human observer coverage would continue in order to monitor fishery participants for compliance with IFQs, IBQs, and allocated groundfish. Existing requirements and regulations to participate in the Shorebased IFQ program would be maintained. This information is described in subparts C through E of Part 50 of the Code of Federal Regulations (CFR). These subparts include, but are not limited to, requirements for a limited entry and QS permit, use of a vessel monitoring system (VMS), at sea observer requirements, human catch monitors at shoreside first receiver locations, and reporting requirements (i.e., logbook, fish ticket, economic data collection program, and prohibitions). Under Alternative 1, the cost for observer coverage in the near future will no longer be federally subsidized. It's expected that the industry will pay the full amount for compliance monitoring by human observers. The 2014 subsidy rate by the Federal government is 48% of the cost for an observer per day of fishing activity.

2.2.2.2 Alternative 2 - Camera Recordings Used to Estimate Discard

Under Alternative 2, the video images are the sole data source for estimating discards. The video is review for fish discarded by fishermen, the species are identified, assign an estimated weight, and the QS account is debited. Two options are identified under Alternative 2 to conduct the review and estimate the catch:

Option A: 100% (census)
Option B: Subsample Video

Option A is to conduct a census of all video images i.e., review all video segments and estimate the total discard for each set or haul that occurred in a trip. Option B is to subsample the video images at some predetermined percent of video review (e.g., 25%), speciate the discard, estimate the weight of the discard, then expand the discard rate to the entire set, haul, or trip to provide a total estimated discard for the trip.

2.2.2.3 Alternative 3 - Logbooks Use to Estimate Discard, with Camera Audits

Alternative 3 provides the opportunity for the fishermen to speciate and estimate the total discarded weight of the fish for each set or haul and provide this information in a logbook. Then, the video images would be reviewed to verify discard events and the species/weight estimates for the trip. The video images of documented discard events would be reviewed at some predetermined level (e.g., 25%) to verify the discard. In addition, all video segments would be subject to random review, at some predetermined level, (e.g., 10%) to look for undocumented discard events. This would ensure the vessel is in compliance with the EM program and documentation of all discard events.

2.3 Discard Accounting – Individual or Fleetwide

Under the catch shares program, total catch must be accounted for to debit individual quota share accounts and fishery allocations. Retained and discarded catch is combined to get total catch. Shoreside monitors are used to verify retained catch when it is landed on motherships or shoreside processors and the West Coast Groundfish Observer Program (WCGOP) uses at-sea monitors to estimate and report discards by species.

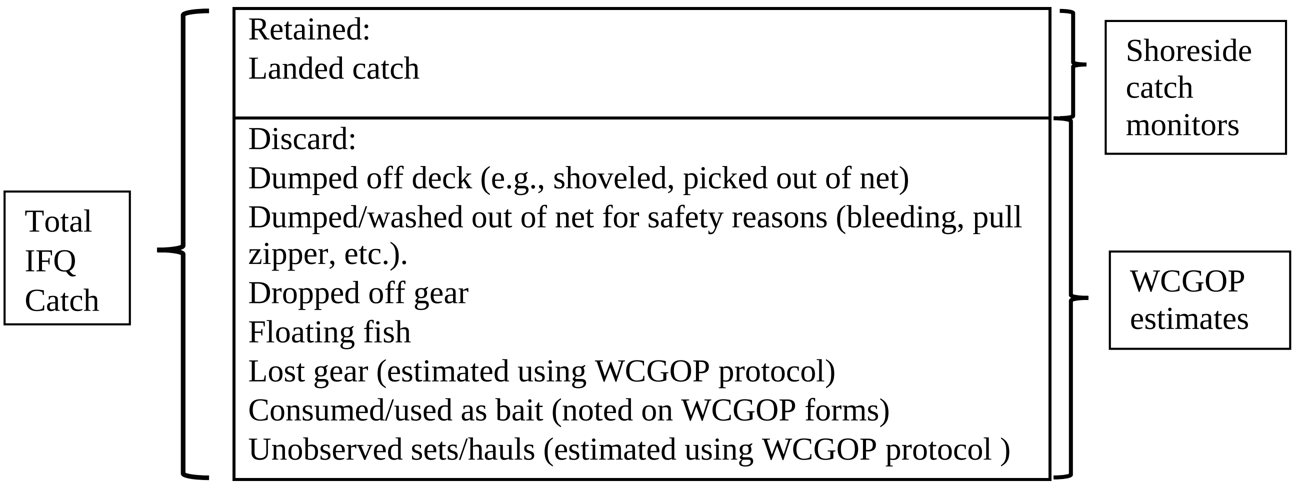


Figure 2-1. General depiction of total catch accounting in the Shorebased IFQ program.

Under an EM program, the estimation (speciation and weight) for these discard events would be conducted using EM rather than the WCGOP. However some of the discard events and scenarios noted in Figure 2-1 may not be captured by EM, such as lost gear, crew consuming fish onboard the vessel, using fish caught as bait, and unobserved hauls/sets that had discard (i.e., EM failed to record the discard), therefore; some other source of data may need to be used to account for the discard activity. In addition, some events may be capture by EM but are difficult to quantify or are rare, such as floating fish on the surface of the water or a fish dropped from the gear.

If these events cannot be estimated using EM, then they could be estimated either annually by the WCGOP or not at all. The discard could be estimated using historical observations by the WCGOP for the time period of 2010 to 2014 to get an average number per year or through the annual observations made by WCGOP that are on vessels that do not use EM in combination with vessels that are randomly selected to have a scientific observer while the vessel uses EM.

In addition, rather than accounting for this discard at the individual level (IFQ) it's possible to account for it during the specification process for Annual Catch Limits (ACL), at the sector level or not at all. Assuming that the total mortality estimated at the sector level from this activity is minor amounts and would not affect individual vessels quota share accounts or other fishery participants, the estimated mortality could be deducted from the ACL prior to allocation to each sector or at the sector level to be taken “off-the-top” prior to IFQ distribution and catch allocation distributions.

Potential changes were developed in the flowing way:
1) Discard events were grouped into discard categories 1 and 2;
2) Accountability was established (i.e., IFQ, Fleetwide, or not accounted);
3) Data source were identified as either EM or the WCGOP.

Three possible options were developed for discard accounting:

Option A: **Estimate Discard with EM and Count against IFQ**
One discard category and all discards are estimated using EM and counted against IFQ:
• Dumped off deck (e.g., shoveled, picked out of net)
• Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
• Dropped off gear
• Floating fish
• Lost gear (not captured by EM, estimate using WCGOP protocol)
• Consumed/used as bait (not captured by EM)
• Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)

Option B: **Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage**

Discard 1 IFQ Accounting:
• Dumped off deck (e.g., shoveled, picked out of net)
• Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
• Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP

Discard 2 Sector or ACL accounting:
• Dropped off gear (use WCGOP estimates)
• Floating fish (use WCGOP estimates)
• Estimated from lost gear (estimate using WCGOP protocol)
• Consumed/used as bait (not captured by EM, use WCGOP estimates)

Option C: Split into two discard categories; no accounting for discard 2 category:

Discard 1 IFQ Accounting:
• Dumped off deck (e.g., shoveled, picked out of net)
• Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
• Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP

Discard 2 No accounting:

• Dropped off gear
• Floating fish
• Lost gear
• Consumed/used as bait

Council staff note: In order for option 3 to be valid it would have to comply with MSA national standards. All catch and discard must be accounted to estimate total mortality estimates and ensure annual catch limits are not exceeded.

2.4 Definitions for Total Catch Accounting - Total Catch, Discard, Retained

For analysis purpose the GEMPAC has developed draft definitions for the total, retained, discarded catch under an EM program. WCGOP provided the GEMPAC draft definitions of total catch and discard that are specific to trawl and fixed gear. The GEMPAC consolidate the individual gear definitions for total catch and discard into the following draft definitions:

Total catch for trawl: Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear, to include any organic or inorganic material confined within a trawl net as the net is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel.

Total catch for fixed gear: Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear to include any fish hooked or in a pot as the gear is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel.

Retained catch for fixed gear and trawl: Retained catch is any portion of the total catch that is delivered to a buyer or processor.

Discard for fixed and trawl gear: Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls.

2.5 Discard Requirements

Currently, under the trawl rationalization program each fishery may discard, or is required to discard, certain species. Under an EM program, discard events will be documented with video; however, it may be difficult to identify some species or differentiate between species on video. Therefore, each fishery is examined for potential discard options and retention requirements under an EM program (see Section 4.3.). For example, when longline fishing, video cameras may be able to capture each individual species as it is hauled above the surface of the water and boarded. However, it still may be difficult to see which species of fish incidentally fell off the hook or was discarded prior to being boarded. In addition, when retrieving a midwater trawl net, fish may "bleed" out of the net as it surfaces so it may be difficult to capture the weight and identification of species when they are unintentionally discarded as a mixed group.

Some statutory management measures such as the Endangered Species Act (ESA) or the Marine Mammal Protection Act (MMPA) may restrict the consideration of some retention rules. Currently, there is an exception for the midwater trawl fishery that targets whiting which allows retention of salmon and halibut if the fish are not sorted at sea. Therefore, exceptions are provided as part of the description of alternatives.

There are three Options identified that allow for discard (Table 2-1, Section 2.5) maximized retention (minimal discard allowed), B) optimized retention (some allowable discard of IFQ species), and C) discard at will (discard any species). The retention and discard requirements are described under each alternative. Exceptions for allowable discard are also described and includes the species groups that may potentially be discarded under each alternative. The discard species are grouped by catch share groundfish species, non-catch share groundfish species, non-groundfish species, prohibited species (halibut, salmon and Dungeness crab), and ESA/MMPA protected species (turtles, marine mammals, seabirds, etc.). Table 2-5, Table 2-6 and Table 2-7 contain species lists.

For analysis purpose the GEMPAC has developed draft definitions for the retention of species under an EM program. The draft definitions were developed based on existing descriptions for maximized and optimized retention options developed in previous GEMPAC reports and adopted by the Council in November 2013. Both definitions contain the same existing regulatory requirements and discard exceptions.

2.5.1 Option A: Maximize Retention

Definition: A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species).

- No selective discard for catch share species, non-catch share groundfish species
- No selective discard for non-groundfish species
- Allow selective discard of trash, mud coral, etc.
- Require selective discards of prohibited species (except whiting trips);
- Require selective discards of ESA and MMPA species (i.e., protected species).
- Non-selective discard for e.g., safety, "bleeding net", zipper accidentally opened, fish came off hook, gilled in net

The following regulatory requirements or discard exceptions apply:

Existing Regulatory Requirements
Vessels must discard prohibited, ESA-listed, and marine mammal species unless otherwise allowed to retain them by regulation or under federal exemption for scientific purposes. The following regulatory requirements apply:

- Mid-water trawl IFQ trips for whiting that deliver to shoreside processors must retain prohibited species (halibut, salmon, and Dungeness crab) unless sorting at sea.
- Mid-water trawl catcher vessels delivering to motherships must retain prohibited species

(halibut, salmon, and Dungeness crab).

- Midwater trawl whiting trips that are unsorted may discard minor amounts of catch not delivered to shoreside or mothership processors. (current regulation**: "**Maximized retention vessels participating in the Pacific whiting IFQ fishery may discard minor operational amounts of catch at sea if the observer has accounted for the discard (i.e., a maximized retention fishery).")
- For LE fixed gear 22 or 24 inch lingcod must be discarded or if the vessel exceeds their non-IFQ trip limit; i.e Regulatory discards. (The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42^{o} N. lat. and 24 inches (61 cm) total length South of 42^{o} N. lat.) **This information would need to be verifiable under an EM system.**

Discard exceptions when fishing under maximized retention - All discards must be enumerated and reported

- The vessel may discard for safety reasons.
- The trawl net is ripped or zipper accidentally opened, or fish fell off hook.
- Fish washed out of the trawl net or is overflowing.
- Vessels may discard mud, sponges, coral, inverts, and inorganic material not generally retained for sale or use.

2.5.2 Option B: Optimize Retention Retain Catch Share Species with Limited Discard Options

The GEMPAC discussed fishery specific discard options under an optimized retention regulatory environment. The definition for optimized retention contains some fishery specific discard options, however it is difficult for the GEMPAC to select which species are appropriate for allowable discard since species identification issues while using EM limit the options. PSMFC has begun to identify species that may be identifiable for discard and further analysis of these options will need be conducted to assist the Council in choosing an initial species list that is specific to each fishery.

Definition: A vessel is generally required to retain all catch share species but may be allowed fishery specific selective discard options of some catch share, non-catch share, and groundfish species if verifiable with EM.

The following regulatory requirements and discard exceptions:

*Existing Regulatory Requirements (**Same as Maximized Retention**)*
Vessels must discard prohibited, ESA-listed, and marine mammal species unless otherwise allowed by regulation or under federal exemption for scientific purposes. The following regulatory requirements apply:

- Mid-water trawl IFQ trips for whiting that deliver to shoreside processors must retain prohibited species (halibut, salmon, and Dungeness crab) unless sorting at sea.
- Mid-water trawl catcher vessels delivering to motherships must retain prohibited species (halibut, salmon, and Dungeness crab).
- Midwater trawl whiting trips that are unsorted may discard minor amounts (**define?**) of

catch not delivered to shoreside processors.

- For LE fixed gear 22 or 24 inch lingcod must be discarded or if the vessel exceeds their non-IFQ trip limit; i.e Regulatory discards. (The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42° N. lat. and 24 inches (61 cm) total length South of 42° N. lat.) T**his information would need to be verifiable under an EM system.**

*Discard exceptions when fishing under maximized retention - All discards must be enumerated and reported (**Same as Maximized Retention**)*

- The vessel may discard for safety reasons (**define?**)
- The trawl net is ripped or zipper accidentally opened, or fish fell off hook.
- Fish washed out of the trawl net or is overflowing
- Vessels may discard mud, sponges, coral, inverts, and inorganic material not generally retained for sale or use.

***Potential Gear Specific Sub-options under Optimized Retention**:*
This information would need to be verifiable under an EM system. Options here are not mutually exclusive; however, there must be adequate images for species identification and weight estimates of catch share species discards.

Midwater trawl non-whiting trips, bottomtrawl, and fixed gear trips may discard the following species if verifiable under the EM program and approved by NMFS:

a) For catch share species
   Option a – Allow discard of flatfish
   Option b – Allow discard of lingcod and sablefish
   Option c – Allow discard of all non-rockfish groundfish (full retention of rockfish only)
   Option d – Allow discard if species that are verifiable with EM

b) For non-catch share groundfish species
   Option c – Allow discard of all non-rockfish groundfish (full retention of rockfish only)
   Option d – Allow discard if species that are verifiable with EM

c) For non-groundfish (Non-FMP and not prohibited species)
   Option e – Allow discard of all non-groundfish species
   Option d – Allow discard if species that are verifiable with EM

2.5.3 Option C: Discard At Will (Status Quo)

Vessels would be allowed to fish in the same manner as they currently do and may discard any species or be required to retain species according to current regulations.

- May discard any species unless regulations require you to retain them
- May discard catch share species, non-catch share species
- May discard non-groundfish
- Allow selective discard of trash, mud coral, etc.
- Require selective discards of prohibited species (except whiting trips);
- Require discards of ESA and MMPA species (i.e., protected species).

Table 2-5. IFQ program and Non-IFQ groundfish species groups that are noted in section 2.5 as potential discards. Source regulations are noted in each list.

Catch share species (IFQ program groundfish species, From: 660.140(c)(1))	**Non-catch share species** **(Non-IFQ Groundfish Species From: Table 1 and 2 to Part 660, Subpart D -- Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances for non-IFQ Species and Pacific Whiting North and South of 40°10' N. Lat.)**
ROUNDFISH	Minor nearshore rockfish & Black rockfish
Lingcod N. of 40°10’ N. lat.	Cabezon
Lingcod S. of 40°10’ N. lat.	Shortbelly
Pacific cod	Spiny dogfish
Pacific whiting	Longnose skate
Sablefish N. of 36° N. lat.	Longspine thornyhead South of 34°27' N. lat.
Sablefish S. of 36° N. lat.	Minor nearshore rockfish & Black rockfish
FLATFISH	California scorpionfish
	Other Fish (sharks (except spiny dogfish), skates (except longnose skate), ratfish, morids, grenadiers, and kelp greenling).
Arrowtooth flounder	
Dover sole	
English sole	
Other flatfish stock complex	
Petrale sole	
Starry flounder	
Pacific halibut (IBQ) N. of 40°10' N. lat.	
ROCKFISH	
Bocaccio S. of 40°10' N. lat.	
Canary rockfish	
Chilipepper S. of 40°10' N. lat.	
Cowcod S. of 40°10' N. lat.	
Darkblotched rockfish	
Longspine thornyhead N. of 34°27' N. lat.	
Minor shelf rockfish complex N. of 40°10' N. lat.	
Minor shelf rockfish complex S. of 40°10' N. lat.	
Minor slope rockfish complex N. of 40°10' N. lat.	
Minor slope rockfish complex S. of 40°10' N. lat.	
Pacific ocean perch N. of 40°10' N. lat.	
Shortspine thornyhead N. of 34°27' N. lat.	
Shortspine thornyhead S. of 34°27' N. lat.	
Splitnose rockfish S. of 40°10' N. lat.	
Widow rockfish	
Yelloweye rockfish	
Yellowtail rockfish N. of 40°10' N. lat.	

Table 2-6. Co-op program groundfish species lists noted section 2.5 as potential discards.

Catch share species (Co-op groundfish species formally allocated, From: MS Co-op program species, 660.150(c)(1)(i))	
Pacific whiting Canary rockfish Darkblotched rockfish	Pacific Ocean perch Widow rockfish
Non-catch share species (At-Sea Whiting Fishery Annual Set-Asides, 2013, From Table 1d. To Part 660, Subpart C)	
Arrowtooth Flounder BOCACCIO, S. of 40°10 N. lat. Chilipepper, S. of 40°10 N. lat. COWCOD, S. of 40°10 N. lat. Dover Sole, Coastwide English Sole, Coastwide Lingcod, N. of 40°10 N. lat. 15 Lingcod, S. of 40°10 N. lat. Longnose Skate, Coastwide Longspine Thornyhead, N. of 34°27 N. lat. Longspine Thornyhead, S. of 34°27 N. lat. Minor Nearshore Rockfish, N. of 40°10 N. lat. Minor Nearshore Rockfish, S. of 40°10 N. lat. Minor Shelf Rockfish, N. of 40°10 N. lat. Minor Shelf Rockfish, S. of 40°10 N. lat.	Minor Slope Rockfish, N. of 40°10 N. lat. Minor Slope Rockfish, S. of 40°10 N. lat. Other Fish, Coastwide Other Flatfish, Coastwide Pacific Cod, Coastwide Pacific Halibut, Coastwide Petrale Sole, Coastwide Sablefish, N. of 36° N. lat. Sablefish, S. of 36° N. lat. Shortspine Thornyhead, N. of 34°27 N. lat. Shortspine Thornyhead, S. of 34°27 N. lat. Starry Flounder, Coastwide YELLOWEYE, Coastwide Yellowtail, N. of 40°10 N. lat.

Table 2-7. ESA-listed species that may be found in the area of operation for groundfish fisheries.

ESA Species	
Green sturgeon *(Acipenser medirostris)*	Southern Resident killer whales *(Orcinus orca)*
Eulachon *(Thaleichthys pacificus)*	Guadalupe fur seals *(Arctocephalus townsendi)*
Humpback whales (*Megaptera novaeangliae*)	Green sea turtles *(Chelonia mydas)*
Steller sea lions *(Eumetopiasjubatus)*	Olive ridley sea turtles *(Lepidochelys olivacea)*
Leatherback sea turtles (*Dermochelys coriacea*)	Loggerhead sea turtles (Carretta carretta)
Sei whales *(Balaenoptera borealis)*	Short-tailed albatross *(Phoebastria albatnfs)*

North Pacific Right whales *(Eubalaenajaponica)* Blue whales *(Balaenoptera musculus)* Fin whales *(Balaenoptera physalus)* Sperm whales *(Physter macrocephalus)*	Marbled murrelet *(Brachyramphus marmoratus)* Southern sea otter *(Enhydra lutris nereis)* California least tern (*Sterna antil/arum browni*)

2.6 Halibut Retention/Discard with Fishery Specific Options

Pacific Halibut Data Collection in the Shore-delivery IFQ Fishery
The WCGOP designed sampling methodologies that help ensure P. halibut mortality can be estimated, regardless of the limitations imposed by the vessel, catch composition, or catch quantity. Three pieces of information are necessary to estimate Pacific halibut mortality (also see Table 2-1, Section 2.6):
1. A count of individual P. halibut in the haul or sample
2. Actual or visual length measurements (cm)
3. A viability obtained by physical assessment of individual P. halibut using IPHC designed dichotomous keys that relate the physical condition of the fish to a viability code (NWFSC 2013). A unique key is used for each gear type (trawl, longline, pot).

Observers could sample all or a subset of P. halibut caught in a haul/set. The proportion of P. halibut sampled is based on the number of P. halibut caught in the haul/set, the level of assistance provided by the crew, as well as other variables (e.g., physical space, time of day, weather). Sampling and assessment of P. halibut is dependent on crew assistance and cooperation. Regulations prohibit vessel crew from discarding any P. halibut without first notifying the observer. The vessel crew must comply with any and all requests by the observer to ensure proper P. halibut sampling, including but not limited to: modifying P. halibut sorting procedures, assisting the observer by delivering the P. halibut to the observer, and modifying operations to ensure P. halibut sampling is completed. Table 2-8 describes the P. halibut data obtained on IFQ-permitted vessels fishing different gear types.

Table 2-8. Data collected from Pacific halibut caught on IFQ vessels using different types of gear. Viability is assessed at the point of fish release when returned to sea.

Gear	Count	Length Measurement	Viability
Bottom trawl	all in the haul	actual, all or subset	yes
Midwater trawl	all in the haul	actual, all or subset	yes
Pot	all in sampled portion	actual, all or subset	yes
Hook -and- line	all in sampled portion	visual, all or subset	no

The Council had specific questions regarding the options for the retention or discard of halibut in each fishery. The GEMPAC developed fishery specific options and took into account the existing regulatory requirements, the current process for viability assessments that are normally conducted by observers, and discard mortality estimations that are applied to each type of gear. IPHC provides the mortality "keys" by fishing gear type that observers use to determine mortality of pacific halibut. The IPHC also determines what mortality rates apply to the different viabilities (Excellent, Poor, Dead for trawl and pot or Minor, Moderate, Severe, Dead for hook and line). The IPHC also has sector specific average mortality rates (i.e., longline and pot). Vessel or sector specific mortality rates based on data from the catch share program could be developed by the WCGOP.

The following gear specific options need to be examined for feasibility and IPHC may need to approve certain options. Council staff and NMFS will work with the IPHC to examine potential changes to halibut mortality assessment methods and the use of sector or vessel specific mortality rates.

For midwater trawl whiting:
Since the fishery is already a maximized retention fishery and all catch is allowed to be retained and landed, all halibut would be considered dead (100% mortality). Current regulations allow fishermen to sort whiting at sea, and if a fishermen chose to do so, would be required to discard halibut. The GEMPAC and GEMTAC believe that sorting at-sea does not occur so only one option was developed for the EM program. If the impact analysis reveals that another option is needed, Council staff will consult the GEMPAC.

For bottom trawl and non-whiting midwater trawl gear:
Option A: Use IPHC mortality rate for specific gear type: 90% mortality if discarded.
Option B: WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet
Option C: IPHC exemption to allow full retention (need to examine the feasibility of this option)
Option D: Captain and crew provide assessment (training would be required)
Option E: Use an appropriate EM viability assessment (currently conducting study, need IPHC approval)
Option F: Use vessel specific mortality rate (update rates periodically)

For Fixed gear:
Option A: Use WCGOP mortality rate for specific gear type: 16% mortality if discarded from longline; 18% mortality rate if discarded from pots.
Option B - Option F: same as bottom trawl and non-whiting midwater trawl gear

2.7 Discard Species List Adjustments

In the future, it's expected that recognition software programs may assist in further refinement or expansion of a species discard list under an optimized retention regulatory environment. During the GEMPAC discussions the group identified that a process to update the species discard list to accommodate advances in fish identification technology or an increase in the ability to identify more species using video review. The development of a species discard list for each fishery is a difficult task and changing technology may allow expansion of these lists after their initial creation. Each fishery will likely have a specific species discard lists. In the future, recognition software may be further developed or regulatory actions could provide the option to expand or change the species lists, therefore; a process that is efficient and flexible to change the list should be developed. Therefore a new component was added to the EM program options.

The GEMPAC identified three options to account for technological changes and to streamline the revision of species discard lists for an EM program:

Option 1: NMFS to make determination and provide list to fishers through the NMFS EM Observer Exemption Process.
Option 2: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).
Option 3: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.

2.8 Vessel Operation Provisions

The following sections discuss provisions that relate to vessel operations and include approval and application processes, and EM system requirements.

2.8.1 Observer Exemption Process

Since observer coverage is mandatory under the IFQ program, participants would need to initially apply for an exemption from NMFS to use EM and then demonstrate they are complying with the standards and practices of its use to continue using EM. Therefore, both initial eligibility criteria and continued eligibility criteria are needed. Since EM use would be a privilege, participants must show they are diligently and effectively using the system to monitor their activity. If vessels do not comply, then the privilege may be revoked and the vessel would be required to use a human observer to monitor their activity. The requirement to be in compliance would provide an administrative incentive for proper use of EM.

The following sections describe potential observer exemption process, eligibility for using EM, IVMP requirements, duration of effectiveness of the IVMP, and participant's requirements to declare when a vessel will use EM. As appropriate, regulations will be specific or performance based for the proposed criteria

2.8.2 **Eligibility for Camera Use**

Under the proposed EM program, participants would need to eligible to use EM. Participants would need to apply for an exemption from the existing observer requirement for all IFQ trips. Participants would need to meet certain "eligibility requirements" and NMFS would review the application for approval. The application would also include a NMFS approved individual vessel monitoring plan (IVMP, See Section 2.8.3).

2.8.2.1 Initial eligibility criteria:

1. Limited entry groundfish trawl permit
2. Quota share permit
3. No IFQ deficits
4. No civil penalties related to fishing activity exceeding a certain amount and timeframe
5. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP)
   a. IVMP unique for each vessel
   b. Multiple IVMPs included if submitted by group of vessels
6. Self-Governing Plan
   a. Data Delivery and Analysis (DDA) specifications
   b. submitted by either a group of vessels or an individual vessel

2.8.2.2 Continued eligibility:

1. Participants must be in compliance with their IVMP
2. Demonstrate proper documentation of the discards in logbooks or on video
3. No civil penalties related to fishing activity exceeding a certain amount within the time period of EM use

2.8.2.3 Self-Governing Plan Elements

If applicable, the following information would also be necessary.

Group Self-Governing Agreement (not inclusive of all elements)

a. Comply with all Federal and State Regulations
b. Retention / Discard Requirements
c. Time and Area Restrictions
d. Data Collection Equipment Criteria
e. Data Collection Requirements
f. Data Analysis Agreement Clause
g. Discard Assessment Protocols and Procedures
h. Vessel / Operator Performance Standards
i. Vessel / Operator Responsibility
j. Compliance Criteria
   i. By Example: escalation of consequences (to be defined by group)

   ii. No Further use of Camera Use Alternative Criteria
k. Escape Clause

Individual Self-Governing Agreement (not inclusive of all elements)

a. Comply with all Federal and State Regulations
b. Retention / Discard Requirements
c. Time and Area Restrictions
d. Data Collection Equipment Criteria
e. Data Collection Requirements
f. Data Analysis Agreement Clause
g. Discard Assessment Protocols and Procedures
h. Vessel / Operator Performance Standards
i. Vessel / Operator Responsibility
j. Compliance Criteria
   i. By Example: fail to demonstrate compliance, vessel must use observer for rest of the year.
k. Escape Clause

2.8.3 Application Approval and Required Information

Applicants would need to follow specific regulations and provide adequate information for NMFS to evaluate the Observer Exemption application. If NMFS deems the application incomplete, it would provide the applicant an opportunity to revise it appropriately. Specifics regarding denial of an exemption would be provided on a case by case basis but the decision would likely be based on set standards that would be developed. This process is identified as a NMFS process; therefore, the standards would likely involve a Council deeming process (see Section 2.11).

1. Operational Information
   a. Installation by certified EMS Provider
   b. EMS service provider responsibilities
   c. Data Confidentiality Standards
   d. Data Storage and Delivery Standards
   e. EMS Coverage Requirements
   f. Monitoring Requirements
   g. Vessel Responsibilities

2. Data Sources
   a. Digital Camera(s)
   b. Winch Sensors
   c. Hydraulic Sensors
   d. Log Book
   e. VMS
   f. GPS

3. EM Data Standards
    a. Secure Watertight Control Box Data Storage
    b. Encrypted Data
    c. Storage Standards
    d. Date and Time Stamp and Counter
    e. Digital File Format
    f. Minimum Frame Rate
    g. Minimum Resolution
    h. Accepted Delivery Methods
    i. Time Frames
    j. Color Optics
    k. Lighting Standards
    l. Power Supply Standards

2.8.4 EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)

IVMPs would play a major role as part of the EM program. These plans would help facilitate an effective program and serve as a clear plan for discard documentation, installation and maintenance of an EM system, protocols for data storage and transfer, among other things.

2.8.4.1 IVMP requirements

Each vessel operator/owner would be responsible for developing an IVMP for the vessel and acquiring the needed approval from NMFS. An IVMP that is approved by NMFS would be part of the Observer Exemption Criteria. NMFS would specify IVMP requirements in regulation. This process is identified as a NMFS process; therefore, the standards would likely involve a Council deeming process (see Section 2.11). A general list of categories of information that would be included in the IVMP is provided here.

Potential categories of information in an IVMP:
a) Type of system
b) Hardware
c) Software
d) Emergency protocols
e) Back-up equipment use protocols
f) Catch handling protocols
g) Layout of vessel
h) Screen shots of all camera views
i) Number of cameras needed with placement specifications
j) Care and maintenance of the EM system
k) Types of sensors and data for sensors to capture
l) Download/maintenance schedule
m) Logbook format (electronic or paper)
n) Tamper Resistant/Taper Evident

o) Lighting Locations (Stern, Deck, Discard Shoot, etc.)
p) Bridge Mounted Computer Interface/Monitors
q) GPS Receiver
r) Winch Sensors
s) Hydraulic Pressure Transducers
t) Power Supply / Backup
u) Wire Runs
v) Geo Fencing (NMFS supplied)
w) System's Check Certification
x) Data logger

2.8.5 EM Vessel Operational Plan - IVMP Expiration

The duration of the IVMP effectiveness must be determined; however, modifications may be necessary. For example, to accommodate changes in fishing practices, changes in fish handing protocols to obtain better information, or protocols for data handling. If modifications to the IVMP are necessary, changes must be made in agreement between the vessel representative and the EM provider. Such changes may require re-approval by NMFS; therefore, criteria that trigger re-approval will need to be developed.

Three options have been identified:
Option A – No Expiration unless modifications are made

- Approval of plans by NMFS
- Plan modification provisions: (NMFS to decide how this is done)
    1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes)
    2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)

Option B – Annual Expiration or if modifications are made
Same as Option A but with annual expiration

Option C – Indefinite or if modifications are made (example 2 or 3 year duration)
Same as Option A but with indefinite expiration

2.8.6 Declaration of EM Use

Agencies and contractors (i.e., NMFS, PSMFC, EM providers, enforcement, states, and observer providers) will need to know the level of participation for EM use. This will help determine employee workload needs (e.g., how many observers, video reviewers, or catch monitors are needed month to month or annually), scheduling data transfers, EM system maintenance needs, etc. In order to process the fisheries in an orderly way, IVMP must provide a "Declaration of EM Use" and specify when an EM system will be used and when the vessel would, if at all, need an observer for a specified period of time within fishing year.

Option A - Annual Declaration of Intent to Use EM (year around).

Option B - For the coming year, participants must indicate in which months, if any, it will use EM and in which months, if any, it will use an observer (e.g. quarterly). The IVMP would provide a description of the responsibility for vessel operator to notify NMFS, EM provider, and NMFS observer program when EM will be used and when observer will be used.

Option C - Trip by trip basis. Under this option, the vessel and the observer provider would need to schedule when observers are needed or available on a per trip basis. The IVMP would provide a description of the responsibility for vessel operator to notify NMFS, EM provider, and NMFS observer program when EM will be used and when observer will be used.

Exception for Emergency situations (e.g., camera broke so need an observer tomorrow, vice versa)

2.9 Equipment and Protocol Provisions

The success of an EM program relies on the ability to capture the data and process it in a timely manner. EM equipment that provides the necessary data for efficient processing and accurate review is critical. A type approval process will need to be developed by NMFS with the aid of current experience and technology. However, technology will change in the future so a process that incorporates the ability to change the standards for equipment use, data formats, and protocols for data transfer will need to be flexible.

2.9.1 EM Equipment Requirements

Although NMFS policy requests the use of open source software so that common platforms can use the data generated or multiple users can access data, the GEMPAC suggest allowing both open source and proprietary equipment and software be allowed if they meet the performance criteria. The following topics would need to be worked out with technical advisors and input from the industry.

2.9.1.1 Data formats:

Create a standardized data output that can be used by multiple users such as PSMFC and NMFS to analyze data or video without a cumbersome conversion process to access the data. This will need to be specified in the future with the advice of PSMFC, States, NMFS, and other technical advisors such as EM providers.

2.9.1.2 Video Hardware:

Image quality must be sufficient to allow clear identification of species or species categories being discarded. Performance standards need to be developed during implementation between NMFS, PSMFC, states, and contractors.

2.9.1.3 Logbook Data Source:

Allow either paper or electronic logbooks; however, electronic logbooks may increase efficiencies in the EM analysis.

2.9.1.4 On Vessel Data Storage:

Integrated and in a secure format (video hardware, sensor data, vessel location data, logbook data)

2.9.1.5 Onboard operations:

Topic examples:

a) Self check system to ensure proper functioning of EM system ("functionality test" within the EM system with a record that the test was performed)
b) EM system is powered on during entire trip, however cameras could be triggered to turn on at first hydraulic event and remain on for the duration of the trip.
c) Back-up equipment use protocols if EM unit or portions of it fail
d) Performance standards need to be developed during implementation between NMFS, PSMFC, states, and contractors.

2.9.2 Data Transfer Process

Protocols need to be established for data transfer. This is a critical component of the EM program since it involves the physical transfer of the data from the vessel to the video reviewer. The process of transferring the data could be electronically via a WiFi network or email or physically pulling a hard drive out of a computer modual and sending it in the mail or driving it from the port to the reviewer. Protocols may also vary based on the type of data being transferred (video, electronic log, or data logger). The method of transfer would be dependent on the amount and type of data being transferred. For example, electronic logbooks can be emailed but a hard drive with a terabyte of data would likely need to be pulled out of the EM system and physically transferred to the reviewer. The method of transfer that would be allowed under the EM program will be developed during implementation however some methods have been identified for use such as Wi-Fi, satellite signal, email, and thumb drives.

Data transfer protocols and frequency may vary by fishing sector. For example, mothership catcher vessels may seldom return to port. This would increase the volume of data to store and affect the frequency of data transfer. If the data transfer processes are to be included in the Council recommended policy then both generic provisions that apply to all vessels or all vessels of a sector, and individual provisions may need to be specified.

The choice of transfer method may drive costs of the program up or down. For example, email would incur minimal costs but hiring personnel to drive port to port to pull hardrives may incur significant costs and is dependent on the frequency of this activity.

Since the data could potentially be used in enforcement actions, data transfer protocols would have to address chain of custody and ensure the integrity of the data is not compromised. Typically the video data is encrypted by the EM provider and cannot be accessed or altered.

Several personnel options have been identified to provide the transfer data from the vessels to the reviewer.

(1) Vessel Operator
(2) Crew
(3) Shoreside catch monitor
(4) PSMFC
(5) EM Provider
(6) Contractor (hired by processor, port, or fisher)

2.9.3 Data Confidentiality/Accessibility/Ownership

All data collected in the EM system (e.g., video, logbooks, and applications) would be considered confidential according to the Magnus-Stevens Fishery Conservation and Management Act, NMFS internal confidentiality rules, and any new or revised rules that are proposed at this time (NMFS confidentiality Final Rule will be released in 2014). This includes access, ownership, and public dissemination of the information.

2.9.4 Video and Data Processing and Analysis

EM data processing would likely involve analysis of EM sensor, video data, and logbooks. The following is an outline of some of the considerations. Video review is a critical component of the EM program; therefore, entities that can perform this function must be identified and clearly defined methods for review and validation must be developed.

2.9.4.1 Video Review Process

The basic review process would include matching video segments with logbook discard events then verifying the discarded species and an estimated weight. Standard review protocols would need to be developed for each fishery and if compliance issues arise that require further review. It's possible that the protocol would need to include defining "audit units" that match fishing logs units (i.e., fishing events, transiting time periods to and from fishing grounds). For some fisheries fishing events are not clearly defined to facilitate an audit and may need to be developed during implementation between NMFS, PSMFC, and contractors.

Once a fishing trip is reviewed and the total discard is estimated, this information would need to be transferred to NMFS to debit a QP account. This information currently flows through PSMFC then to NMFS for final accounting. Since PSFMC manages the Pacific Fisheries Information Network this data flow protocol is expected to remain. However there may be efficiencies to consider if data is reviewed by an EM provider or a third party and transferred to PSMFC versus directly to NMFS.

The amount of video to review depends on the method chosen to monitor discards. For example, if a census of all video for a fishery is chosen then all video of discard events would be captured. If logbooks with audit is chosen, then a determination must be made as to how much video should be reviewed that would reduce the risk of missing discard activity to a level that is appropriate for IFQ accounting. What level of sampling is appropriate if sub-sampling the video for discard events and expanding the rate to the entire trip is used?

An analysis of this information can be found in Section 4, Impact Analysis of the Alternatives (analysis needs further development).

2.9.4.2 Video reviewers

Potential reviewers for discard events (not mutually exclusive):

Option A: NMFS
Option B: Pacific States Marine Fisheries Commission
Option C: EM Provider
Option D: Third Party

2.10 WCGOP Scientific Observations

The NMFS Northwest Fishery Science Center Fisheries Observation Science Program collects and analyzes critical fisheries data from U.S. West Coast fishing vessels. Independent field biologists known as observers are deployed aboard working fishing boats to collect this scientific data. While at sea, observers collect a variety of data on fishing operations, catch composition, and protected resources. They also collect biological samples from the catch. Staff provide logistical and scientific support, ensure data quality, and train observers. Our scientists also produce a variety of data products and reports to support fisheries management and the NOAA mission. Fishery scientists and managers depend on observer data and analysis for stock assessments, management decisions, in-season quota tracking, and scientific research.

2.10.1 Observer Programs

There are currently two Federal observer programs being operated by the NMFS Northwest Fishery Science Center in the Pacific coast groundfish fishery: Shorebased IFQ Program and the WCGOP.

These two programs are very different from each other particularly in how they are funded, the type of sampling and fishery data that are used to derive total catch, and availability of data for inseason management. Two types of funding mechanisms are currently used to fund observers: federally funded observers and third-party or “pay-as-you-go” observers. The WCGOP is federally funded and currently provides observer coverage in the LE and open access nonwhiting fisheries. Federal funds are used to run the program infrastructure (training, debriefing, and data management) and to hire, equip, insure, and transport observers. Third party providers are used to observe fishing activity under the Shorebased IFQ program and are funded by the fishery participant directly to the third party provider.

2.10.1.1 West Coast Groundfish Observer Program

The WCGOP is a year-round program that provides observers for all of the commercial groundfish fisheries . Because monitoring of the Pacific whiting shoreside sector has been carried out under EFPs, WCGOP observers have not been used to provide coverage for that sector. All WCGOP sampling protocols and coverage strategies are defined by NMFS. Because there are few observers relative to the number of vessels in the groundfish fishery, observer sampling coverage has focused on obtaining bycatch data at sea that can be combined with state fish ticket data to derive bycatch ratios for different fishing areas and target fishing strategies. Vessel logbook data are used to estimate fleetwide fishing effort. Using observer, fish ticket, and logbook data, the fishery is modeled to derive an estimate of total catch by species. Due to the delayed availability of fish ticket and logbook data, and the time needed to process observer data, the final analysis of estimated total catch by species is typically not finalized until well over one year after the fishing year has ended.

Observer coverage goals for the WCGOP are detailed in a coverage plan (NMFS 2006a). Observers initially covered about 10 percent of the west coast LE trawl fleet effort, selected via a stratified random sample. Trawl fleet coverage has since increased to about 25 percent and has also been expanded to include the LE fixed-gear and open access vessels.

2.10.1.2 IFQ Fisheries Observer Program

Third party providers are used to secure observers for IFQ fishing trips. These observers are trained in the same manner as those observers in the WCOP. The NMFS-permitted observer providers collect the fees directly from the vessels, recruit qualified individuals, provide insurance and benefits to the observers, deploy the observers, and ensure that the observer data are delivered to NMFS.

The IFQ Program requires 100% at-sea observer coverage, as all catch of IFQ species/species groups must be accounted for. The observer data is used to account for any IFQ discard, including the mandatory discarding of Pacific halibut. The observer data, in combination with landings data, will enable the fishermen to track their individual quotas and allow managers to monitor the progress of the fishery. Because both the discarded and the retained weights are estimates; the observed estimates of total catch contain some uncertainty.

Vessels that require observer coverage are:

- All whiting and non-whiting groundfish trawl and non-trawl vessels.

- All motherships participating in the at-sea whiting fishery.
- All mothership catcher-vessels participating in the at-sea whiting fishery.
- All catcher processors participating in the at-sea whiting fishery.

Under the IFQ program both observers (at sea) and catch monitors (at shoreside facilities) are used to monitor total catch. Observers are highly trained biologists that work independently aboard vessels to quantify total catch. They estimate bycatch, collect biological samples, and monitor for fishery interactions with marine mammals, sea turtles, and seabirds. A catch monitor is someone who is land-based at first receiver facilities and confirms that total landings are accurately sorted, weighed, and recorded on fish tickets (landing receipts).

Observers focus on scientific data collection at sea, while catch monitors ensure compliance with IFQ landed fish sorting requirements, and together they give NMFS a very accurate and complete picture of the fishing mortality in the IFQ program. First receivers must use an approved electronic fish ticket reporting software to and submit the data to Pacific States Marine Fisheries Commission.

Observers collect the following information:

- Fishing activity, including areas and depths fished, gear set, and retrieval times.
- Catch, such as how much of each species was discarded.
- Individual fish, including length, weight, and sex.
- Bycatch of protected species like marine mammals.

All IFQ catch is delivered to licensed first receivers. This can be a person or company that receives, purchases, or takes custody, control, or possession of catch onshore from a vessel that harvested fish under the IFQ Program (e.g., fish buyer station or processing plants). All buyers must hold a first receiver site license for each physical landing site. Site licenses are effective for one year from the date of issuance. First receivers currently holding a site license, must register prior to the ending date to continue to receive landings from the IFQ program. New first receivers must contact the Pacific States Marine Fisheries Commission to install electronic fish ticket software.

Each first receiver taking delivery of IFQ species is required to have a certified catch monitor present for the entire duration of the landing. Catch monitors are certified by NMFS and must meet responsibilities specified in the regulations at § 660.17. Once verified, catch monitors independently report catch data to the Pacific States Marine Fisheries Commission and NOAA Fisheries catch accounting databases. Catch monitors are available from approved observer providers. Catch monitors perform more of a compliance role than that of a biologist and are required to report any observations of suspected violations of regulations.
There are two types of duties for observers in the IFQ fishery, compliance observations and scientific observations. Compliance observations are needed to support catch and discard monitoring in the IFQ fishery to estimate total catch by a fishermen. Scientific observations are conducted to collect data to support stock assessments and estimate protected species interactions, amongst other things. If EM is used on IFQ trips and the observer is removed from the vessel without making other program adjustments, significant scientific information would be lost. A

continuous need exists for at least some level of scientific observer coverage to collect biological samples and other scientific data on EM trips.

2.10.2 Payment for Scientific data collection/observations

Previous to the IFQ program NMFS provided scientific data collection on roughly 20 percent of the limited entry trawl fleet. This cost was covered by the Government. Under an EM program scientific data collection will be needed from vessels without an observer. It's estimated that the WCGOP will sample roughly 20-30 percent of the EM fleet; however, these rates will need to be examined and a sampling scheme developed by NMFS in the future.

A funding source to continue this task under an EM program must be identified to support the WCGOP efforts. Three options were developed:

Option A: Government funded, same as pre IFQ
Option B: Industry Funded
Option C: Combination of both Government and Industry

2.11 NMFS Processes

While working through the development of the alternatives and options certain components or portions of the EM program were identified for NMFS to develop. For example, NMFS will need to set up an internal process to conduct a "type-approval" process that authorizes vessels to use certain EM equipment on a vessel, and set up a process for applicants to submit an "Observer Exemption Application" to request use of EM in lieu of an observer.

A list of processes are identified here; however it's expected that some of the development will be done in consultation with the GEMPAC or other technical advisors. In addition, regulations will need to be developed to provide specific guidance to fishermen and EM providers, or observer providers (e.g., fill out applications, make changes to individual vessel monitoring plans, or for compliance with program rules). The development of these processes and associated regulations would likely involve a Council deeming process for the Council to review the draft regulations before they go into the proposed rule stage. Approval from the Office of Management and Budget for the collection of information under the Paperwork Reduction Act (PRA) will be needed when appropriate and are preliminarily identified in the list below. The list may be updated as the decision document is developed and the impact analysis expanded.

- Observer Exemption Process (including an application for fishermen, PRA)
- Individual Vessel Monitoring Plan Approval (including a form for submission to NMFS for review, PRA)
- Equipment Type Approval (including a list of specifications for EM providers to accommodate, PRA)

- Approved EM Provider List (including a list of specific criteria for providers to demonstrate their capability and standards, PRA)
- Eligibility Criteria (Initial and Continued)
- Declaration Process to Use EM (possibly including port hail in/out process, PRA)
- Confidentiality Rules (if different from status quo)
- WCGOP Scientific Observation Sampling Scheme

2.12 Spatial Variation for High Bycatch Areas

This option could be applied to allow the use of EM based on ocean areas that are known for high or low bycatch. Under these options, the areas need to be identified and designed for explicit use of EM or would use preexisting areas such as the Rockfish Conservation Area or Essential Fish Habitats.

Option A - No special provisions

Option B - Under this option, fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers. Vessels would declare their fishing area prior to departure and be required to follow the appropriate fishing protocols for that area.

Option C - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required. The level of review would need to be determined.

The GEMPAC understand the possible utility of this type of management, however; this type of spatial management may add too much complexity to the management of the IFQ fishery and would require identifying additional management areas which in turn may be difficult and costly to manage.

Therefore, the GEMPAC recommends removal of Option B and C for spatial management options.

2.13 Adaptive or Phased Implementation

Implementation of an EM program could be done for all fisheries at one time through regulation (Option 1). However, there may be other options. Implementation of an EM program could be done through a pilot program using an Exempted Fishing Permit (ESP.) (Option 2). For example, an EM program may be developed for a fishery, and then implemented on a temporary basis through an EFP to identify issues and improve the program before it is implemented full scale for a particular fishery or all fisheries. It could also be done through a "phased-in" approach. For example, if development of an EM monitoring program (i.e., regulations, camera system, EM providers, review process, accounting protocols, enforcement, etc.) is ready for use in the mid- water trawl fishery then NMFS could implement the program by regulation before other EM programs are fully developed for use in other fisheries such at the bottom trawl (Option 3).

Another approach would be to implement an EM program based on retention rules (Option 4), starting with any gear types that are willing to fish under a maximized retention type fishery (See Alternative 2 in Section 2.5 for a description of a maximize retention fishery). For example, bottom trawl and non-whiting mid-water trawl vessels that are willing to retain and land all fish (excluding prohibited species and ESA/MMPA species) would be allowed to use EM. Then, as EM capabilities improve to provide verifiable species identification (for example distinguishing aurora rockfish from rough eye rockfish), the EM program could be expanded to include other discard options. A list of species that are shown to be verifiable with EM would need to be developed over time.

Implementation could be organized in a number of ways.
Option A. None, implement all fisheries at one time through regulatory implementation
Option B. Use EFPs to test final Council policy, prior to full regulatory implementation.
Option C. Phase in by sector/gear.
Option D. Phase in retention options over time, start with maximize retention fisheries and move to other retention rules as reliable technologies for speciation are developed.
Options B-D are not mutually exclusive.

2.14 Alternatives Considered but Eliminated from the Detailed Analysis

The following topics were discussed during the public scoping process; however the Council eliminated them from further consideration and not analyzed in this document. An explanation is provided under each topic.

2.14.1 Mandatory Use of an EM program

Under this option, all participants in the Shoreside IFQ program would be required to use EM. No human observers would be used to monitor for compliance with IFQs, IBQs, or catch allocations. Making the EM program mandatory was considered during the public scoping; however, it was not further analyzed in this EA because some participants may not want to use EM and only want a human observer. If the system breaks down vessel would not be able to fish until the system is working. This could delay fishing activity until a technician can repair the system. This limits vessels options and can monetarily impact a vessel significantly depending on the amount of time the vessel is tied up, the target species, and the price of fish.

2.14.2 Full retention of All Catch

Under this option, vessels would be required to retain all retain all catch share species and non-catch share groundfish species for the IFQ and co-op fisheries (see **Table 2-5** and **Table 2-6**, respectively), non-groundfish species, prohibited species; ESA species (Table 2-7); and MMPA species. Vessels would not be allowed to discard species for safety reasons, bleeding nets or any other reason.

This option was considered impractical and potentially dangerous. Vessels would not be able to retain marine mammals or ESA listed species unless instructed to do so through a Federal exemption. Although exemptions can be made, it's typically done for special cases and research purposes. In addition, retaining large marine organisms is not possible or safe in some cases. Also, trying to capture fish they may have accidentally been released would be impractical and by not allowing vessels to discard fish for safety reasons could endanger vessel crew.

2.14.3 No declaration of EM use

Under this option, vessels would not be require to declare to appropriate agencies and contractors their intention to use EM. This option was not further analyzed because federal and non-federal agencies, EM providers, observer providers and enforcement need this information for budgetary and labor planning purposes.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter describes the Pacific Coast groundfish fishery and the resources that would be affected by the alternative action. Physical resources are discussed in Chapter 3.2, biological resources are described in Chapter 3.3, and socio-economic resources are described in Chapter 3.3. Rather than repeat information detailed in the other NEPA documents, the information has been summarized in this document and the reader is referred to the appropriate sections in the other NEPA documents for further detail.

3.1 Action Area and Physical Characteristics of the Affected Environment

The action area is the state and federal waters of the U.S. and includes the shoreline out to the 200 nautical mile line of the U.S. Exclusive Economic Zone. The area of operation of the Pacific Coast groundfish fishery is within this area (Figure 3-1).

Figure 3-1. Fishery management lines on the U.S. west coast. Source: PFMC 2014, SAFE.

3.2 Biological Characteristics of the Affected Environment

3.3 Socio-Economic Characteristics of the Affected Environment

3.3.1 Landings, Revenue, and Participation

Section 3.2 in the 2015-16 Groundfish Harvest Specifications FEIS (as well as EISs for earlier biennial periods) describes commercial fisheries targeting groundfish and characterizes west coast fishing communities with respect to groundfish fisheries. Section 3.2.1 of the FEIS describes revenue trends for commercially important groundfish. That information is incorporated by reference here. The 2014 Groundfish SAFE document contains a series of tables summarizing landings and ex-vessel revenue in groundfish fisheries, landings and revenue by port, and indicators of fishery participation. These data may be summarized here to highlight current fishery trends. Both long-term historical landings, revenue, and price data (the full PacFIN database time series) and a recent a 10-year baseline period of 2003-2012 are used to characterize fisheries and communities.

Table 3-1 shows the share of landings and inflation-adjusted ex-vessel revenue by groundfish fishery sector (IFQ, whiting catcher processor, and whiting mothership) for the 2012 baseline period.

Table 3-1. Exvessel revenue and total pounds landed in 2012 by month and fishery sector.

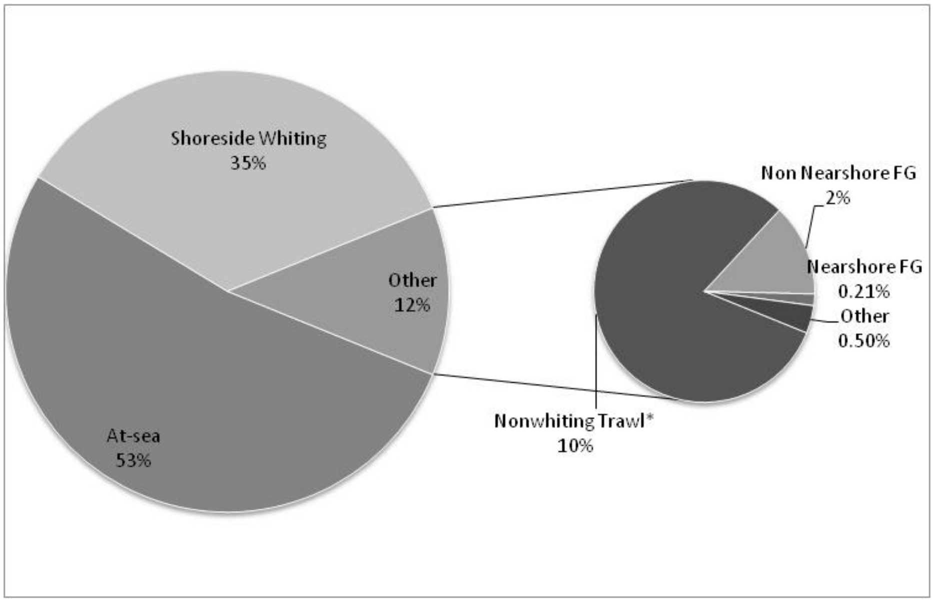
Key IFQ = Individual Fishing Quota, CP = Catcher processor or CP, and Mothership or MS.

Year	Month	IFQ lbs.	IFQ rev.	CP lbs.	CP value	MS lbs.	MS value
2012	Jan	1,491,862	1,141,585	0	0	0	0
2012	Feb	2,395,897	1,639,885	0	0	0	0
2012	Mar	3,329,906	2,110,348	0	0	0	0
2012	Apr	4,954,879	2,844,151	0	0	0	0
2012	May	4,265,175	2,236,024	44,844,730	6,329,660	9,390,741	1,325,467
2012	Jun	13,934,687	3,411,107	0	0	6,049,386	922,719
2012	Jul	26,469,461	5,863,888	0	0	1,097,743	167,691
2012	Aug	36,519,674	7,520,641	8,223,969	1,251,804	4,642,409	744,548
2012	Sep	26,705,062	6,256,446	35,760,005	4,935,301	12,818,454	1,721,627
2012	Oct	35,277,242	7,111,834	32,687,073	4,246,301	47,645,273	6,213,841
2012	Nov	25,327,203	5,737,083	0	0	2,850,173	357,770
2012	Dec	4,049,970	2,309,175	0	0	0	0
2012	**Sum**	184,721,018	**48,182,167**	121,515,776	**16,763,066**	84,494,178	**11,453,663**

Source: Cost Recovery Annual Report, NMFS 2014

Pacific whiting fisheries dominate in terms of landings, accounting for 88% of the total. However, because whiting fetches a low price per pound, those sectors accounted for only 39% of inflation-adjusted ex-vessel revenue. Non-whiting trawl/shoreside IFQ accounts for the next largest share of landings and revenue, 10% and 34% respectively. Fixed gear landings fetch a relatively higher price so while those sectors accounted for only a little more than 2% of landings, they garnered a quarter of groundfish revenue, primarily in the non nearshore sector that targets sablefish.

Figure 3-2 shows revenue trends for groundfish sectors over the baseline period. Revenues have been more stable for nonwhiting sectors compared to whiting. One way of assessing variability is the coefficient of variation (the standard deviation divided by the mean). The values for the sectors (over the baseline period) shown in the figure are as follows: nonwhiting trawl (including non-trawl IFQ in 2011-2012): 0.131; shoreside whiting trawl: 0.584; non nearshore fixed gear: 0.269; nearshore fixed gear 0.074; at-sea catcher-processors: 0.503; at-sea mothership catcher vessels: 0.551.



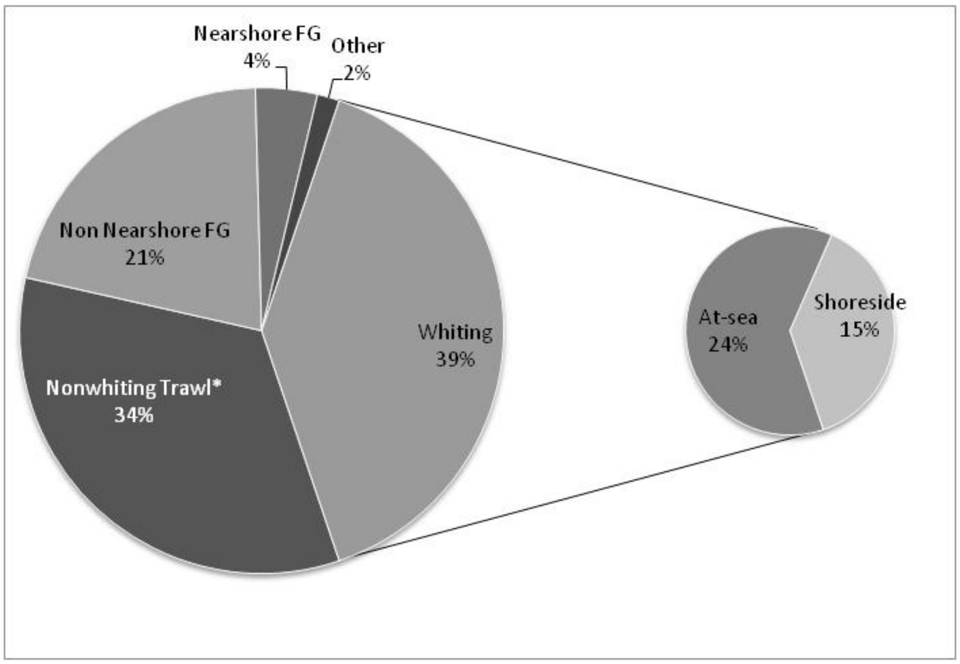


Figure 3-2. Share of groundfish landings (top) and inflation adjusted ex-vessel revenue (bottom) by fishery sector, 2003-2012. Source: *2011-2012 non-whiting trawl includes IFQ non-trawl landings. SAFE Tables 12a-b and 14a-b

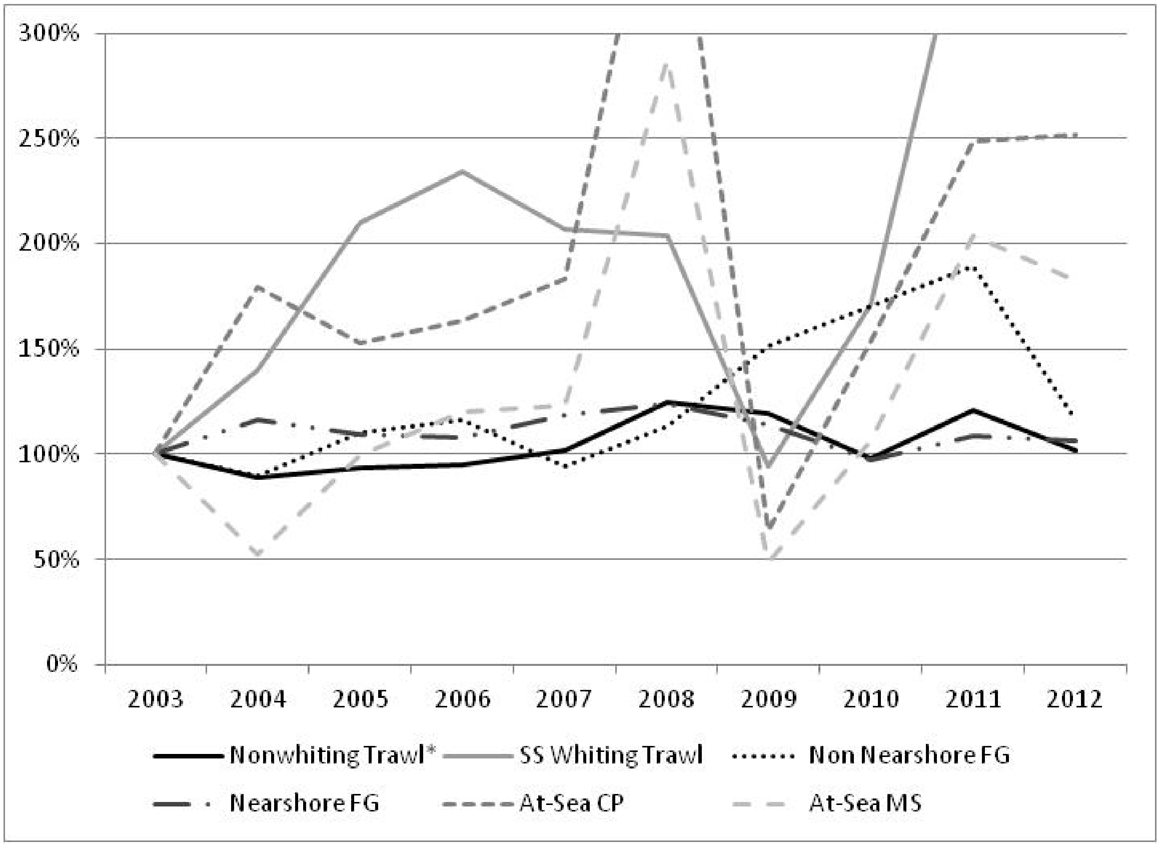


Figure 3-3. Ex-vessel revenue trends (inflation adjusted, 2012, from groundfish only) for groundfish fishery sectors, 2003-2013; 2003=100. *Nonwhiting trawl includes non-trawl IFQ in 2011-2012. Value outside figure scale (>300%): 2008 at-sea CP whiting 408%, 2011shoreside whiting 342%. Source: SAFE Tables 12b and 14b.

CHAPTER 4 IMPACT ANALYSIS OF THE ALTERNATIVES

The terms "effect" and "impact" are used synonymously under NEPA. Impacts include effects on the environment that are ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Direct effects are caused by the action itself and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Cumulative impacts are those impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Sections 4.1 through 4.3 of this document discuss the direct and indirect impacts on the physical, biological, and socio-economic environment that are likely to occur under each of the proposed alternatives, including the Status Quo alternative. Section 4.4 presents the reasonably foreseeable cumulative effects of the environment from the proposed alternatives.

4.1 Effects on the Physical Environment

Alternatives 2 and 3 would implement an EM program that is a general framework for each fishery. There are several options to choose from within the alternatives that can be specific for each IFQ gear sector and may be appropriate for one sector and not the other. However, each alternative and options selected with those alternatives are unlikely to have a significant direct impact on fishing activities. Although the range of options include maximized retention to discarding fish species at will, all fish (except halibut, lingcod, and sablefish) are considered dead.

Landing more fish that are undesirable by the fish processors (under maximized retention) may have an impact on processing plants financially through additional handling and trucking of fish. Additional costs to dispose of fish may be passed on to fishermen or born by the processing facility. It’s possible that fish meal may be utilized in other ways to help off-set the cost of trucking and handling the surplus of fish that are generally unmarketable.

Impacts to essential fish habitat (EFH) or marine habitats are not expected to change as a result of the proposed actions since fishing practices and areas fished are not expected to change significantly. Fishing practices (number of hooks, pots, trips, set/hauls) are not expected to significantly change under all options using EM. Fish handling on deck may take more time under all retention options to accurately identify and estimate species weights before they are discarded. Under the option to allow EM in low bycatch areas (Spatial Management Sub-option 1) or higher review of EM video in areas with high bycatch (Spatial Management Sub-option 2) could change areas fished by the fleets if they chose to fish in areas with low bycatch or chose to avoid high by catch areas. Generally fishermen already try to fish in low bycatch areas or avoid high bycatch areas. A significant amount of analysis would be needed to identify these management areas as well as monitoring activity within them. These sub-options could create more complexity in management. None of the remaining alternatives or options are expected to alter areas currently fished by all fisheries.

4.2 Effects on the Biological Environment

Effects on the biological environment resulting from fishery management actions primarily include changes in species mortality levels resulting from implementation of the alternatives. Implementation of an alternative that changes fish retention and discard requirements could have a direct biological effects; however, the fisheries would continue to operate under current ACLs and IFQ limits. Additional mortality of some species could be realized if maximum retention was required in all fisheries, although most of the species currently discarded under the status quo would not result in exceeding current ACls or IFQ limits. All other options that are available to build an EM program are mostly administrative and do not affect the bioloigical environment. Indirect effects from fishery management actions include changes in fishing practices that affect the biological environment, but are further away in time or location than those occurring as a direct impact. Indirect biological impacts could result if catch data were inaccurate or delayed such that fishery specifications (bycatch limits, species allocations, OYs, and biological opinion thresholds) could not be adequately monitored or the fishing stopped before one of the specifications were exceeded. If a fishery specification were exceeded, the magnitude of the impact would depend of the status of the stock (healthy, precautionary zone, or overfished), the proportion of allowable fishing mortality represented by fishery specification that was exceeded, and the stock's sensitivity to changes in fishing mortality. If other fisheries could not be effectively managed to stay within the same fishery specification, cumulative indirect impacts could result.

4.2.1 Overview of Effects

Under the No Action Alternative (Alternative 1), vessel's would still be required to have a limited entry permit with a QS permit and must have quota pounds in their account to continue fishing under the IFQ Program. Participants in the IFQ Program must continue using human observers on 100% of all IFQ trips. Observers would continue to estimate catch and discard to provide full accounting of all IFQ catch and submit this information to PSMFC, and NMFS would debit IFQ QS accounts. Catch monitors would still be required to monitor offloading and verify catch accounting by observers. Fishermen would still be allowed to discard any species, regardless if it is an IFQ or non-IFQ species, and continue to discard species they are required to discard under the current groundfish regulations. Fishermen would continue to use existing procedures regarding logbook reporting requirements for permit holders/vessel operators, to submit this information along with economic data, and be required to use VMS. Observer coverage is currently subsidized by NMFS; however, in the near future full payment will be required by the industry.

The one major difference between all action alternatives is how discard is documented and enumerated to debit a vessels QP account.

Under Alternative 2, a vessel captain “self reports” the discard by species and provides a weight in a logbook. Video documentation of those discards are then reviewed at some predetermined level (See section x.x for a discussion of review rates) to verify the discarded species and weight. The reviewer would also look for discard events that are not recorded in the logbooks. If there are no discrepancies between the two data sources then the logbook data is used to debit the QP account. Protocols for resolving discrepancies would be used.

Under Alternative 2, video documentation of the discard events would be reviewed to identify and enumerate the discard either through a census of all video (or through a sampling and expansion of the discard that is documented in the video. Under Alternative 3, the fishermen self-report the discard by recording the species and their weights in a logbook; the video is then reviewed to verify the information submitted. Discrepancies between both data sources are resolved before debiting the fishermen’s QP account.

Beyond these major differences, there are many options to choose from within each alternative to build a EM program, such as which species can be discarded, declaration process for vessels to announce when they will use EM, how fish should be handled so the video can capture adequate images of them before they are discarded, how and what data is captured on video, how will data be transferred from the vessel, how will analyze the data, and how will the program be implemented.

The most important decision is which species will be retained and which will be allowed for discard in each fishery (i.e., midwater trawl whiting, midwater trawl non-whiting, bottom trawl and longline). Allowing discard will hinge on whether video can appropriately capture the discard in a clear image so a video reviewer can identify the species and estimate the weight of the discard. Three options are provided: 1) maximize retention; 2) optimum retention (some selective discard of certain species), and 3) discard at will (currently allowed).

Overall, impacts to fish resources are not expected to change significantly under any alternative or option since most fish discarded (except halibut, lingcod and sablefish) are considered dead after release. Since the fishery is under an IFQ system, exceeding ACLs is unlikely. Most of the IFQ species are not being caught and there is room for increase. If fish are discarded and not reported or captured by EM then impacts could increase but it will be difficult to enumerate this.

Each fishery will be examined for impacts to fish resources under these three basic options (not yet analyzed). Under optimized retention, further analysis is provided regarding the impact of choosing several species or species groups for discard in each fishery. In general impacts to fish resources may be greater under Option 1 (maximize retention requirements) since vessels would be required to retain nearly all catch and bring it to shore or deliver it to motherships, as is the case with the current midwater trawl whiting fishery. Impacts to fish resources may be less under Option 2 (optimize retention) if certain species are allowed to be selectively discarded by fishermen, assuming fish mortality rate estimates do not change. Option 3, fishermen in the non-whiting midwater trawl, whiting vessels that sort at sea, bottom trawl, and fixed gear (pot and longline) would still be allowed to discard any species unless required to retain them by regulation. Therefore Option 3 would have the least impact on fish resources and discard rates would be similar to what is estimated under the current program. However, fish identification is most difficult with EM under Option 3 and least under Option 1. At this time multiple efforts are being pursued to help identify fish through different fish handling protocols (such as with chutes, fish length boards and discard stations, and fish recognition software). At this time a specific EM species discard list for each fishery has not been developed.

Of critical importance, and yet to be analyzed, is the level of risk that managers are willing to take to capture rare events such as yelloweye rockfish discard if a fisher was allowed to discard them, log it, and then use video review to not only review the logbook discard event but also to randomly sample the video to see if discard events are not logged. Fishery managers will need to examine what level of risk is appropriate and the cost implications for trying to capture all events to balance management of overfished species and the economics of fishing activity. Cost for video review can increase dramatically for a fishermen if all video is reviewed (census) versus only 10 or 25 percent.

4.2.1.1 Overfished Species and Affect on Rebuilding Plans

Harvest specifications, and the science used as the basis for management decision-making are derived from the most recent assessments and/or rebuilding analyses prepared for those stocks informed by an assessment. Please see the 2015-2016 SAFE document for an explanation of the process that sets the harvest limits for the managed groundfish stocks (PFMC 2014).

There are six overfished west coast rockfish stocks (i.e., bocaccio south of 40º10' N lat., canary rockfish, cowcod south of 40º10' N lat., darkblotched rockfish, Pacific ocean perch, and yelloweye rockfish) and one overfished flatfish stock (i.e., petrale sole) at the start of 2013. All seven of these stocks are rebuilding and three (i.e., bocaccio south of 40º10' N lat., darkblotched rockfish, and petrale sole) are predicted to rebuild by the start of 2015.

Rebuilding plans are in place for six overfished rockfish species, as well as petrale sole, where assessments have indicated spawning biomass has declined to below the MSST. New full and updated assessments and rebuilding analyses were done in 2013 inform the 2015 and 2016 harvest specifications for many of the overfished species. New full assessments were conducted for cowcod, darkblotched rockfish, and petrale sole in 2013; however, a new rebuilding analysis was only prepared for cowcod. The results of the new assessments for darkblotched rockfish and petrale sole indicated those stocks would be rebuilt by 2015 and 2014, respectively. The SSC did not recommend new rebuilding analyses for these two stocks given their imminent rebuilding expectation. An update assessment for bocaccio was prepared in 2013. Like darkblotched, the stock is predicted to rebuild by 2015 and the SSC therefore recommended no new rebuilding analysis be prepared. Catch reports for canary rockfish, Pacific ocean perch, and yelloweye rockfish were prepared in 2013. These catch reports indicated total catches were within limits prescribed in these stocks' respective rebuilding plans.

Stock rebuilding parameters estimated from the most recent rebuilding analyses and current rebuilding parameters specified at the start of 2013 are provided in Table 4-1.

Table 4-1. Rebuilding parameters estimated in the most recent rebuilding analyses and specified in rebuilding plans for overfished groundfish stocks at the start of the 2013-2014 management cycle.

Stock	T_{MIN}	$T_{F=0}$	T_{MAX}	T_{TARGET}	**Harvest Control Rule Specification**
Bocaccio	2018	2018	2031	2022	SPR 77.7%
Canary	2027	2028	2050	2030	SPR 88.7%
Cowcod	2059	2060	2097	2068	SPR 82.7%
Darkblotched	2012	2016	2037	2025	SPR 64.9%
POP	2040	2043	2071	2051	SPR 86.4%
Petrale sole	2014	2014	2021	2016	25-5 Rule
Yelloweye	2044	2047	2089	2074	SPR 76%

4.2.1.2 Bycatch Limits

Under the IFQ system there are individual by catch limits for halibut. In addition, there are bycatch limits for certain groundfish species that are either pooled by groups of fishermen or traded amongst individuals. The at-sea whiting sectors are managed under bycatch limits for selected overfished species. Mandatory co-ops in the mothership sector are allocated a portion of these sector bycatch limits and are accountable for keeping catch of these species within their allocation. Bycatch limits are not expected to change under any of the proposed alternatives.

4.2.1.3 Tracking and Monitoring Under the Proposed Action

All vessels would be required to carry at-sea observers at their own expense to monitor sorting and discarding of the catch and shoreside landings. There would also have to be an electronic system to report bycatch and landings, which may be integrated with the current state fish ticket (landings reporting) system. NMFS would also continue to administer a system to track QS/QP holdings. A comprehensive EM program is expected to require minimal increases in enforcement effort. Since the EM program would be voluntary, vessels may immediately lose privileges for certain violations. In addition, it's possible that existing coops and new coops could assist in "self-policing" to increase accountability between members and lessen the need for enforcement actions. To resolve ongoing EM monitoring issues or in response to violations, observers may be required in place of EM.

Under Alternative 1 (No Action), at-sea observers would be required on all vessels (100 percent coverage). Observers would be required to monitor the sorting, weighing, and discarding of catch.

Under Alternative 2 or 3, to assure accuracy when QPs are discarded at sea, vessels may be required to meet specified monitoring and weighing provisions, including adequate space for catch sorting, an adequate location for video monitoring, and the equipment necessary for accurately weighing and documenting QP species at sea.

Under all alternatives, biological data collected by shoreside samplers would include age structure data (lengths, otoliths, scales, snouts, etc .) and would continue to provide much needed fishery dependent length and age data use in stock assessments. Providing quality fishery dependent length and age data is expected to have a beneficial effect, as it helps stock assessment scientists better understand a stock's population status and changes in the stock. Stock assessments are important to the management process because they are generally used as the basis for setting future harvest levels.

Under alternative 1, catch composition data would continue to be collected by at-sea observers; however, under alternative 2 and 3, sampling would need to be conducted on EM vessels to collect biological data and possibly verify EM data that is seen by reviewers and logged by vessel operators. The level of sampling and the cost to support these efforts has not yet been evaluated or decided upon.

A catch monitor is present during the entire delivery to ensure that all incidental catch makes it to the point of weighing. This includes monitoring the primary sorting stations and confirming the weight of the catch includes species that may have been missed in the initial sorting, and confirming that all catch is recorded accurately. Depending on a processor's capacity and efficiency, and the size of vessel deliveries, a full offload could take a few hours to the majority of the day. Although this monitoring program would remain in regulation, it's possible that some efficiencies may be lost since many observers depart the vessel and become the shoreside catch monitor. Under Alternative 2 and3 a shoreside monitor will need to be present for vessels that deliver and do not have an observer aboard the vessel. Vessels and processors will need to work together to ensure a catch monitor is available.

Fish ticket data must be submitted within 24 hours of the time the catch was landed rather than daily, electronic fish ticket data for some deliveries may not be submitted until almost two days after the catch was landed and would be available to managers shortly thereafter.

One major consideration for debiting a QP account is the timeframe to get the data into the system. Under Alternative 3 (logbook audit) it's possible to get the data from the logbook into the system within a week; however, it may take up to a month or more depending on the review software and the number of discard events to review, or corrections to be made to get the data into the system and reconcile a QP account. The physical transfer of the video data (via electronic or car) to the reviewer and the length of time it takes for the reviewer to conduct the audit are the limiting factors for the process. Review all the video (Alternative 2, Option A: census), would take the most time and be the most costly to fishermen.

4.2.1.4 Indirect Biological Effects

Valid and timely data are needed to monitor total catch of all IFQ species, IBQ species, and catch allocations. Positive indirect biological effects could occur if the quality of catch data were improved such that more timely and accurate data were available for managing the fishery inseason and keeping total catch within the fishery specifications, including: bycatch limits, species allocations, OYs, and biological opinion thresholds. Negative indirect biological effects could result if catch data used to manage the fisheries inseason were inaccurate or delayed such that fishery specifications could not be adequately monitored or the fishing stopped before one of the fishery specifications were exceeded.

If a fishery specification for precautionary zone and healthy groundfish species or species groups is exceeded, the risk to the stock is generally lower than it is for overfished species. If a fishery specification of a constraining overfished species was greatly exceeded due to unreported discarding at sea, inaccurate catch accounting, or delayed catch reporting, the risk of exceeding rebuilding-based OYs is increased. There are many variables that affect the time it takes a stock to rebuild, fishing mortality is only one of those variables. However, exceeding the rebuilding based OY could result in an extended rebuilding period for an overfished species.

4.2.2 Effects on prohibited species and protected species

Salmonids: None of the alternatives would cause additional impact to salmonids since fishing behavior is unlikely to change and fishers would be required to discard them (except shoreside and at-sea whiting catcher vessels). If other fisheries are required to retain them under Option A Maximized retention then some additional impacts may occur; however, current impacts are minimal in groundfish fisheries. The shoreside and at-sea whiting fishery operates under a limit and an EM program would not increase the limit nor cause an increase in catch rates.

Halibut: Halibut impacts are not expected to increase unless vessels are required to retain them under maximized retention, as is the current practice in the shoreside and at-sea whiting fishery. IF all catch is considered dead then impacts may reach a maximum but would not exceed current IBQs and catch allocations for each sector. If vessel continue to discard them and current IPHC halibut mortality rates are applied then impacts would likely be similar to the status quo. Several options for discard mortality and retention are identified but are not yet analyzed yet: Using WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet (Option B**),** captain and crew provide assessment (Option D), an appropriate EM viability assessment (Option E), or vessel specific viability assessment (Option F).

Marine Mammals: The alternative actions are not likely to affect the incidental mortality levels of marine mammals over what has been considered in previous NEPA analyses.

Seabirds: The alternative actions are not likely to affect the incidental mortality levels of seabirds over what has been considered in previous NEPA analyses.

Sea Turtles: The alternative actions are not likely to affect the incidental mortality levels of sea turtles over what has been considered in previous NEPA analyses.

Endangered Species: The alternative actions are not likely to affect the incidental mortality levels of endangered species over what has been considered in previous NEPA analyses.

4.3 Effects on the Socioeconomic Environment

This section of the EA looks at direct and indirect impacts, positive and negative, on the socio-economic environment. Basic information regarding the people and the fisheries that are projected to be affected by the management alternatives will be presented in Chapter 3. The following section differs from Chapter 3 in that it discusses what is projected to happen to the affected people and fisheries as well as what social changes are expected to occur, and, how changes are expected to affect fishing communities.

In this section, the primary impact mechanisms that will be traced through to their socioeconomic effects are:

- Increased retention of unwanted fish
- Replacement of human compliance observers with electronic monitoring, on a voluntary basis
- New onboard catch handling restrictions (e.g. ensuring adequate quality camera capture of any discards)
- Other new data collection activities (e.g. discard logbooks)
- New data processing related tasks (e.g. data retrieval and video review)
- Changes in the configuration of the shoreside monitoring task (e.g. use of catch monitors present in the port rather than relying on observers)
- New and changing distribution of responsibility for paying for various tasks (e.g. payment for at-sea biological observations, payment for video review)

One of the main impacts of the alternatives that runs through all sectors, including the government sector, is the impacts on the direct costs of the compliance and biological monitoring programs. For that reason, this section will start with an assessment of the direct compliance and biological monitoring costs of the alternatives followed by a full evaluation of the impacts to each sector.

4.3.1 Analysis of Program Costs for Compliance and Biological Monitoring

A complete assessment of costs is underway and is expected to be completed in the summer of 2014. Contributions to the cost assessment have been requested from NMFS WCR and NWFSC as well as PSMFC. There will be some significant uncertainties in that assessment including uncertainties about

1. EM program participation rates in aggregate and by port
2. Additional fleet consolidation
3. Organization of the shoreside monitoring function

4. Changes to fees charged by providers for compliance observers and shoreside catch monitors

The outcome for some of these uncertainties will depend on how fishery participants respond to the program. To deal with these some of these uncertainties, ranges of estimates will be developed and some results may be presented qualitatively, or quantitatively but with out dollar values assigned.

Others uncertainties depend on the eventual design of the program. There are also a number of decision points that will affect the cost estimates and distribution of costs. A few of the more significant ones may be

1. Who will retrieve data from vessels
2. Whether all video must be reviewed (Alternative 1) or only a percentage of it (Alternative 2).
3. What amount of discarding will be allowed (and hence the video that must be reviewed more carefully reviewed)
4. Who will carry out the video review function
5. Who will pay for the video review function

Note: The following analysis has not yet been fully reviewed by the Groundfish Electronic Monitoring Technical Advisory Committee.

4.3.1.1 Assumptions

Participation Rates

On one of the most important factors – EM participation rates – a range of working assumptions is being considered on a preliminarily basis. **Comment on this range is sought at the June Council meeting.**

Table 4-2. Preliminary working assumptions on rates of vessel participation in the EM program.

Low Rate	Medium Rate	Higher Rate
20	50	80

Fleet Consolidation

Under the No Action Alternative, there may be further fleet consolidation as a continuation of the rationalization process started with the implementation of Amendment 20 in 2011. While there has already been some consolidation, additional consolidation might be expected with the start of QS trading and as subsidies for observer fees end. It would be expected that if the action alternatives have a substantial effect on vessel operating costs there might be an effect on fleet consolidation. The amount of consolidation expected is extremely difficult to predict and it is possible that there would be no additional consolidation under No Action. On this basis, no attempt will be made to model additional fleet consolidation but the possibility or such consolidation will be covered in the discussion of results and discussion of the impact on fishery participants.

Other Assumptions

Other assumptions will be identified and specified as the analysis is further developed.

4.3.1.2 Cost Categories

For purposes of developing the analysis, costs have been broken out into the categories provided in Table 4-3. It may be necessary to develop cost estimates in two fashions: one for implementing a program for all sectors at one time and another for implementing the program for one or two sectors, with an assessment of the incremental costs for adding sectors at a later time. Costs may vary in important ways depending on how many sectors are covered at one time.

Table 4-3. Cost estimation template.

	Private	Government	Alt 1	Alt 2					Alt 3				
			Status Quo: Human Observers Estimate Discard	**Camera Recordings Used to Estimate Discard**					**Logbooks Used to Estimate Discard, with Camera Audits**				
				At-sea Whiting	Shoreside MWT	Bottom Trawl	Longline	Pot	At-sea Whiting	Shoreside MWT	Bottom Trawl	Longline	Pot
Component			None	Cameras					Logbooks and Cameras				
<u>Electronic Monitoring</u>													
Individual Vessel Monitoring Plans (IVMPs)													
Development of standards for IVMPs (1x)		x		??	one project for all sectors?				??	one project for all sectors?			??
Development of IVMPs by vessels(1x)	x			??	??	??	??	??	??	??	??	??	??
Approval of IVMP by NMFS (1x)		x		??	??	??	??	??	??	??	??	??	??
Maintenance and revision of IVMP	x	x		??	??	??	??	??	??	??	??	??	??
Vessel Equipment													
Development of standards for equip. (1x)		x		??	one project for all sectors?				??	one project for all sectors?			??
Purchase cost (1x)	x			??	??	??	??	??	??	??	??	??	??
Installation cost (1x)	x			??	??	??	??	??	??	??	??	??	??
Maintenance - annual	x			??	??	??	??	??	??	??	??	??	??
Data Transfers													
Development of protocols and software (1x)		x		??	one project for all sectors?				??	one project for all sectors?			??
Retrieval/submission of data													
-video	?	?		??	??	??	??	??	??	??	??	??	??
-logbook	?	?		??	??	??	??	??	??	??	??	??	??
Video/Data Processing													
	?												
Development of protocols and software (1x)	?	x		??	one project for all sectors?				??	one project for all sectors?			
Video/logbook review						Costs Assuming Review of 100% of Hauls					Costs Assuming Review of 20% of Hauls		
	?	?											
- during gear retrieval & catch sorting b/	?	?		$27/day	$24/day	$320/day	$123/day	$60/day	$7/day	$18/day	$82/day	$38/day	$20/day
				$372/trip	$52/trip	$1,136/trip	$442/trip	$234/trip	$100/trip	$40/trip	$290/trip	$138/trip	$79/trip
	?	?											
- after sorting and stowage until offload	?	?		??	??	??	??	??	??	??	??	??	??
Transmission of Data to Catch Acctng Sys		x											n/a
Data Storage and Maintenance													
Development of protocols, software etc. (1x)		x		??	one project for all sectors?				??	one project for all sectors?			

	Private	Government	Alt 1	Alt 2					Alt 3				
			Status Quo: Human Observers Estimate Discard	**Camera Recordings Used to Estimate Discard**					**Logbooks Used to Estimate Discard, with Camera Audits**				
				At-sea Whiting	Shoreside MWT	Bottom Trawl	Longline	Pot	At-sea Whiting	Shoreside MWT	Bottom Trawl	Longline	Pot
Component			None	Cameras					Logbooks and Cameras				
Equipment costs (1x)		x		??	??	??	??	??	??	??	??	??	??
Equipment maintance				??	??	??	??	??	??	??	??	??	??
Resp to data req.		x		??	??	??	??	??	??	??	??	??	??
Compliance and Biological Observers	-	-	100% Cov	Partial Coverage (e.g. 25%)					Partial Coverage (e.g. 25%)				
Government Costs (WCGOP)													
Program planning and development (1x)		x		??	one project for all sectors?				??	one project for all sectors?			
Ongoing admin costs (e.g. trip notifctn sys)				??	??	??	??	??	??	??	??	??	??
Observer training admin costs		x		??	??	??	??	??	??	??	??	??	??
Observer debriefing admin costs		x		??	??	??	??	??	??	??	??	??	??
Data QA/QC, summary, and analysis		x		??	??	??	??	??	??	??	??	??	??
Gear and equipment	-	x		??	??	??	??	??	??	??	??	??	??
Costs – At-Sea for Biological Observers	- ?	?											
Observer provider fees	?	?		??	??	??	??	??	??	??	??	??	??
Observer boarding costs (e.g. food)	x			??	??	??	??	??	??	??	??	??	??
Costs – At-Sea for Compliance Observers													
Observer provider fees	x			??	??	??	??	??	??	??	??	??	??
Observer boarding costs (e.g. food)	x			??	??	??	??	??	??	??	??	??	??
Shoreside Catch Monitor (CM) c/	-	-	100% Cov	100% Coverage					100% Coverage				
First Receiver - Shoreside CM													
CM training & admin costs		x			??	??	??	??		??	??	??	??
CM debriefing & admin costs		x			??	??	??	??		??	??	??	??
Gear and equipment		x			??	??	??	??		??	??	??	??
CM provider fees	x				??	??	??	??		??	??	??	??

a/ PSMFC trains the catch monitors and processes the reports they generate. These costs are covered by a government contract.

b/ Values provided here are based on PSMFC's study and include time identifying retained species, which may not be necessary if cameras are only being used for discard monitoring. Additionally, these cost estimates do not take into account other operational modifications that vessels may be able to make to reduce video review time.

c/ Catch monitoring costs are implicated since observers will no longer be available to move shoreside and handle catch monitoring responsibilities.

d/ The video review costs do not go down by 80 percent in moving from the 100% video review of Alternative 2 to the 20% video review of Alternative 3, because 20% is the minimum level of review permitted (1 of 5 hauls, or 2 of 10). A minimum of one haul must be reviewed from each trip. If the trip has less than 5 hauls, one haul will always be algebraically more that 20% of the trip. E.g., a trip that has a total of three hauls will always have 1 haul reviewed. 1 haul of a total of 3 is 33%, not 20%. Similarly, if a vessel fishes 12 hauls on a trip, 3 hauls will be reviewed. 3 of 12 is 25%. Additionally, a fixed cost of one half hour per trip was added to the review time to cover the time it takes to handle the drives and identify trips and hauls from the sensor data. An additional one half hour added to the time would further increase the cost from a directly proportional time per haul calculation.

Government Policy Development, Implementation and Administrative Costs (Across Categories)

Government costs have been broken out into a number of categories for purposes of completeness. However, the categories may be rolled up and a single estimate provided for the program as a whole. Under the action alternatives, program planning and administrative costs will be required for tasks such as developing criteria for and then approving individual vessel monitoring plans and electronic monitoring equipment; organizing the retrieval, transmission, and storage of data from the field; coordinating the video review function (whether carried out as a government or contractor activity); summarizing and responding to data requests; developing and implementing observer deployment and sampling plans to collect biological data given only partial at-sea coverage by compliance monitors. Depending on the amount of participation in the EM program, there may be a need to develop a new system for vessels to provide advance notification of trip. There may also be an addition to the costs for data summary and analysis as a result of the need to develop statistical estimates (there is currently a census) and to incorporate information from the EM system as a way of improving those estimates. Total observer training, debriefing, gear and equipment costs may decline with fewer observers but average costs could increase.

Under the action alternatives, government costs will likely vary depending on the sectors and gears covered by the alternative adopted. With respect to program development and planning costs, it may be that once a program is developed for one sector, the additional costs for adding other sectors will be lower. Some of the ongoing costs of administering the program are likely to vary by the number of participants, which will be a partial function of the sectors and gears covered. The government costs associated with the EM program might be considered costs associated with a LAPP in which case those costs would be recoverable through fees of up to three percent of total exvessel value (maximum on total cost recovery for the trawl rationalization program as a whole). The shorebased IFQ sector is already being charged the maximum 3 percent fee, therefore any increases in government costs will have to be covered from other sources. The mothership sector is being charged less than the three percent maximum, therefore it might be that some of the government costs associated with the program can be passed through to the industry. It should be noted that for the WCGOP there may be some administrative savings as a result of managing fewer observers. An assessment will be required to determine whether these savings are greater than the expected cost increases associated with the EM program.

Electronic Monitoring

Video Review Costs

Under the action alternatives there would be a new cost for video review that is not present under the No Action Alternative. It has not been determined who would bear the video review costs. Estimates have been developed for the cost of video review time during initial catch retrieval and sorting. These are displayed in Table 4-3. These estimates currently include time required to identify catch being retained. Time required for video review may be less than these estimates if only discard events have to be evaluated for species identification. Additionally, other innovations could be developed which speed video review time.

Vessels need to be monitored for discard events for the entire time fish are onboard the vessel until they are offloaded. This costs is not included in the current video review time estimate. It may be possible that video review between catch sorting activities and arrival in port may be assisted through programming software that identifies video segments where back deck activity is occurring, thus reducing the amount of transit video that needs to be reviewed. Other technologies such has hatch sensors may be useful in increasing the efficiency of reviewing video.

Logbooks (Alternative 2 Only) and Fish Tickets

Logbook reporting requirements would not change under Alternative 1. Under Alternative 2 fishermen would be required to report discards by species and provide an accurate estimate of the weight. This will require the creation of logbooks for certain fisheries. The current state trawl logbook for midwater and bottom trawl activity would need to be modified to include species discard categories with instructions. This would require additional fields in the Pacific Fisheries Information Network (PACFIN) reporting system and may require additional changes to state computer reporting systems. Potential changes to existing logbook system are described in the Table 4-4.

Table 4-4. Potential changes to logbooks or additional logbooks for each fishery under Alternative 3.

Key: MDTW = midwater trawl, LL = longline, BTW = bottom trawl

Fishery/Gear	Additional data fields	Changes to state system	Changes to PACFIN
Whiting/MDTW	Estimated Pounds Discarded Each Tow	Yes if state wants/required to track	Yes if discard info is provided to NMFS via PSMFC, may need to apply species comp to estimated total discard to get individual species discards
Non-whiting/ MDTW; BTW	Estimated Pounds Discarded Each Tow	Yes if state wants/required to track	Yes if discard info is provided to NMFS via PSMFC, may need to apply species comp to estimated total discard to get individual species discards
Fixed gear/LL and Pot	May not need changes for Oregon fixed gear logbook; California trap log – add discard field; Need to develop a logbook for Washington.	Yes if state wants/required to track	Yes if discard info is provided to NMFS via PSMFC; changes to accommodate California and Washington data.

Under each of the alternatives, first receivers in the states of Washington and California would continue to complete and submit the required paper fish tickets on forms as required by the state of landing. In the State of Oregon, first receivers would either complete paper fish ticket forms provided by the state, or computer generated tickets providing they contain all data fields specified in state law. State requirements for fish ticket submissions would not be changed under any of the proposed alternatives.

Additional Sections to be Developed

Biological and Compliance Observers

Prior to the trawl rationalization program approximately 20 to 25 percent of the trips were covered with government paid biological observers. Under the trawl rationalization program industry paid compliance observers have also filled the biological observer function. Under the No Action Alternative this would be expected to continue with no change. Under either of the Action Alternatives, biological observer coverage would be required to sample the catch and collect other data at-sea on a randomly distributed sample of trips by vessels participating in the EM program. A determination will be needed on who pays for the observers used in the new biological sampling regime under EM: Would the vessels pay or would government payment for observers resume? Depending on that determination, there may be a new government cost for the biological observers replacing the compliance observers paid for by industry or the industry might pay some costs for the biological observers, in addition to the EM costs.

In the past, biological observers for the trawl fishery were provided by largely the same companies that currently provide the compliance observers; and the training for both types of observers is quite similar. Under the action alternatives, the total demand for observers will likely be reduced; the demand for compliance observers will go down, mitigated to some degree by an increase in demand for biological observers. The reduction in overall demand is likely to result in an increase in the per-day-at-sea price for observers. There may also be a reorganization of the shoreside monitoring tasks such that it is no longer carried by observers once they reach port. Such a reorganization, by reducing the revenue an observer provider generates with an observer already in place in the field, could cause providers to have to increase prices to maintain a reasonable profit margin.

Shoreside Catch Monitors

It is expected that the organization and total costs associated with the shoreside catch monitoring program would change with the implementation of any of the action alternatives. Currently the catch monitoring function is generally carried out by the at-sea observers who, upon arriving in port, go to shore and fulfill the monitoring function at first receiver site. The shoreside catch monitoring task might take an hour or two or a half-day or more to complete, depending on the type of delivery. This would be expected to continue under the No Action Alternative. Under the action alternatives, to the degree that vessels opt into the EM Program, observers would not be available to fulfill this function and other arrangements will have to be made. This reorganization of the shoreside monitoring task is expected to impact provider fees for catch monitors and observers as well as catch monitoring program administrative costs, and gear and equipment costs.

Effect on Catch Monitoring and Observer Costs

The impact on catch monitoring and observer costs will depend on the EM program participation rates, how industry decides to organize itself to fulfill this function, and how government functions are organized. Observer time fulfilling the shoreside monitoring function is paid by the first receiver, rather than the vessel. The fees providers currently charge for catch monitoring services are influenced by the efficiencies related to having an observer fulfill the shoreside catch monitoring function and might be higher if the catch monitoring function were fulfilled by shorebased personnel, particularly in ports where this is not enough demand to support a full time catch monitor.[3] If some vessels are not carrying observers, a shoreside monitor will need to be in the port to cover a task which may only be a few hours in duration. Depending on the number of landings in the port or port region and the number of those landings without observers to cover the shoreside monitoring function, the task might need to be handled by a part time monitor or a monitor travelling in from another region. Anecdotally it has been reported that for remote ports with a small number of landings that the costs of servicing the ports with observers has been problematic. This challenge might be even greater when a catch monitor is needed in a port for only part of a day. Variable EM participation will create logistical challenges in organizing this task and add to the need for advance planning, particularly if there are only one or two catch monitors covering a region. First receiver cooperation in timing of offloads and sharing of catch monitors would also affect the number of monitors that need to be available and related costs. First receivers and providers might decide to organize the shoreside function by largely ignoring opportunities for utilization of the at-sea observers in this capacity and relying only on "dedicated shoreside monitors". Unless there are a large number of landings in a particular port or port area, or catch monitors are able to fulfill some other program functions when not observing offloads, it seems likely that the average catch monitoring field costs (labor, transportation, etc.) are likely to be higher than under the current system where the at-sea observer fulfills the shoreside monitoring function. First receivers in ports in which there are a large number of landings, may gain some additional measure of advantage over first receivers in smaller more isolated ports, if their volume of landings allows them to achieve lower average catch monitoring fees. While the current practice is that first receivers pay the shoreside monitoring fees, increased fees could affect the exvessel prices first receivers are willing to pay for deliveries. Current rates that providers charge for the catch monitoring tasks are provided in Table 4-5.

Table 4-5. Current provider fees for catch monitoring services.

Reorganization of the catch monitoring task could also exert an upward influences on the prices vessels pay for observers, since providers will no longer be able to cover some of the logistics

[3] Analyst's conclusion based on personal communications with Alaska Observers Inc and Saltwater Inc on May 27, 2014.

related costs of placing observers in the field with revenue from fees charged when observers fulfill the catch monitoring function.

By Port Demand for Catch Monitoring Services

Catch monitoring costs will be influenced by the demand for services in a port or port region. The by-port demand for catch monitoring services will be a function of the number of vessels in a port participating and not participating in the EM program; the number of first receivers in a port and their ability to coordinate landings with vessels and with one another; and the total number and seasonality of landings. Additionally, geographic proximity to other ports and related travel time and costs will determine the opportunity first receivers have to pool together with other ports to generate greater demand and potentially lower prices.

This section provides information on the distribution trawl IFQ program of landings, vessels, and first receivers across ports from 2011 through 2013 (Figure 4-1 through Figure 4-3 provide annual data and Figure 4-4 though Figure 4-19 provide monthly data). Annual values are also broken out by IFQ gear sector: nonwhiting trawl (may include some vessels using midwater trawl to catch whiting, whiting trawl (vessels using midwater trawl used to target whiting) and nontrawl (vessels using non-trawl gears to participate in the trawl IFQ program). Monthly figures do not provide IFQ gear sector break outs. The reader should be aware that the scale of the axis for landing counts for Oregon ports is larger (going to a maximum of 250) than for Washinton and California (going to a maximum of 50). Other than that, the same scales are maintained between graphs to facilitate comparisons between ports. In Westport, in one month the number of landings exceeded the scale provide (a total of 51 landings were made, as noted on the graph). Table 4-6 provides a key to the port abbreviations used in the annual tables.

The following summary is based on the 2011 to 2013 annual and monthly landings by port in Figure 4-1 through Figure 4-19. Bellingham is geographically isolated from other ports and has very low levels of landings spread through most of the year. Westport has high levels of landings but they are seasonal and dominated by whiting. Covering off–season landings might be problematic and it could become much more difficult to cover Westport with catch monitors if vessels in the whiting fishery were able to participate in EM but not vessels in other IFQ gear sectors. Ilwaco has a lower level of demand for catch monitors but may benefit by its proximity to the high demand port of Astoria. Astoria has the highest demand for catch monitoring along the coast and has high demand for coverage of both whiting and nonwhiting landings. Newport also has high demand for coverage of whiting landings but much lower for nonwhiting landings (comparable to Ilwaco and Brookings). Other than Astoria, Coos Bay, Eureka, and Fort Bragg have the highest annual demands for coverage of nonwhiting landings. If the 2011 to 2013 trend in Crescent City continues, it will likely fade out as an IFQ port. As mentioned above, the landings showing for Bodega Bay and Berkeley appear to be coding errors and will be removed from the next draft of this document. The other active ports from San Francisco south (San Francisco, Half Moon Bay, Monterey, Moss Landing, and Morro Bay) have generally lower numbers of nonwhiting landings than ports to the north with the exceptions of Crescent City, Westport, and Bellingham. Landings for 2011 in Half Moon Bay and 2012 in Morro Bay might be the exceptions. Avila appears to have faced out as an IFQ port.

There is some degree of seasonal variations in the landings of most every port. In six of the fifteen ports in which there were landings in 2013,[4] there were at least some months in which there were no landings (Bellingham, Westport, Brookings, Crescent City, Half Moon Bay, and Monterey, Table 4-7). For months in which fishing occurred, there were fewer than an average of five landings a month in 2013 in Bellingham, Crescent City, San Francisco, Monterey, and Moss Landing. There was an average of between six and ten landings a month for months fished in 2013 in Ilwaco, Brookings, Eureka, Fort Bragg, Half Moon Bay and Morro Bay. There were an average of 16 per month in Westport and Coos Bay, but seasonality was much heavier in Westport than Coos Bay. The greatest averages were in Astoria (56 per month) and Newport (50 per month). Demand and seasonality in Westport and Newport are heavily influenced by the whiting fishery. Footnotes in Table 4-7 provide information on the travel time between ports.

Table 4-6. Key to port abbreviations.

Port Abbreviation	Port
BLL	Bellingham, Washington
WPT	Westport, Washington
ILW	Ilwaco, Washington
AST	Astoria, Oregon
NWPT	Newport, Oregon
COS	Coos Bay, Oregon
BRK	Brookings, Oregon
CC	Crescent City, California
ERK	Eureka, California
FB	Fort Bragg, California
BDG	Bodega Bay, California
SF	San Francisco, California
B	Berkeley, California
HLF MN	Half Moon Bay, California
MNT	Monterey, California
MOS	Moss Landing, California
MOR	Morro Bay, California
AVL	Avila, California

[4] Of the 16 ports in Table 4-7 only Avila had no 2013 landings.

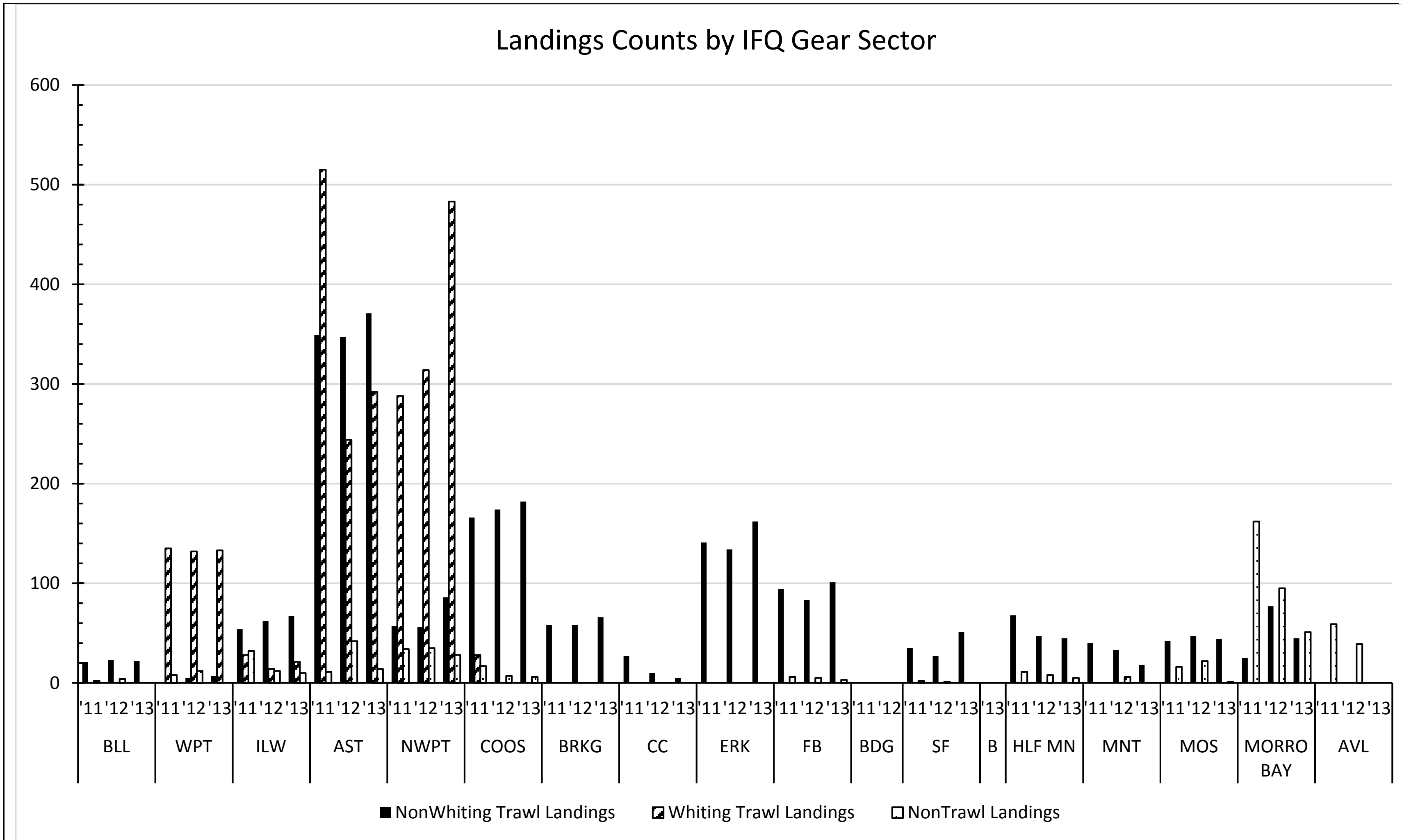


Figure 4-1. Number of nonwhiting trawl, whiting trawl, and nontrawl IFQ landings by port for 2011, 2012, and 2013 (see Table 4-6 for key to port names)) – there are no first receives in Bodega Bay (BDG) or Berkeley (B) therefore the landings reported for these ports are likely miscodings.

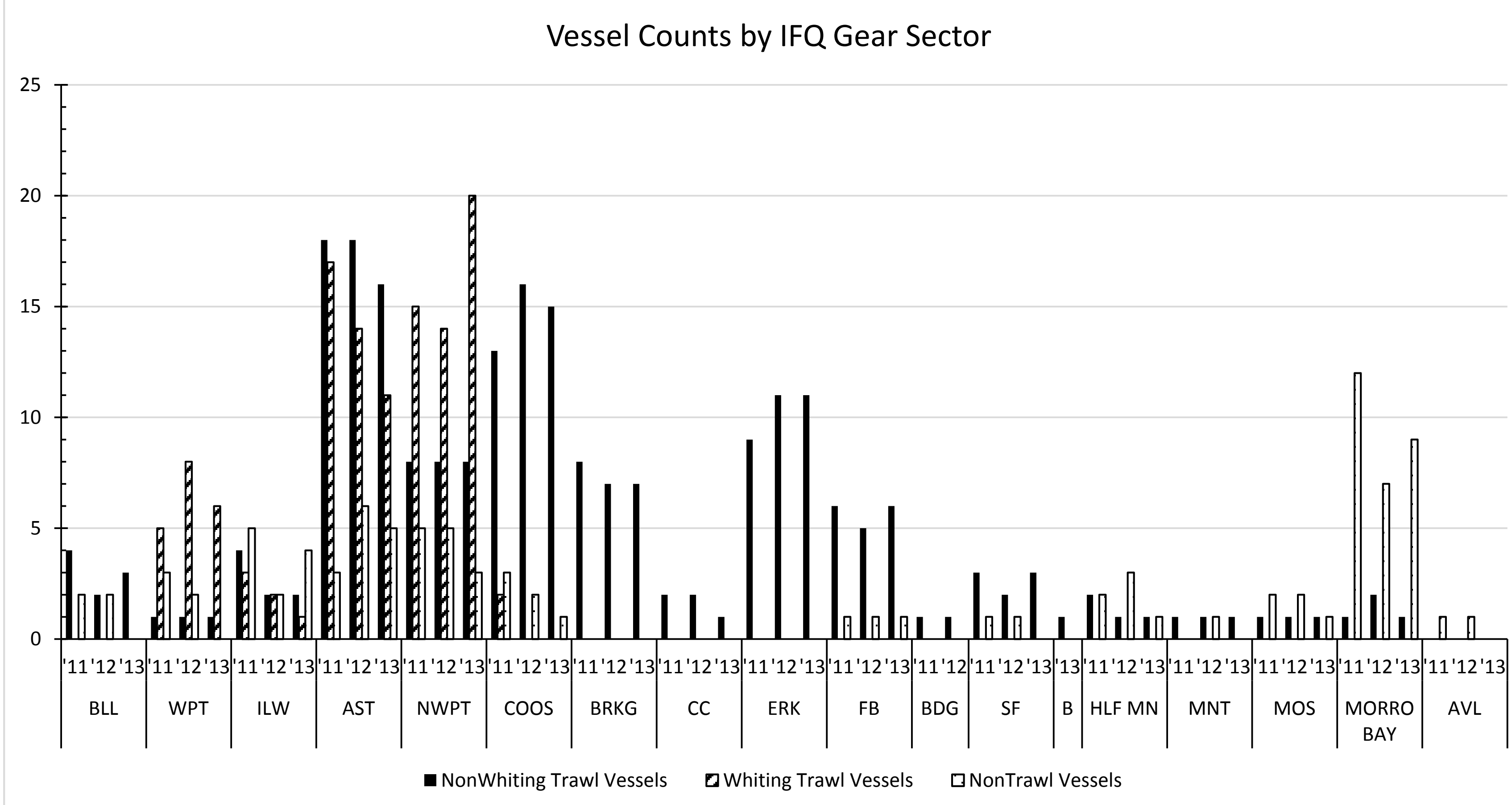


Figure 4-2 Number of nonwhiting trawl, whiting trawl, and nontrawl IFQ vessels by port for 2011, 2012, and 2013 (vessels participating in more than one IFQ gear sector or landing in more than one port are counted more than once, see Table 4-6 for key to port names)) – there are no first receives in Bodega Bay (BDG) or Berkeley (B) therefore the landings reported for these ports are likely miscodings.

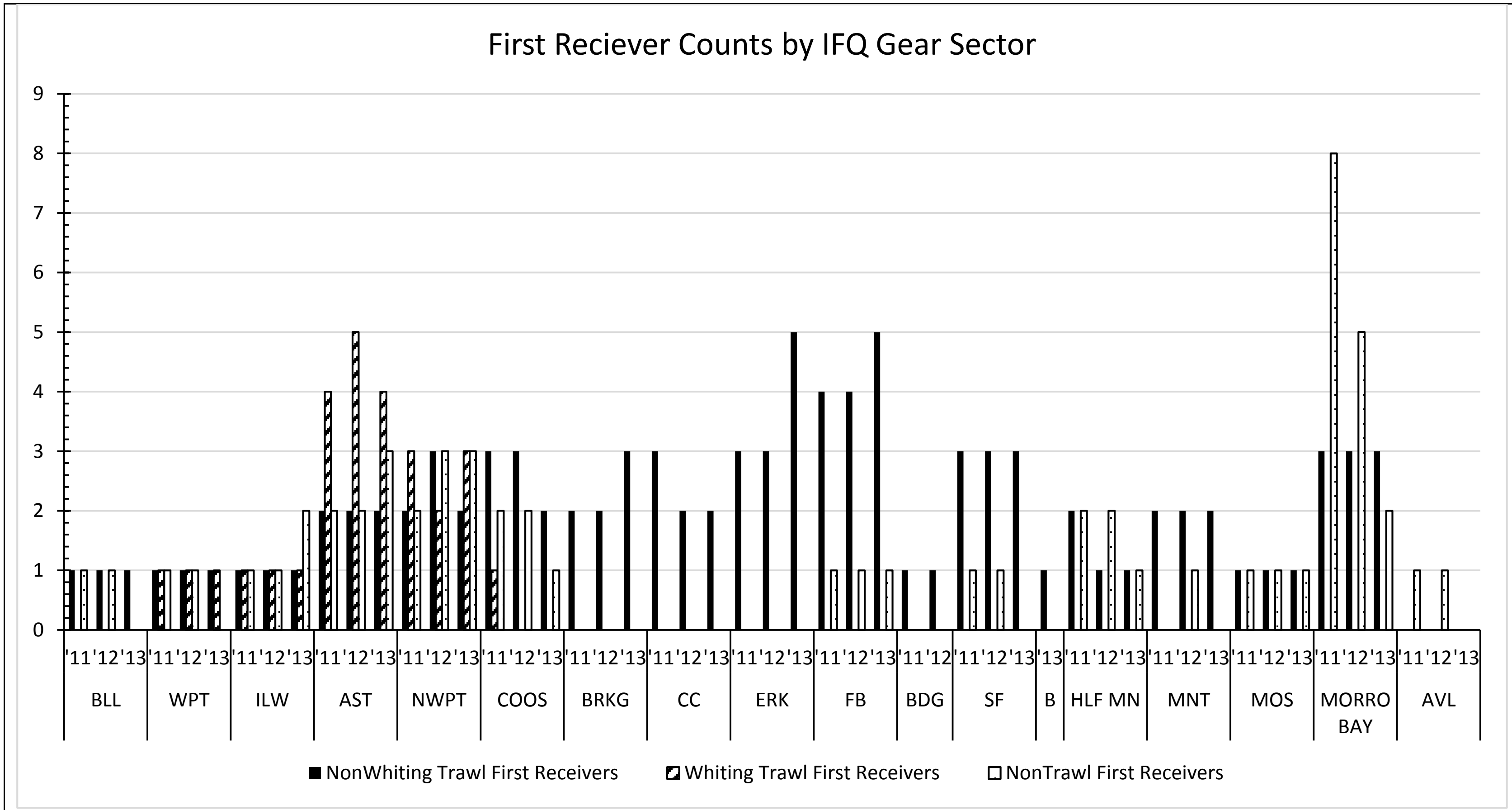


Figure 4-3 Number of nonwhiting trawl, whiting trawl, and nontrawl IFQ first receivers by port for 2011, 2012, and 2013 (first receivers receiving from more than one gear group are counted more than once, see Table 4-6 for key to port names) – there are no first receives in Bodega Bay (BDG) or Berkeley (B) therefore the landings reported for these ports are likely miscodings.

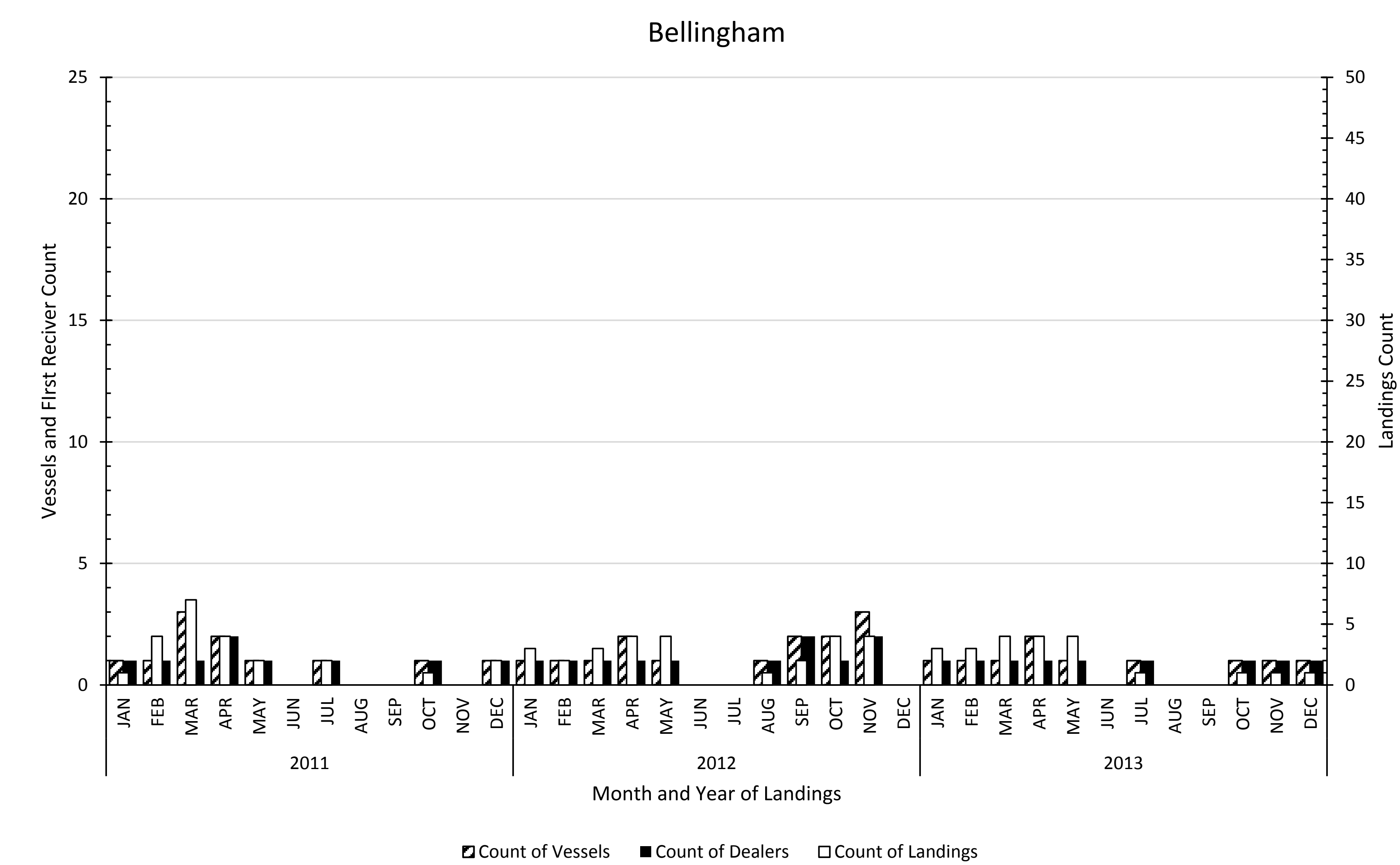


Figure 4-4 Bellingham, Washington, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings – no whiting landings were made to this port)

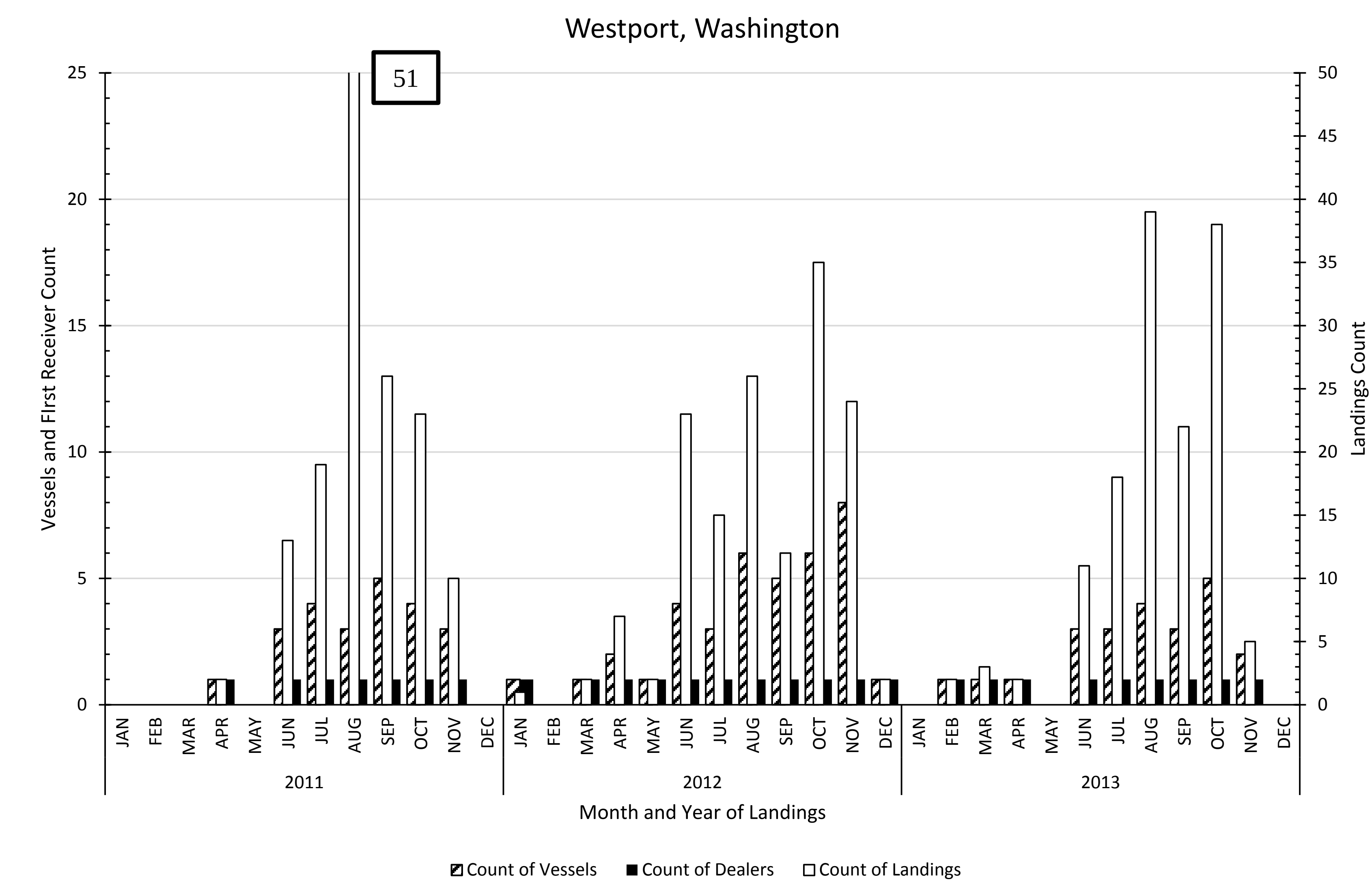


Figure 4-5 Westport, Washington, counts f vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting and whiting landings)

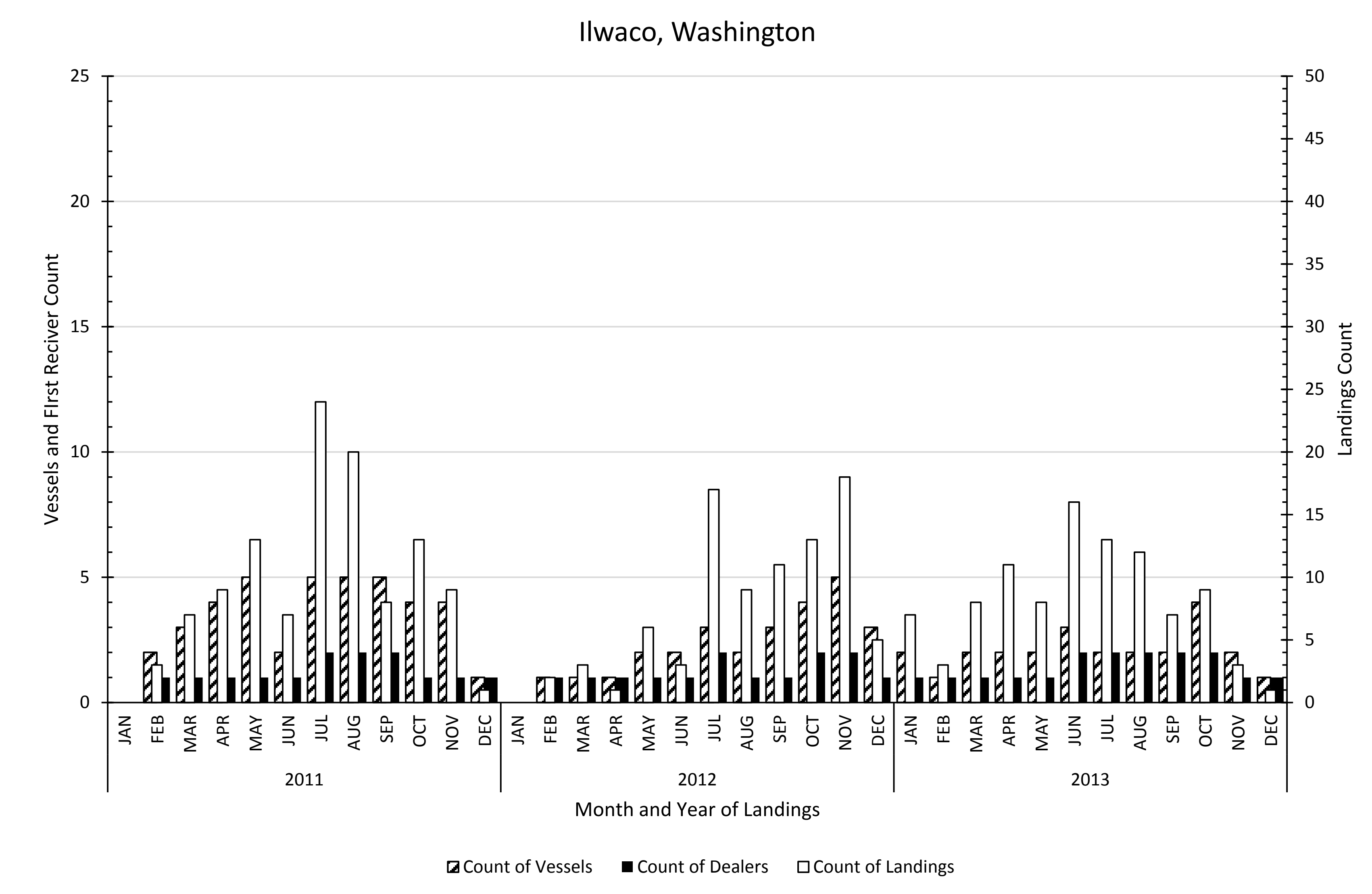


Figure 4-6 Ilwaco, Washington, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting and whiting landings).

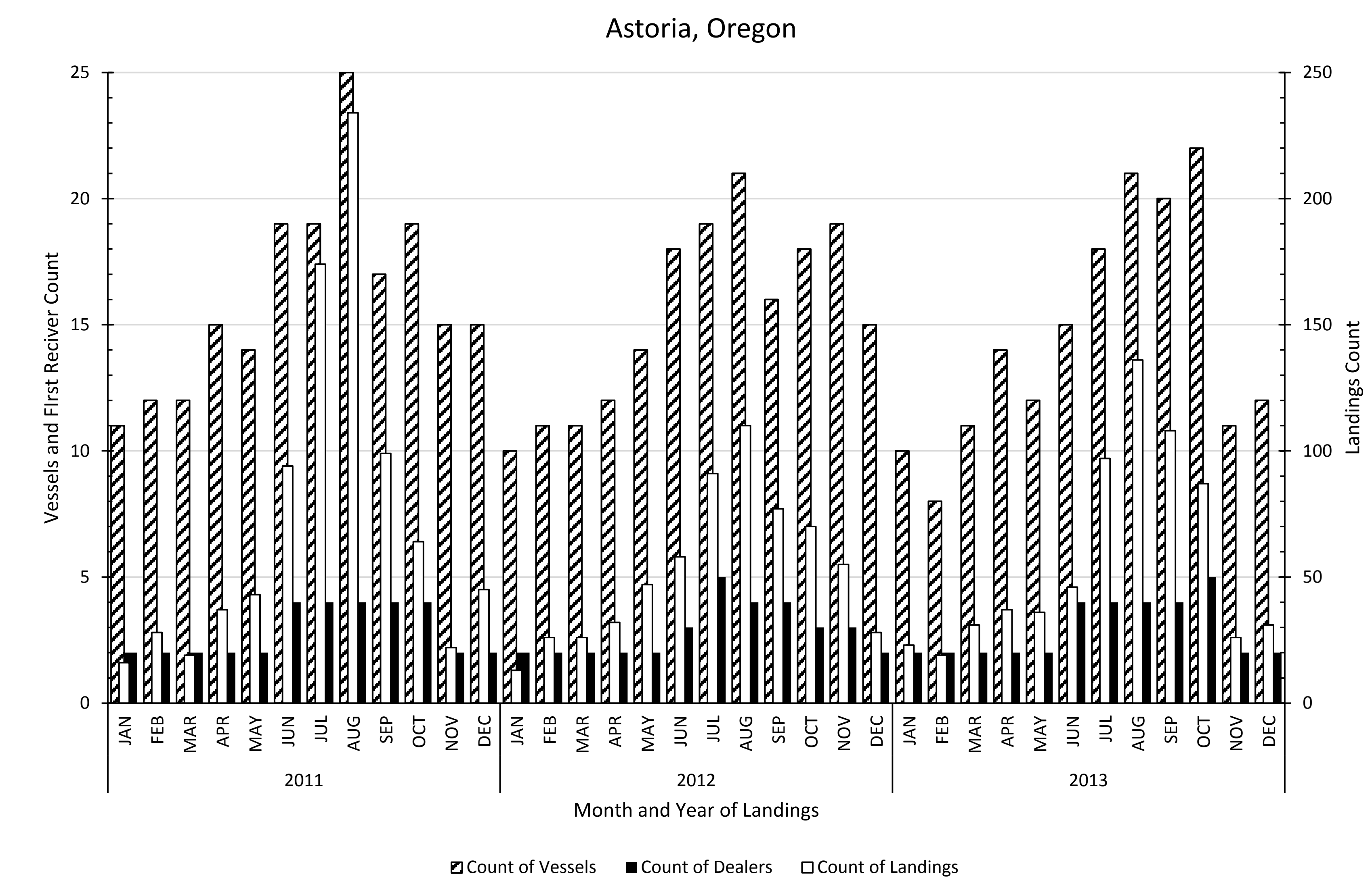


Figure 4-7 Astoria, Oregon, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting and whiting landings).

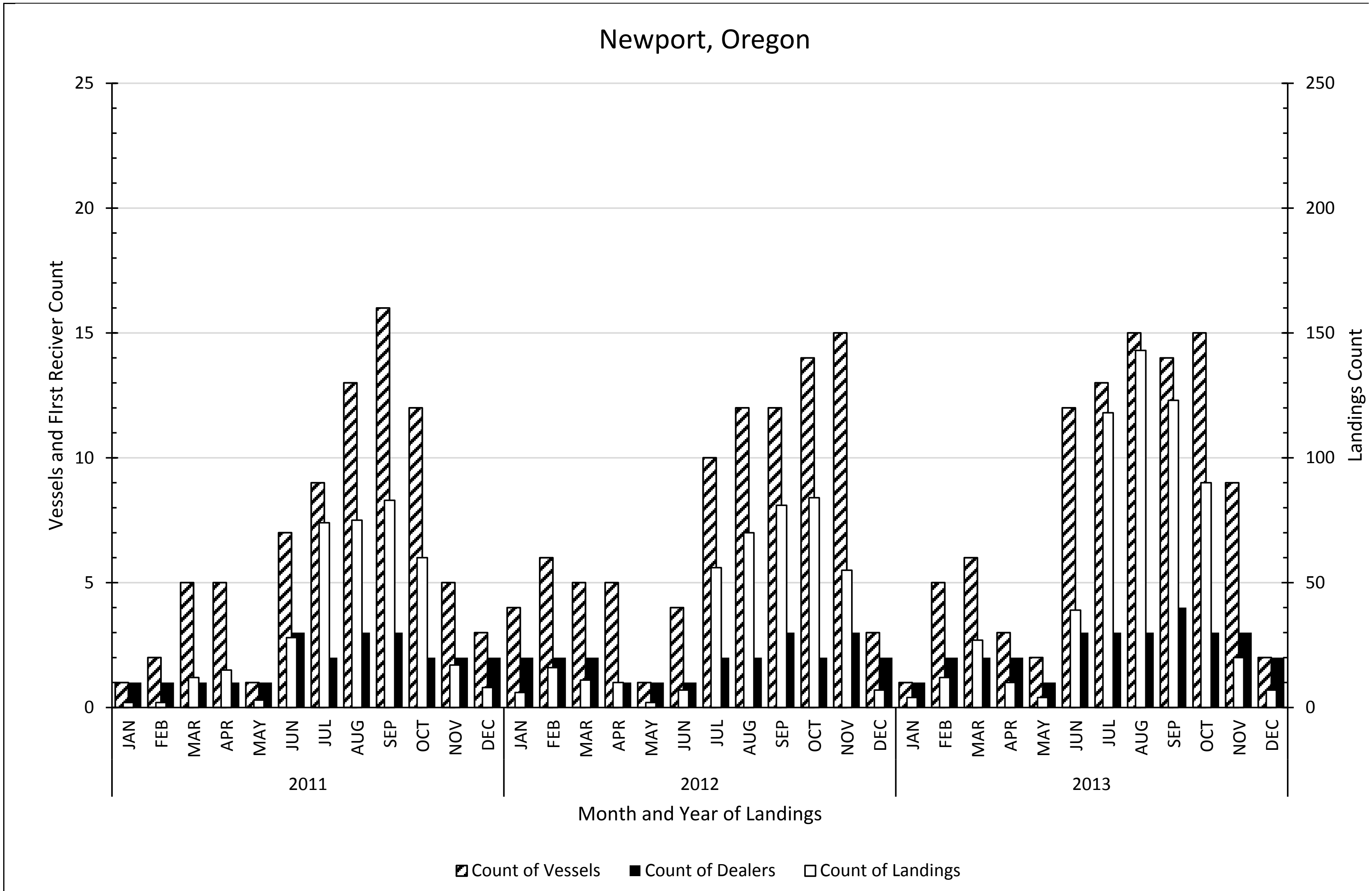


Figure 4-8 Newport, Oregon, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting and whiting landings).

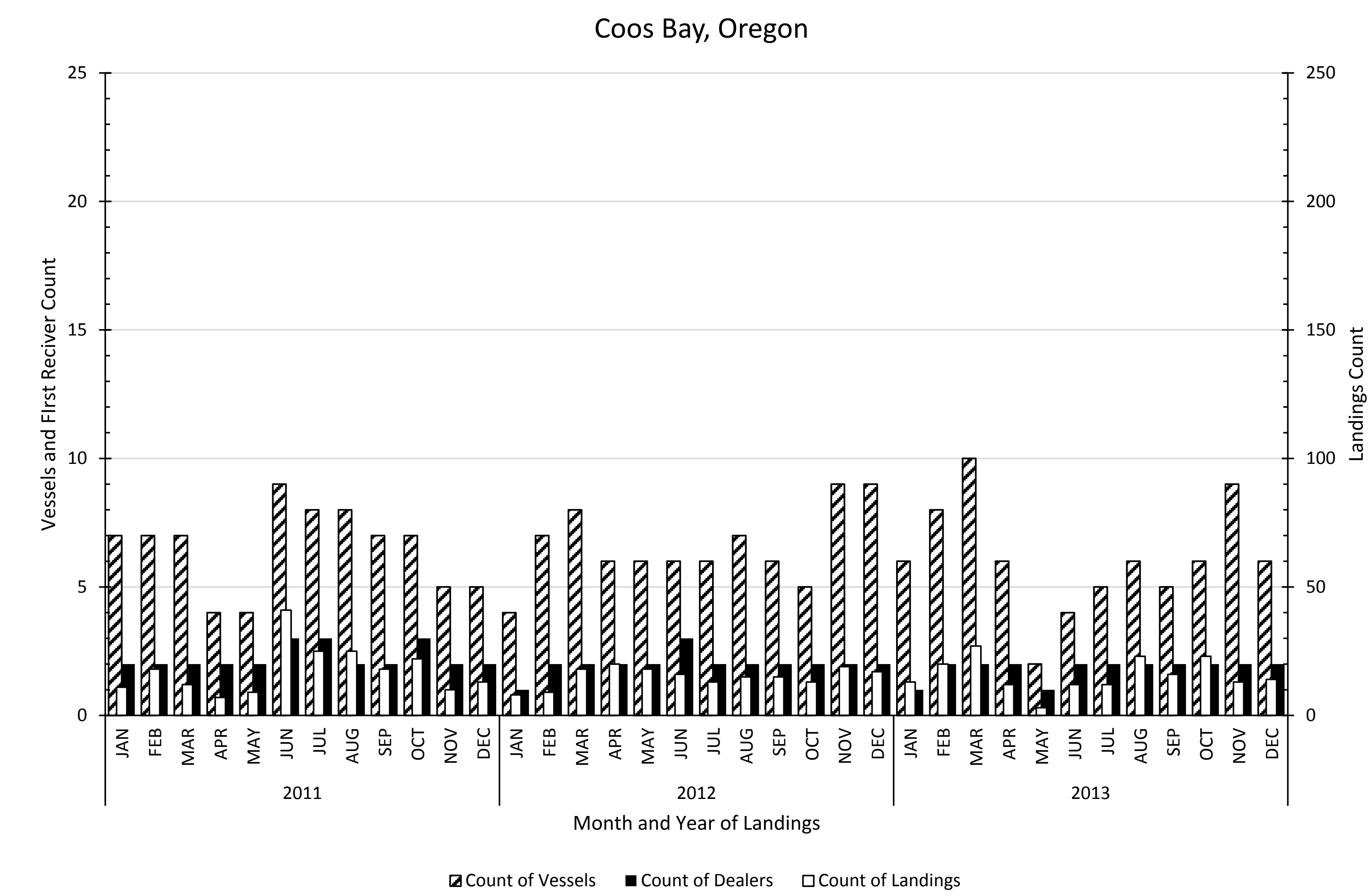


Figure 4-9 Coos Bay, Oregon, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting and whiting landings – there were whiting landings only in 2011).

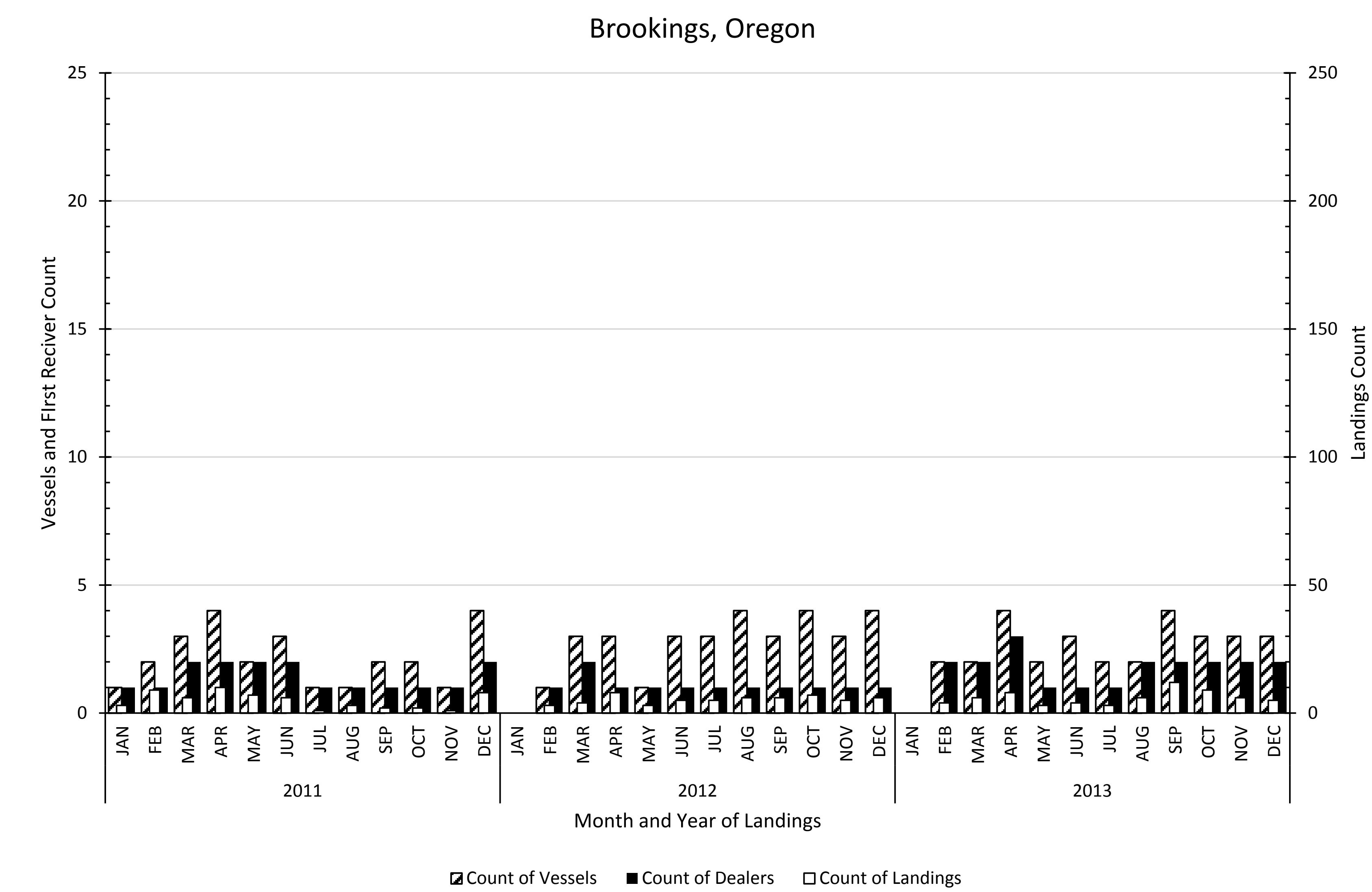


Figure 4-10 Brookings, Oregon, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting and whiting landings).

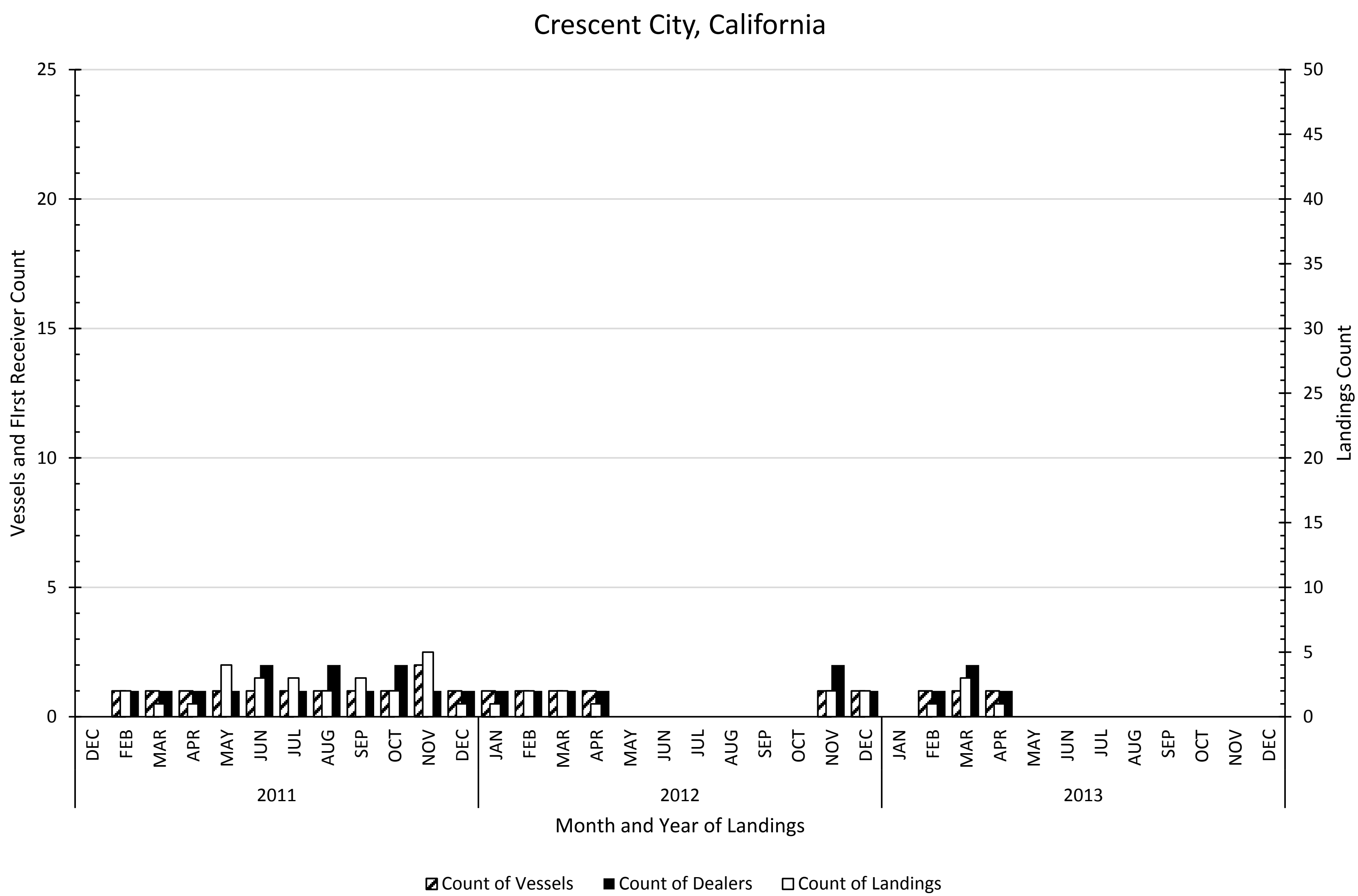


Figure 4-11 Crescent City, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

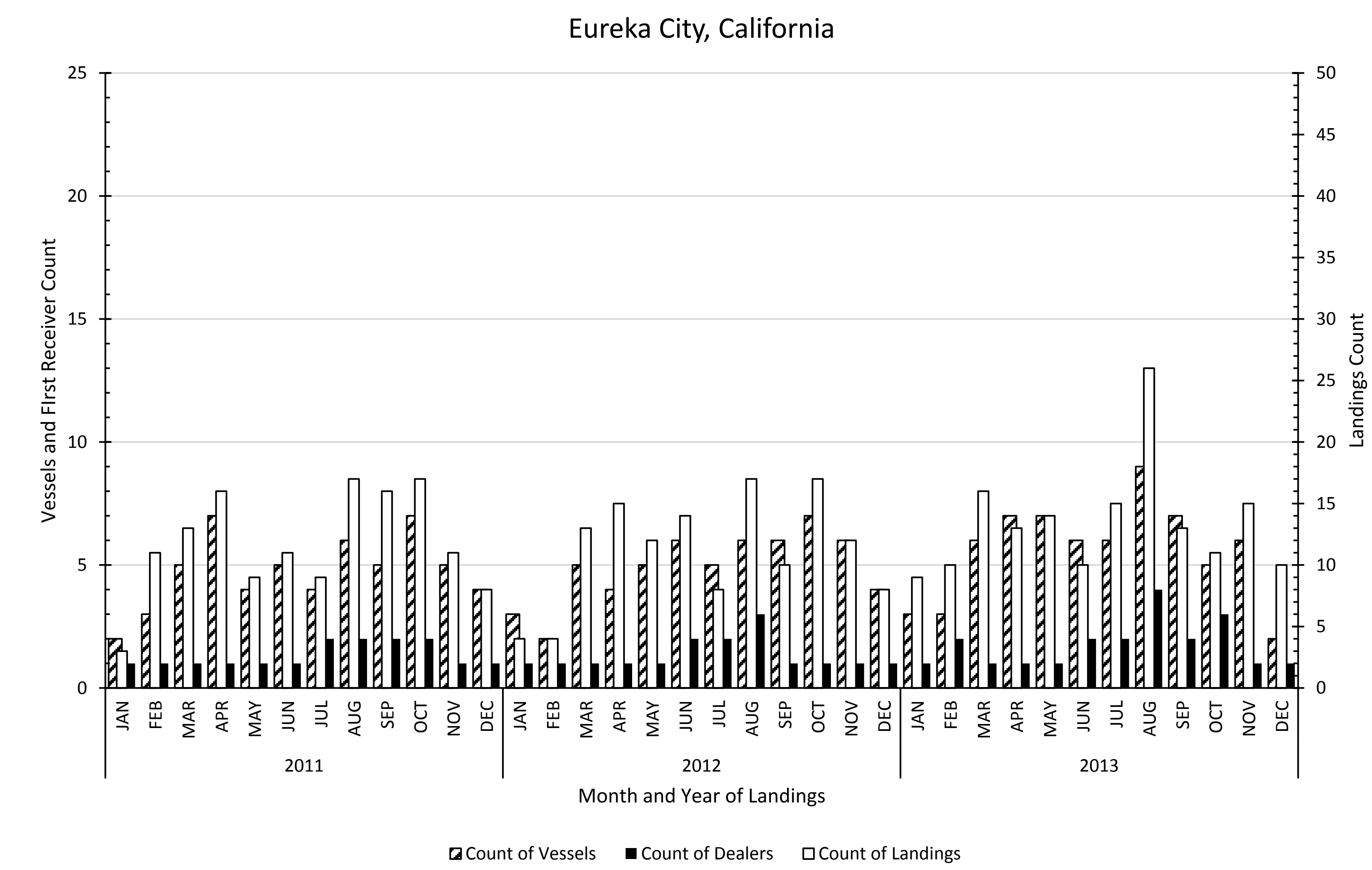


Figure 4-12 Eureka, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

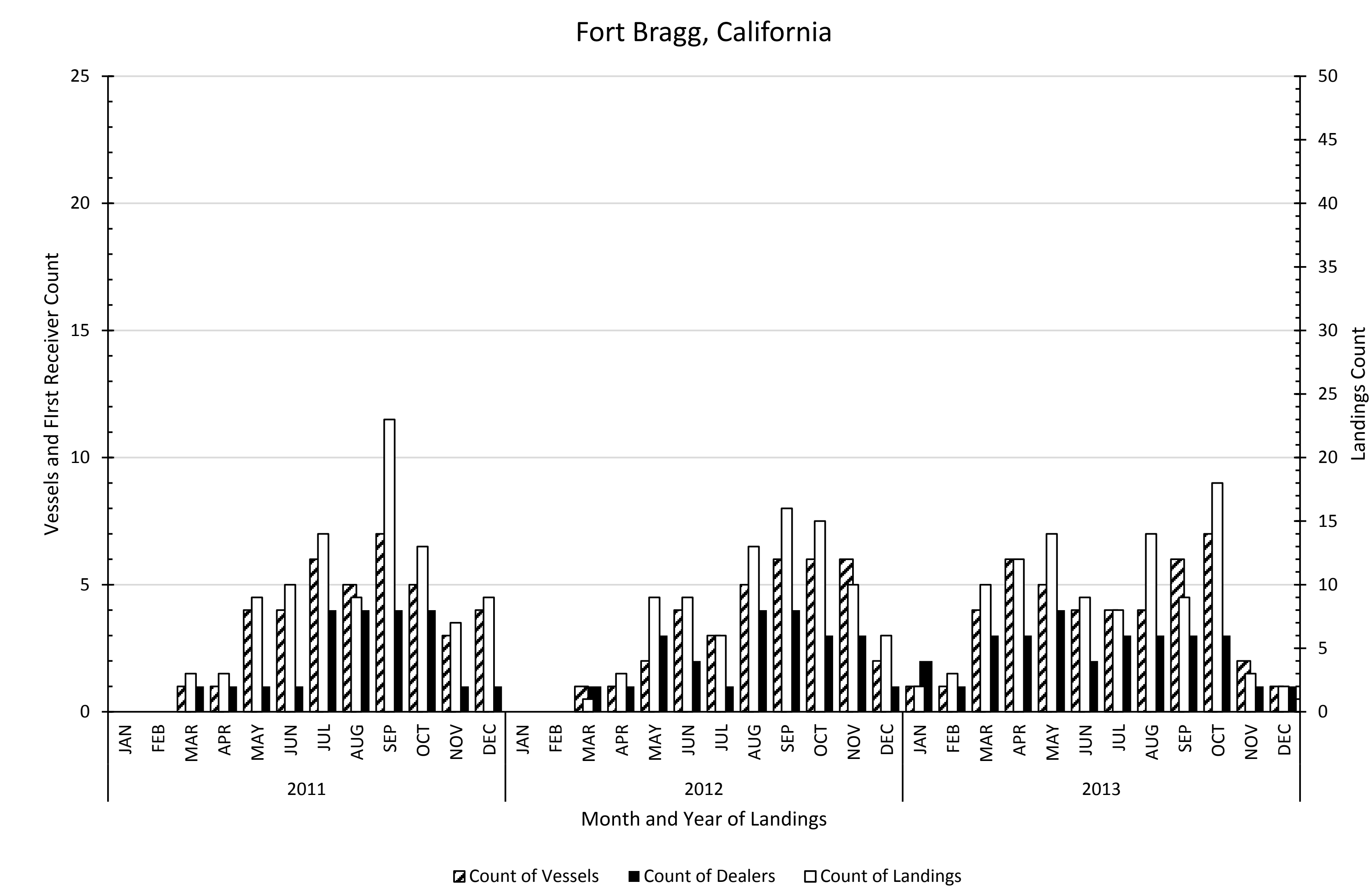


Figure 4-13 Fort Bragg, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

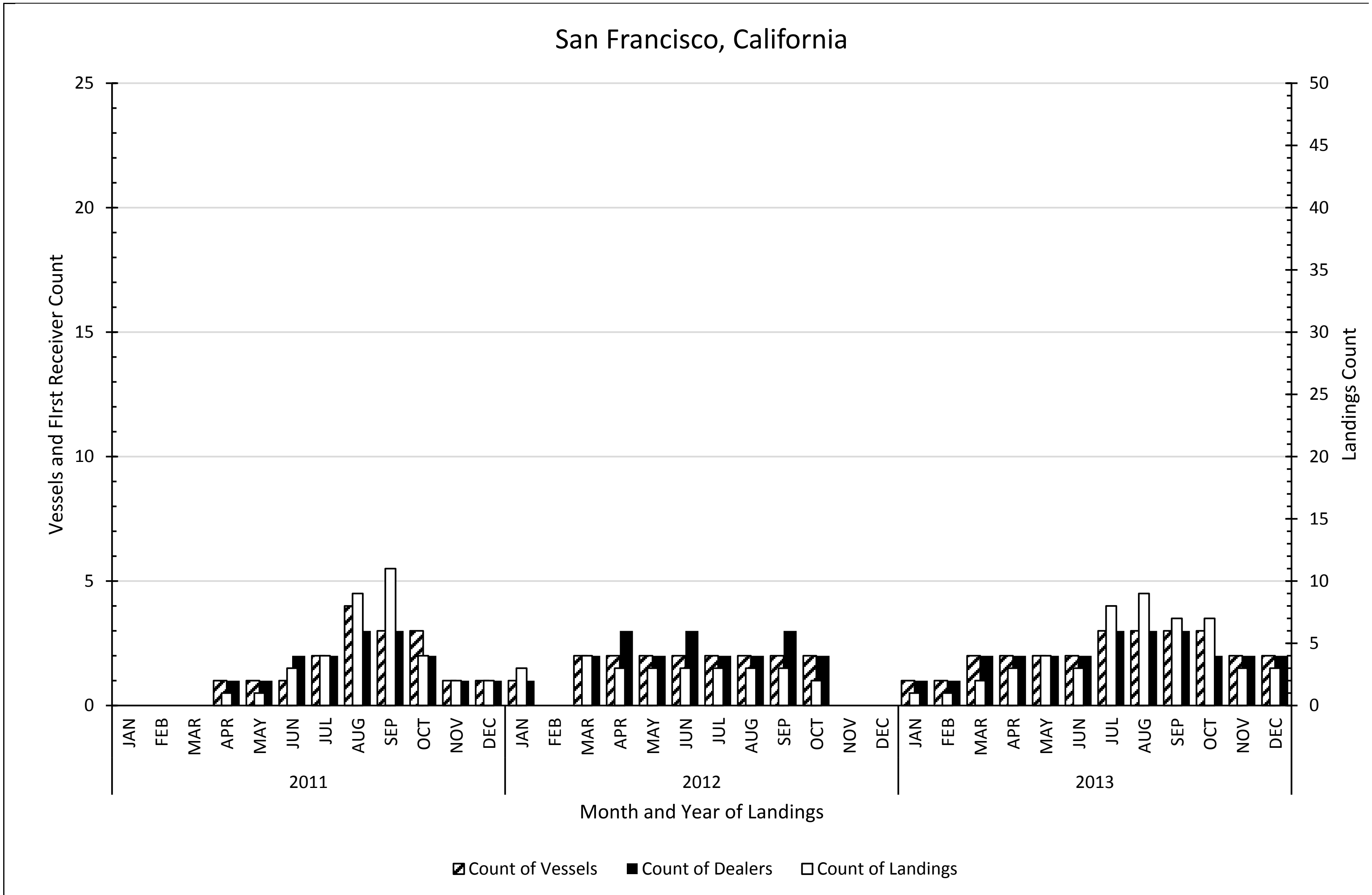


Figure 4-14 San Francisco, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

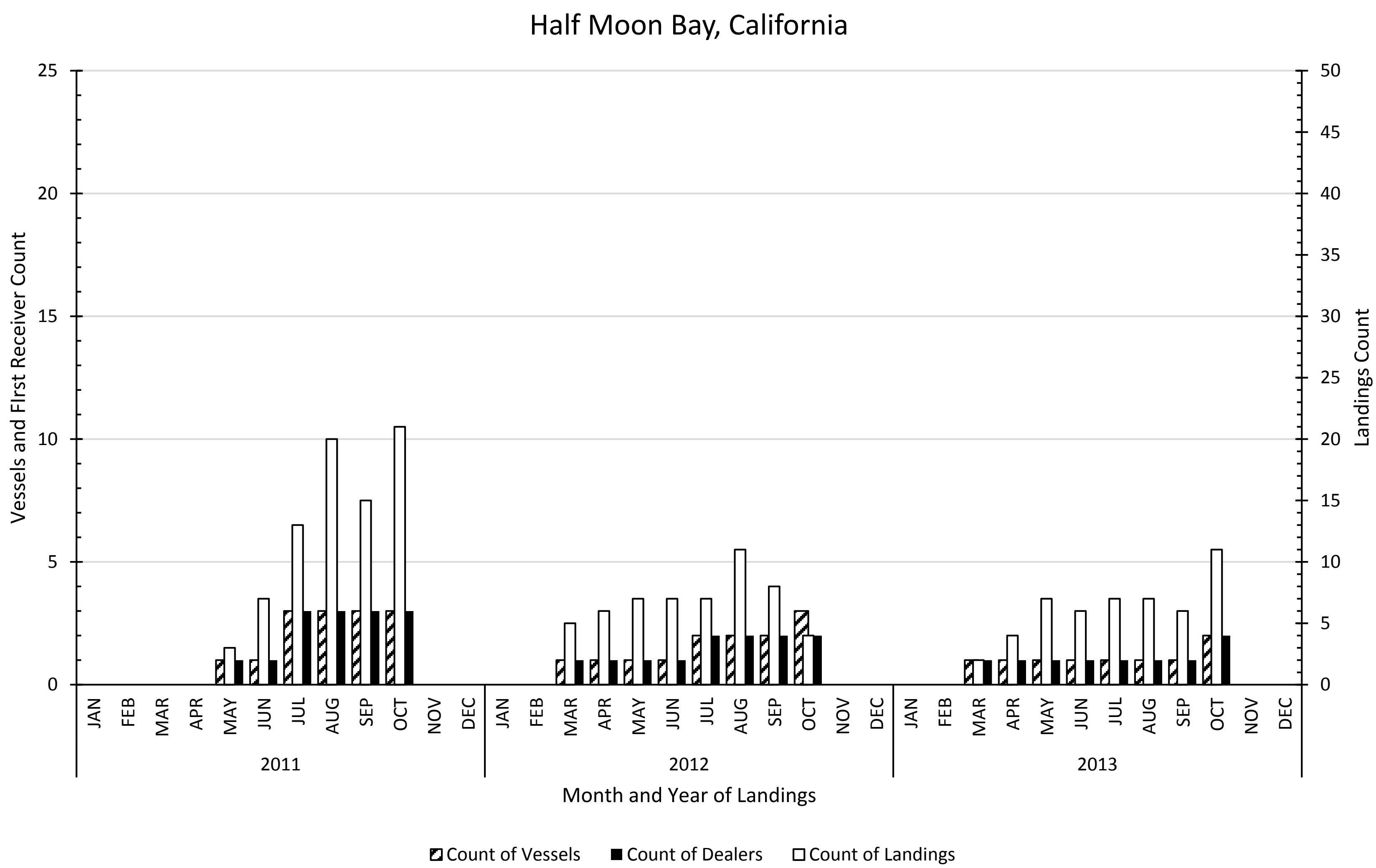


Figure 4-15 Half Moon Bay, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

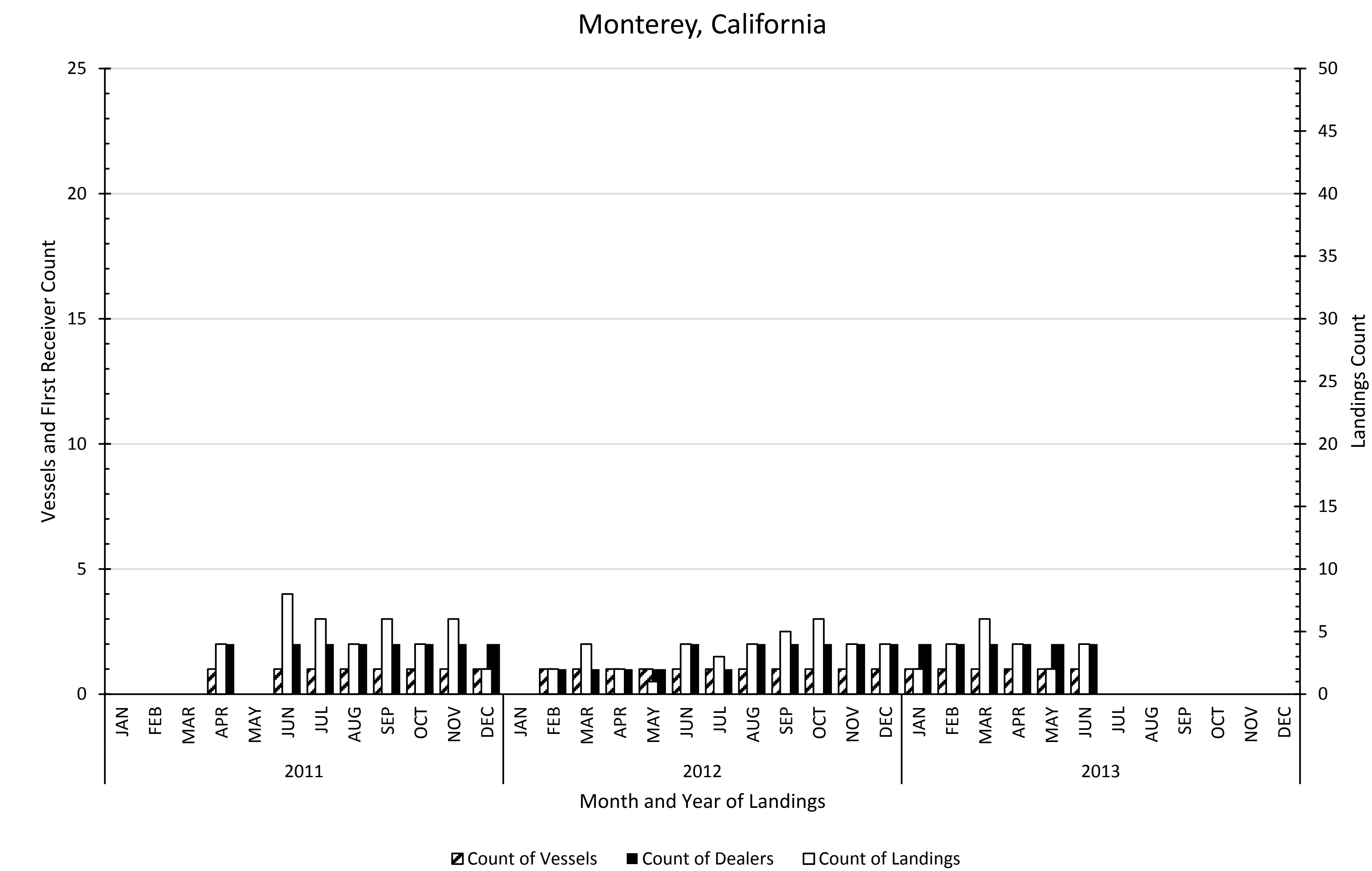


Figure 4-16 Monterey, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

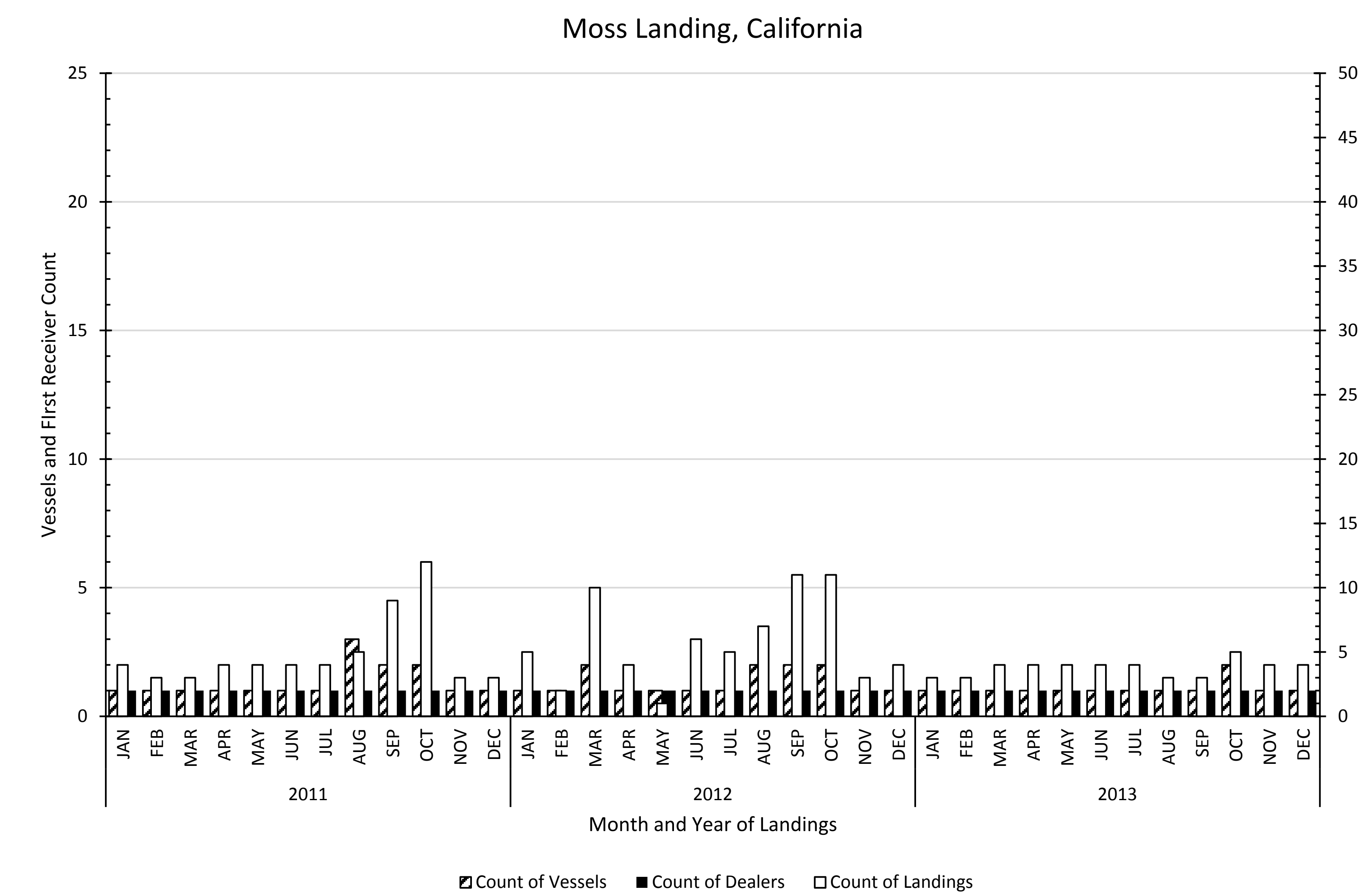


Figure 4-17 Moss Landing, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

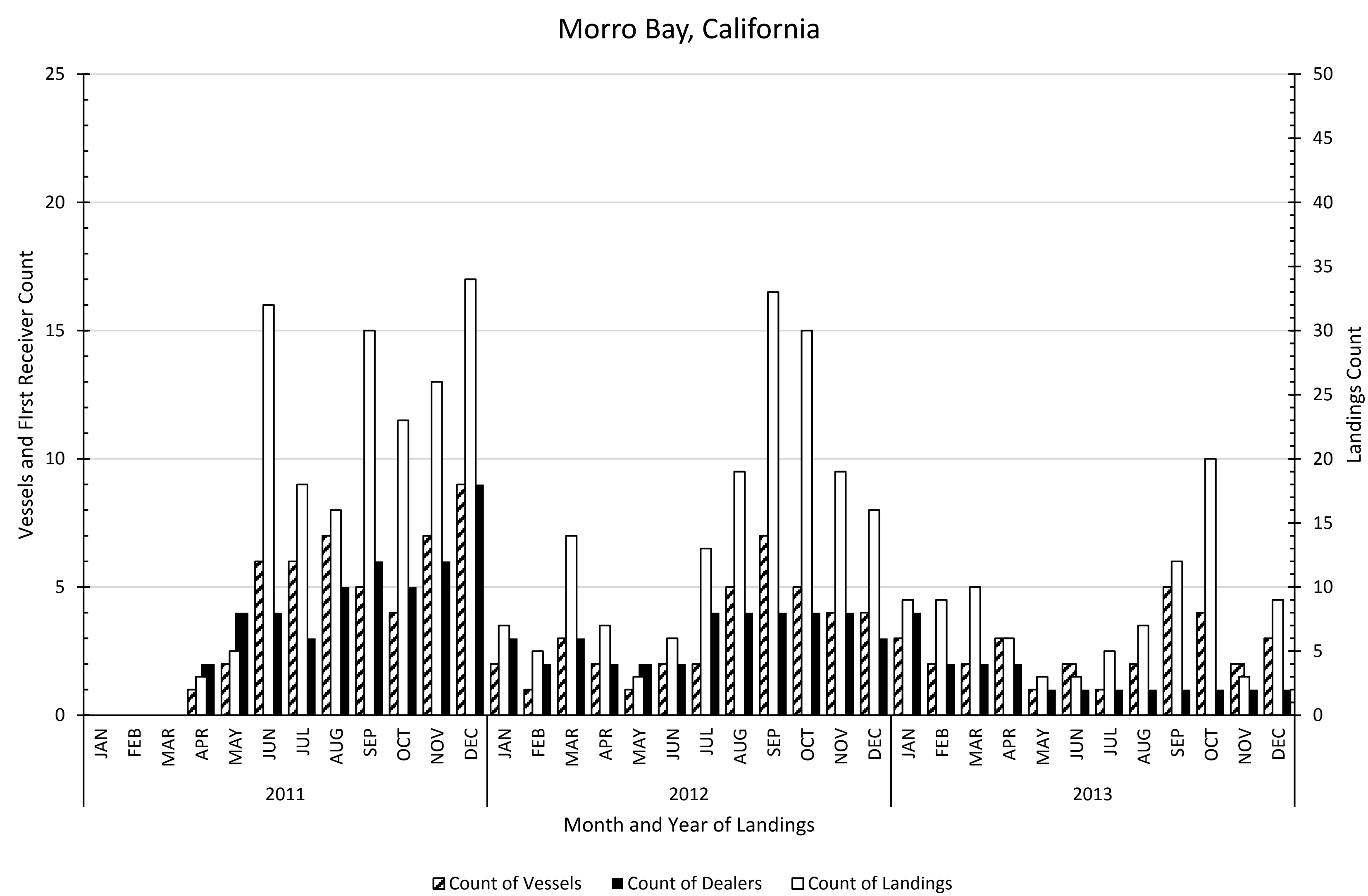


Figure 4-18 Morro Bay, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

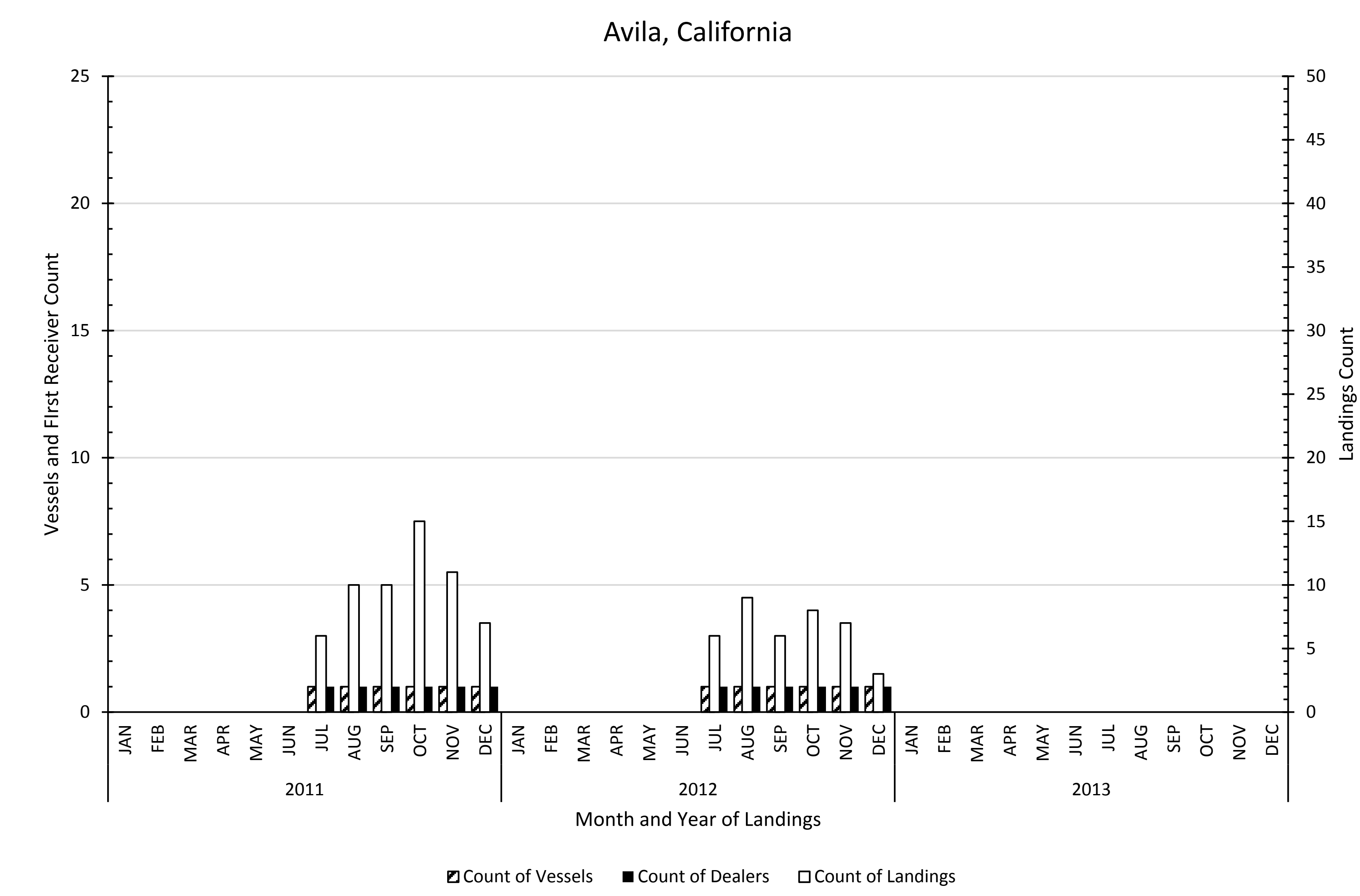


Figure 4-19 Avila, California, counts of vessels, dealers and landings by month for 2011 through 2013 (includes nonwhiting landings only – no whiting landings were made to this port).

Government Costs for Catch Monitors

Currently, in addition to observer training with the NWFSC, most every observer goes to a separate training with PSFMC to learn how to fulfill the shoreside catch monitoring function. Catch monitors are able to use the equipment provided by the NWFSC to fulfill their shoreside monitoring tasks. The PSMFC checks data quality of the reports submitted by catch monitors on a bimonthly basis and debriefs catch monitors annually. The costs of training and debriefing are covered through a government contract. This would likely continue to be the case under the No Action Alternative.

Under the action alternatives, if the shoreside catch monitoring task is reorganized to use monitors dedicated to only shoreside activities fewer shoreside monitors would be needed to fulfill this function. This could result in a reduction in the total number of shoreside monitors that need to be trained on an annual basis and possibly a reduction in debriefing time. The administrative effort for the bimonthly quality checks would be relatively unaffected, assuming that there is no change in the total number of landings. There is no reason to believe there would be substantial differences between the action and no action alternatives.

Table 4-7. PREIMINARY assessment of challenges with providing catch monitoring in each port based on seasonal landing patterns (summary of data in Figure 4-4 through Figure 4-19).

Port	Assessment of CM Needs Based on Number of Landings (averages are for months with landings – zero months excluded)	PRELIMINARY Assessment of Feasibility of Dedicated Shoreside Monitoring With Current Practices
Bellingham, Washington	Occasional seasonal (Oct-May). In 2013, an average of 2 per month, max of 4 and minimum of 1 (3 zero months).	[i]
Westport, Washington	Regular seasonal (June through November). In 2013, an average of 16 per month, max of 39 and minimum of 2 (3 zero months).. The whiting fishery is the source of the vast majority of the landings see Figure X-X.	[ii]
Ilwaco, Washington	Year round part time with seasonal peaks. In 2013, an average of 8 per month, max of 16 and minimum of 1 (no zero months).	[iii]
Astoria, Oregon	Year round full time (possibly), with season peaks. In 2013, an average of 56 per month, max of 136 and minimum of 19 (no zero months).	
Newport, Oregon	Seasonal full time and year round part time. In 2013, an average of 50 per month, max of 153 and minimum of 4 (no zero months).	[iv]
Coos Bay, Oregon	Consistent, year round part time. In 2013, an average of 16 per month, max of 27 and minimum of 3 (no zero months).	[v]
Brookings, Oregon	Consistent, year round part time – very low. In 2013, an average of 6 per month, max of 12 and minimum of 3 (1 zero months).	[vi]
Crescent City, California	Very low brief seasonal. In 2013, an average of 2 per month, max of 3 and minimum of 1 (9 zero months).	[vii]
Eureka, California	Consistent, year round part time with seasonal peak. In 2013, an average of 9 per month, max of 26 and minimum of 14 (no zero months).	[viii]

Port	Assessment of CM Needs Based on Number of Landings (averages are for months with landings – zero months excluded)	PRELIMINARY Assessment of Feasibility of Dedicated Shoreside Monitoring With Current Practices
Fort Bragg, California	Year round but very low demand in winter months. In 2013, an average of 9 per month, max of 18 and minimum of 2 (no zero months).	[ix]
San Francisco, California	Year round low level, small seasonal increase in the summer In 2013, an average of 4 per month, max of 9 and minimum of 1 (no zero months).	[x]
Half Moon Bay, California	Low level seasonal demand May through October In 2013, an average of 6 per month, max of 11 and minimum of 2 (4 zero months).	[xi]
Monterey, California	Relatively consistent low level demand, ending June 2013. In 2013, an average of 4 per month, max of 6 and minimum of 2 (6 zero months).	[xii]
Moss Landing, California	Relatively consistent low level demand. In 2013, an average of 4 per month, max of 6 and minimum of 3 (no zero months).	[xiii]
Morro Bay, California	Year round variable demand. In 2013, an average of 8 per month, max of 20 and minimum of 3 (no zero months).	[xiv]
Avila, California	July thru Dec low level landings in 2011 and 2012. No landings in 2013.	[xv]

[i] Problematic because of seasonality, low demand and isolated relative to other fishing ports.
[ii] Some low demand in shoulder seasons, might be met with catch monitors from the Columbia River area. There might be enough demand from June through October to support a catch monitor and requirements for a second person during peak months, particularly if offloading is continuing for more than 8 to 12 hours a day.
[iii] Proximity to Astoria might make fulfilling the catch monitoring function more feasiable.
[iv] During seasonal peaks there would not appear to be a problem, assuming vessels and first recievers are able to coordinate the timing of deliveries. Off season would require part time only.
[v] Might be possible with a year round part time catch monitor.
[vi] Might be possible with a year round part time catch monitor.
[vii] Possible with coverage travelling in from Eureka. Travel time 1 hr 34 minutes. Appears to be disappearing as a trawl port.
[viii] Would require part time coverage year round. Seasonal peak might be covered with only part time coverage.
[ix] Very part time work in the winter.
[x] Possible if same part-time catch monitor could cover other bay area ports, including Half Moon Bay.
[xi] Possible if same part-time catch monitor could cover other bay area ports.
[xii] Possibly a part time individual might cover both Monterey and Half Moon Bay – driving time 27 minutes.
[xiii] Twenty minute driving time from Moss Landing to Monterey.
xiv Two hour 20 minute driving time from Moss Landing to Morro Bay.
[xv] 27 min driving time from Moss Landing to Avila.

4.3.2 Trawl IFQ Program Fishing Operations (Harvesters)

This section considers the impact of no action and the action alternatives on fishing operations/harvesting businesses. These entities are defined by their operation of a vessel, whether access to the vessel is acquired through vessel ownership or lease. Separate discussion is provided with respect to potential impacts on other types of fishery participation: quota share ownership, vessel ownership for purposes of leasing, crew and vessel operators, etc.

With respect to fishing operations, the main impacts that will be considered are as follows:

1 Change in Operating Costs
2 Change in Operational Flexibility

3 Change in Privacy

4.3.2.1 No Action Alternative

Under the no action alternative, the current Federal subsidy for observers is likely to run out in the next year or two. With the end of this subsidy, the increased financial costs may lead to an increase in consolidation within the fleet, resulting in fewer fishing vessels. Additionally, the impacts of the cost increases may be greater for vessels which have lower net revenue per day of fishing than vessels with higher net revenue per day. Observer costs which are a fixed cost for each day of fishing will erode a greater proportion of the profits of lower net revenue per day vessels than higher net revenue per day vessels. Depending on cost structures this could change the nature of the fleet. For example if smaller vessels also tend to have lower net revenue per day then the number of smaller vessels in the fleet may diminish. Or if vessels operating along a particular area of the coast have lower net revenue per day then those vessels may sell their quota to vessels operating on other regions of the coast.

4.3.2.2 Action Alternative

For both those who participate and do not participate in the EM program, costs are likely to be higher if some sectors of the fleet are covered by EM while others are not (as compared to a system where all sectors are covered at the same time). Also, the lower the participation rate in the EM program the higher the likely per fishing day costs of the program; and similarly the lower the participation rate in the at-sea compliance monitoring program, the higher the likely per day fishing costs for those carrying compliance observers.

Effects on Participants in the EM Program

- Elimination of observer costs
- New costs for electronic equipment (acquisition and maintenance)
- New costs for servicing (retrieving and transmitting/transferring data) (responsible party still to be determined)
- New costs for video review (responsible party still to be determined)
- New costs for disposal of unwanted retained fish
- Increased operational flexibility with respect to departure and duration of fishing trip
- Decreased operational flexibility with respect to discards (until camera technologies improve)
- More constraints on fish handling on the vessel, potentially reducing efficiency (to ensure good camera images, including a possible requirement for the use of discard chutes).
- More privacy with respect to potential observer presence throughout the ship and privacy related to factors other than visual images
- Less privacy with respect to constant video surveillance within camera range
- Reduction in available hold space for a maximized retention fishery
- Problematic mixing of species (e.g. retained dogfish may have adverse impact on product quality if kept in the same hold with other fish).

- Time required to fill out logbooks (Alternative 2 only
- To the degree that discards are allowed, crew members may need to become more proficient in species identification, including juveniles and flatfish species for which species identification can be more problematic.
- There may be application fees associated with the individual vessel monitoring plans that vessels would be required to acquire.

In addition to these factors, the consistency of EM programs between fisheries (especially between the West Coast and Alaska) will have an impact on costs (e.g. if each fishery has different camera and logbook requirements then costs would be higher than they might otherwise be).

Federal permits and endorsements*:* Under all of the alternatives, vessels participating in the IFQ fishery must be registered to a limited entry permit with a trawl endorsement. In 2013, the cost to renew a limited entry permit with a trawl endorsement was $152.00. Under Alternatives 2 and 3, the costs for limited entry trawl permits with trawl endorsements are expected to remain relatively unchanged, with only minor upward adjustments being made if administrative costs increase.

Effects on Those Not Participating in the EM Program

- Potential increase in per day observer costs
- The current pool of funds for observer cost subsidies may last longer if there are fewer vessels drawing on it and that money is not reprogrammed to other types of reimbursements.

4.3.3 Quota Share Owners

Under an IFQ program, on average over the long-term, the fishing operations are expected to make zero economic profit, which is a technical way of saying that the industry is achieving normal profit levels. Under a normal profit situation, QS owners will capture any unexpected economic profits (above normal profits) which occur from changing conditions in the fishery, e.g. unexpected increases in exvessel prices would increase QS value and unexpected increases in fuel costs would decrease QS value. If the EM program reduces operational costs a portion of that reduction will be capitalized in the value of the QS, increasing the costs to subsequent entrants such that their costs are more likely to be at normal profit levels. Absent other changes in the market place, those holding the QS at the time of the change will experience increased revenue up until they sell the QS and then a higher revenue from the sale of the QS. Under the action alternatives it is expected that the fishery will operate at normal profit levels on average over the long term with higher quota share prices than would otherwise be present. Under the no action alternative, it is expected that the fishery will operate at normal profit levels on average over the long term with lower quota share prices than would occur under EM (assuming the analysis shows that EM is less than expensive than observer coverage).

4.3.4 Vessel Owners

Vessel owners will be differentially affected depending on the vessel efficiency (net profits) on a per day basis. Those who have invested in vessels only able to generate a lower net profit per day (e.g. because of hold size) may find the value of the asset diminishes as the fixed per-day at-sea compliance monitoring costs increase, and may benefit as those costs decrease. Under No Action, per day costs are expected to increase as a result of a reduction in subsidies under. Under the action alternatives, per day costs are expected to decrease for vessels participating in the EM program (analysis has yet to determine this for certain). Also, whether the decrease will be enough to compensate for the loss of subsidies is also yet to be determined. Costs for vessels continuing to use observers are likely to increase. While some smaller vessels may have been challenged in providing space to accommodate an observer, there is no reason to expect that a vessel, because of its physical configuration, would be unable to participate in the EM program if its operator so desired.

4.3.5 Crew Members

Crew members may be directly affected by

- Changes in fish handling task
- Changes in privacy and social circumstances (cameras compared to observers)
- Changes in vessel profits that could lead to changes in crew revenue (depending on the structuring of crew payments and negotiating leverage)

Crew members may also be affected by consolidation in the fleet or a geographic redistribution of job opportunities. If EM reduces per day monitoring costs it could enhance the viability of vessels which have lower revenue per day, allowing those vessels to survive longer reducing total fleet consolidation. With respect to geographic distribution, on the one hand, EM might make it more viable to achieve at-sea monitoring out of isolated low demand ports. On the other hand, the shoreside catch monitoring function may become more difficult to fulfill in those ports, as discussed in Section 4.3.1.2.

4.3.6 Other Fisheries

Inconsistency in requirements for EM monitoring among different fisheries could make it more expensive for vessels moving between fisheries. Creating a greater cost barrier for movement between fisheries could change the competition within fisheries.

If maximized retention requirements increase the mortality of non-groundfish taken in the groundfish fishery, fishing opportunities in other fisheries could be reduced (an assessment of current bycatch information is needed to evaluate this as a possible outcome).

4.3.7 Processors

The most likely direct effect on first receivers will relate to possible changes in the costs of shoreside catch monitoring services (see discussion in Section 4.3.1.2). In that regard, first receivers in high landing ports (higher number of landings) may experience either no change or a lesser increase in catch monitoring costs than first receivers in low landing ports. This could advantage processors in high landings ports. While first receivers in low landing ports could try to pass costs on by reducing exvessel prices, the expected long-term result of such a practice would be the transfer of QS out of those ports to the higher landing ports. The need to control catch monitoring costs could encourage first receivers to coordinate with one another in

How significant is the shoreside catch monitoring cost to processors? To be developed: catch monitoring costs relative to exvessel revenue for a range of typical sized landings.

Processors may also be impacted depending on how the disposal of unwanted retained catch is handled. Whiting deliveries are already made under maximum retention rules so under either action alternative there would be no expected change in retention with respect to the whiting fishery, relative to the no action alternative.

4.3.8 EM Providers

Under status quo, EM providers have been participating in research and development work. That would likely draw to a close under either of the action alternatives if all sectors are covered by EM. Under the action alternatives, new business opportunities would be created for EM providers. Depending on businesses' strategies, the EM provider companies could be the same as the catch monitor provider companies. There are a number of different tasks that could be handled by either EM providers or Observer/Catch Monitor providers

- EM equipment, installation, and maintenance
- EM software
- Data retrieval (hard drive retrieval)
- Video review

Some of these functions, such as hard drive retrieval, might also be handled by catch monitors, state personnel, or crew members. More policy development is needed in this area.

4.3.9 Video Reviewers

The new task of reviewing video will be created. Video review might be conducted by:

- PSMFCa
- NMFS
- 3rd Party (EM Provider or Observer/Catch Monitor Provider)

Costs of review and who pays for the review may vary depending on the entity providing the services. If NMFS handles the video review task it would be difficult to create a funding mechanism by which industry would pay for the task. The maximum 3 percent of exvessel revenue fee is already being collected for the shorebased IFQ program. However, the mothership co-op program is at about 2 percent, which might leave some room for charging video for review (if the additional one percent is not taken up by other expenses related to the electronic monitoring program). If industry pays for the review there will be more private incentive for innovation to develop technologies and software to increase efficiency of the review process.

4.3.10 **Observer Providers**

A transition to EM would likely inject considerable uncertainty during the adjustment period. The demand for observer and catch monitor services will depend both on the amount of participation in the program and the at-sea biological observations contracted for by the WCGOP. The provision of shoreside catch monitoring services might present some particular logistical challenges (see Section 4.3.1.2). For ports with relatively low levels of demand for catch monitoring it may be difficult for more than one provider to service the port, affecting competition and fees. Fees for observers and catch monitors might have to increase in order to maintain a reasonable profit level.

4.3.11 **Communities**

Communities will be effected depending on the industries ability to coordinate and supply shoreside catch monitors to ports with low level and season demand. Other factors which may affect the flow of QS trading among geographic areas may impact communities. Further discussion will be developed.

Communities may also be impacted depending on how the disposal of unwanted retained catch is handled. Impacts might include odor, water usage, and truck noise. If a meal plant is installed, the retained catch may benefit the community.

4.3.12 **Government**

4.3.12.1 Federal

In addition to the direct costs of the EM program and adjustments to the program for biological observers (see Section 4.3.1.2), some of the additional costs and savings to be considered include

- Costs for increased shoreside biological sampling of retained fish (could be a state task)
- *List to be developed*

4.3.12.2 States

States might be called on for biological sampling in the ports (to replace the retained catch sampling currently conducted by at sea observers). There is a question as to whether the states could become providers for shoreside catch monitoring services. There may also be a need to modify trawl logbooks to allow the recording of discards. The logbooks used in the fishery are currently state logbooks. If the Federal requirement for recording discards is met with state logbooks there may be some additional changes required for the computer reporting system. See Section 4.3.1.2 for further discussion.

4.3.12.3 Pacific States Marine Fisheries Commission

PSMFC currently receives Federal money for training, debriefing and data quality checks for shoreside catch monitors. This contract could decrease if there are fewer catch monitors in the field. PSMFC could take on other roles in the EM system, including the role of video reviewer.

PSMFC may need to make changes to the PacFIN data system to incorporate a new discard logbook (Alternative 3).

4.4. Cumulative effects

[Insert text after preferred alternative is selected]

CHAPTER 5 LIST OF PREPARERS

The document was prepared by Pacific Fishery Management Council staff:

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CHAPTER 6 REFERENCES

APPENDIX A

MSA Management Standards

Table 6-1. National Standards from the Section 301 of the MSA.

NS-1	Conservation and management measures shall prevent overfishing while achieving,on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
NS-2	Conservation and management measures shall be based upon the best scientific information available.
NS-3	To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
NS-4	Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
NS-5	Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
NS-6	Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
NS-7	Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
NS-8	Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
NS-9	Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
NS-10	Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Trawl Rationalization Goals and Objectives (Amendment 20)

Table 6-2. Trawl Rationalization goals and objectives from Amendment 20.

Goal *Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.*
Objectives The above goal is supported by the following objectives:
1. Provide a mechanism for total catch accounting.
2. Provide for a viable, profitable, and efficient groundfish fishery.
3. Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.
4. Increase operational flexibility.
5. Minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical.
6. Promote measurable economic and employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry.
7. Provide quality product for the consumer.
8. Increase safety in the fishery.
Constraints and Guiding Principles The above goals and objectives should be achieved while the following occurs:
1. Take into account the biological structure of the stocks including, but not limited to, populations and genetics.
2. Take into account the need to ensure that the total OYs and allowable biological catch (ABC) are not exceeded.
3. Minimize negative impacts resulting from localized concentrations of fishing effort.
4. Account for total groundfish mortality.
5. Avoid provisions where the primary intent is a change in marketing power balance between harvesting and processing sectors.
6. Avoid excessive quota concentration.
7. Provide efficient and effective monitoring and enforcement.
8. Design a responsive mechanism for program review, evaluation, and modification.
9. Take into account the management and administrative costs of implementing and oversee the IFQ or co-op program and complementary catch monitoring programs, as well as the limited state and Federal resources available.

Pacific Groundfish FMP Goals and Objectives

General FMP

Table 6-3. Pacific Groundfish FMP Goals and Objectives

Goal 1 - Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.
Goal 2 - Economics. Maximize the value of the groundfish resource as a whole.
Goal 3 - Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.
Objectives. To accomplish these management goals, a number of objectives will be considered and followed as closely as practicable:
Conservation Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.
Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.
Objective 3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.
Objective 4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.
Objective 5. Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.
Economics Objective 6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.
Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.
Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.
Objective 10. Recognize the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.
Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.
Social Factors. Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.
Objective 13. Minimize gear conflicts among resource users.
Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.
Objective 15. Avoid unnecessary adverse impacts on small entities.
Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.
Objective 17. Promote the safety of human life at sea.

APPENDIX A. ANALYSIS OF EM PROGRAM PROVISIONS

1.1. Retention options

1 Max retention - this would be status quo for midwater whiting; however for other gears there would likely be additional cost to sort, market, and distribute fish, additonal costs to send to landfill. ay flood markets if too much fish is landed accross region. Optimum retention cos would be less than max retention but uncertain based on marketability of certain species. Discrad of know unmarketable fish is positive benefit cus it reduces the costs of sorting, marketing and distribution of fish. May flood markets if too much fish is landed accross region. Discard at will allows fishermen to meet loacl and regional/national demands, similar to staus quo so future landings would be similar to current state of fisheries.

direct impact if changes are needed, definitons of catch/discard could affect handling protocols; max retention may be inefficient, take up hold space; installation of equipment and a change in fish handling may reduce efficiencies for vessel (reduce profit?)

direct impact-need to identify EM provider and create plan; costs to contract with EM provider and purchase system and modify vessel if necessary.

Agenda Item F.2.a
Supplemental Electronic Monitoring
Regulatory Process Overview
June 2014

Agenda Item F2

Electronic Monitoring Regulatory Process

Agenda Item F2 - Reference Materials

- F2a Att1: Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program.
- F2a Supplemental Att 2: Letter from Honorable DeFazio
- F2b GEMPAC Report: GEMPAC Report to Council.
- F2b PSMFC Report: PSMFC Final 2013 Report.
- F2b NMFS Report: Net Revenue Analysis for Electronic Monitoring on the West Coast.
- F2c Supplemental Pub Comment: Report on the 2004 to 2010 US Shore-based Whiting EM Program

Council Action

Consider Refining Alternatives and Adopting Preliminary Preferred Alternatives, as Appropriate, for Public Review

Overview

- GEMPAC report
- Draft Analysis of Alternatives
- Net Revenue Highlights
- Advisory body statements
- Public Comment
- Council Action

Agenda Item F.2.b,
GEMPAC Report to Council

GEMPAC Recommendations

1) Adopt the definitions for total catch, retained catch, discard, maximized, and optimized retention for trawl and fixed gear as noted in Appendix C for the purpose of development and analysis of an EM program.

2) Revise the alternatives and options as detailed in Appendix D, "Recommended Revisions and Additions to Adopted Alternatives and Options."

GEMPAC Recommendations in the Draft EM Program Analysis Attachment 1, Table 2-1

Photo courtesy of Archipelago Marine Research Ltd.

Video Reading Protocols

		DETAILED COMPONENTS FOR All FISHERIES		
Section Ref.	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.2.2	Video Reading Protocols	None	**Option A**: 100% (census). **Option B**: Subsample Video (% to review must be developed)	Audit logbook (intensity varies based on vessel's compliance history)

GEMPAC recommended preliminary Preferred Alts:
Fixed gear representatives like Alternative 3. MDWT whiting like Alt 3 but want further analysis of Alt 2 prior to final recommendation.

Current IFQ Retained/Discard Accounting

Total IFQ catch

Retained:

Landed catch

Shoreside catch monitors

Discard:

Dumped off deck (e.g., shoveled, picked out of net)
Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
Dropped off gear
Floating fish
Lost gear (estimated using WCGOP protocol)
Consumed/used as bait (noted on WCGOP forms)
Unobserved sets/hauls (estimated using WCGOP protocol)

WCGOP estimates

Discard Accounting

		DETAILED COMPONENTS FOR All FISHERIES		
Section Reference	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.3	Discard Accounting - Individual or Fleet-wide	Observers/IFQ	**Option A**: One discard category and all discards are estimated using EM and counted against IFQ. **Option B:** Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard in Category 1, the estimate is based on trips with observer coverage. **Option C**: Split into two discard categories; Category 1 count against IFQ, no accounting for discard 2 category.	

Discard Accounting - Option A

Option A - Estimate Discard with EM and Count against IFQ

One discard category with IFQ accounting:

- Dumped off deck (e.g., shoveled, picked out of net)
- Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
- Dropped off gear
- Floating fish
- Lost gear (not captured by EM, estimate using WCGOP protocol)
- Consumed/used as bait (not captured by EM)
- Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)

Discard Accounting - Option B

Option B - Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL

Discard 1 IFQ Accounting:

- Dumped off deck (e.g., shoveled, picked out of net)
- Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
- Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP

Discard 2 Sector or ACL accounting (use WCGOP estimates and protocols):

- Dropped off gear
- Floating fish
- Estimated from lost gear
- Consumed/used as bait

Discard Accounting - Option C

Option C- Split into two discard categories; no accounting for discard 2 category

Discard 1 IFQ Accounting:

- Dumped off deck (e.g., shoveled, picked out of net)
- Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
- Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP

Discard 2 No accounting:

- Dropped off gear
- Floating fish
- Estimated from lost gear
- Consumed/used as bait

Discard Requirements

		DETAILED COMPONENTS FOR All FISHERIES		
Section Reference	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.5	Discard Requirements	Discard at will unless required to retain.	**Option A**: **Maximized Retention** **Option B**: **Optimize Retention of Catch Share Species with Limited - Potential Gear Specific Sub-options under Optimized Retention (must be verifiable under EM)** **Option C - Discard At Will** (Status Quo)	

GEMPAC Recommended Preliminary Preferred Alts:

- Fixed gear and bottom trawl representatives prefer Optimized retention (Option B)
- Midwater trawl whiting representatives prefer Maximize retention (Option A)

Halibut Retention/Discard

		DETAILED COMPONENTS FOR All FISHERIES		
Section Ref.	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.6	Halibut Retention/ Discard with Fishery Specific Options	Use WCGOP and IPHC protocols	**Option A**: Apply mortality rate for specific gear type: • MDWT Whiting 100% mortality; • MDWT non-whiting and BTW IPHC 90% mortality if discarded; • Fixed gear longline IPHC 16% mortality if discarded; • Fixed gear pot IPHC 18% mortality if discarded.	

Halibut continued

		DETAILED COMPONENTS FOR All FISHERIES		
Section Ref.	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.6	Halibut Retention/ Discard with Fishery Specific Options	Use WCGOP and IPHC protocols	**Option B:** WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet **Option C:** IPHC exemption to allow full retention (need to examine the feasibility of this option) **Option D:** Captain and crew provide assessment (training would be required) **Option E**: Use an appropriate EM viability assessment (currently conducting study, need IPHC approval) **Option F**: Use vessel specific mortality rate (update rates periodically)	

Discard Species List

		DETAILED COMPONENTS FOR All FISHERIES		
Section Reference	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.7	Discard Species List Adjustment	None	**Options for a process to expand or change the species lists:** **Option A**: NMFS make determination and provide list to fishers through the NMFS EM Observer Exemption Process. **Option B**: Use Council process routine management measures (e.g., use groundfish specification process, or some other routine management measure). **Option C**: Set initial lists in regulation and change through Council process with proposed/final rule making.	

Payment for Scientific Collection

		DETAILED COMPONENTS FOR All FISHERIES		
Section Reference	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.10.1	Payment for Scientific data collection/observations	Status quo however in near future industry will need to pay for all observer costs	**Option A**: Government funded, same as pre IFQ **Option B**: Industry Funded **Option C**: Combination of both Government and Industry [Need to discuss allocating costs] **GEMPAC Recommended Preliminary Preferred:** Most industry representatives would like Option A	

NMFS Processes

		DETAILED COMPONENTS FOR All FISHERIES		
Section Reference	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.11	NMFS Processes	N/A	Identify items for NMFS to work out and then conduct a formal deeming process with the Council. • Observer Exemption Process • Individual Vessel Monitoring Plan Approval • Equipment Type Approval • Approved EM Provider List • Eligibility Criteria • Declaration Process to Use EM • Confidentiality Rules • WCGOP Scientific Observation Sampling Scheme	

Spatial Management

		DETAILED COMPONENTS FOR All FISHERIES		
Section Reference	**Component**	**Alternative 1 Status Quo: Human Observers Estimate Discard**	**Alternative 2 Camera Recordings Used to Estimate Discard**	**Alternative 3 Logbooks Used to Estimate Discard, with Camera Audits**
2.12	Spatial Variation for High Bycatch Areas	Status quo for current are restrictions (e.g., Rockfish Conservation Areas)	**Option A** - No special provisions ~~**Option B** - fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM in high bycatch areas~~ ~~**Option C** - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required~~	

GEMPAC recommends removal of Option B and C.

EM Fishery Specific Alts and Options

Fishery specific decision Tables 2-2 through 2-4 provide the alternatives and options for:

- Midwater trawl whiting
- Fixed gear (longline & pot)
- Midwater non-whiting and bottom trawl

Only components of the EM program that contain options are provide in the tables.

These are the decision points for the Council for each fishery.


QUEST-
IONS?

Draft EM Program Analysis
Attachment 1

Purpose & Need (pp. 11):

"…monitor the IFQ program for compliance in an economical and flexible manner…"

Objectives (pp. 19-20):

1. Reduce total fleet monitoring costs to levels sustainable for the fleet and agency;
2. Reduce observer costs for vessels that have a relatively lower total revenue;
3. Maintain monitoring capabilities in small ports;

and others…

Chapter 4: Impact Analysis

Physical and Biological Environment

- Potential gear switching
- Potential changes in geographic distribution
- Increased retention and related mortality
- Changes in certainty around groundfish mortality estimates
- Changes in certainty around compliance
- Changes in quality of data on interactions with protected species

Socio Economic Impacts

- Continuing to develop the socioeconomic impact assessment
- Today covering
  - Cost estimation
  - Participation rate assumption
  - Logistical challenges
  - Net revenue analysis
- Information not available at May GEMPAC Mtg

Cost Estimation

- Working with NMFS and PSMFC to develop
  - Template – Table 4-3, pp. 91-92
    - Cost centers
    - Columns on who pays
    - Includes PSMFC video review cost estimates
    - Much to be developed
- Average Costs Will Vary Depending on Fisheries Included and Participation
  - Both government and private (provider fees)
  - With more fisheries, fixed costs spread over more vessels.
  - Likely inverse correlation
    - More EM participation,
      lower average EM costs, **higher** average observer costs
    - Less EM participation,
      higher average EM costs, **lower** average observer costs

Participation Rate Assumption

Costs will be affected by participation rates

Analysis range:

- High - 80%
- Medium - 50%
- Low - 20%

Looking for comments on this range

Logistical Challenges

- Monitoring capability in small ports
  - Resolve at-sea compliance observers
  - New challenge - shoreside catch monitors?
    - Currently observers cover shoreside monitoring
    - How will cost of shoreside coverage be affected?

- Seasonal by port - Figures 4-4 through 4-19
  - Seasonal summary for 2013 – Table 4-7.

Excerpts from Table 4-7.

Port	2013 Seasonal Summary (averages are for months with landings – zero months excluded)
Bellingham, Washington	Average of 2 per month, max of 4 and minimum of 1 (3 zero months).

Excerpts from Table 4-7.

Port	2013 Seasonal Summary (averages are for months with landings – zero months excluded)
Bellingham, Washington	Average of 2 per month, max of 4 and minimum of 1 (3 zero months).
Astoria, Oregon	Average of 56 per month, max of 136 and minimum of 19 (no zero months).

Excerpts from Table 4-7.

Port	2013 Seasonal Summary (averages are for months with landings – zero months excluded)
Bellingham, Washington	Average of 2 per month, max of 4 and minimum of 1 (3 zero months).
Astoria, Oregon	Average of 56 per month, max of 136 and minimum of 19 (no zero months).
Fort Bragg, California	Average of 9 per month, max of 18 and minimum of 2 (no zero months).

Excerpts from Table 4-7.

Port	2013 Seasonal Summary (averages are for months with landings – zero months excluded)
Bellingham, Washington	Average of 2 per month, max of 4 and minimum of 1 (3 zero months).
Astoria, Oregon	Average of 56 per month, max of 136 and minimum of 19 (no zero months).
Fort Bragg, California	Average of 9 per month, max of 18 and minimum of 2 (no zero months).
Monterey, California	An average of 4 per month, max of 6 and minimum of 2 (6 zero months).
Moss Landing, California	Average of 4 per month, max of 6 and minimum of 3 (no zero months).

Excerpts from Table 4-7.

Port	2013 Seasonal Summary (averages are for months with landings – zero months excluded)
Bellingham, Washington	Average of 2 per month, max of 4 and minimum of 1 (3 zero months).
Astoria, Oregon	Average of 56 per month, max of 136 and minimum of 19 (no zero months).
Fort Bragg, California	Average of 9 per month, max of 18 and minimum of 2 (no zero months).
Monterey, California	An average of 4 per month, max of 6 and minimum of 2 (6 zero months).
Moss Landing, California	Average of 4 per month, max of 6 and minimum of 3 (no zero months).
Morro Bay, California	Average of 8 per month, max of 20 and minimum of 3 (no zero months).

Shoreside Logistical Challenges

- A smaller local core of observers/monitors
- Some vessels carrying EM
- Some observers at-sea
- Need to cover a few hour task.

- Responses to situation: uncertain
- Depending on the response - might expect
  - Some decrease in efficiency
  - Increased need for coordination
  - Reduced flexibility regarding landings

NMFS Report - Net Revenue Analysis (Agenda Item F.2.b, NMFS Report)

Economic health of fleet & at-sea monitoring costs

Table 2. Trawl endorsed vessels (page 5)	Variable Net Revenue Per Day	Per Vessel Annual Total Cost Net Revenue
At-sea Pacific Whiting	$11,500	$220,000
Shoreside Pacific Whiting	$8,100	$195,000
DTS Trawl	$2,900	$59,000
Non-Whiting, Non-DTS Trawl	$3,000	$22,000
Groundfish Fixed Gear	$3,900	$80,371

NMFS Report - Net Revenue Analysis (Agenda Item F.2.b, NMFS Report)

Table 4.	(page 6)	Per Vessel Annual Total Cost Net Revenue				
EM Variable Cost Per Day	EM Fixed Cost Per Year	Small Vessel (<60’)	Med Vessel (60’-80’)	Large Vessel (>80’)	Fished in AK	Only West Coast
$0	$0	$58,000	$63,000	$145, 000	$200, 000	$55, 000

NMFS Report - Net Revenue Analysis (Agenda Item F.2.b, NMFS Report)

Table 4.	(page 6)	Per Vessel Annual Total Cost Net Revenue				
EM Variable Cost Per Day	EM Fixed Cost Per Year	Small Vessel (<60’)	Med Vessel (60’-80’)	Large Vessel (>80’)	Fished in AK	Only West Coast
$0	$0	$58,000	$63,000	$145, 000	$200, 000	$55, 000
. . .	. . .	. . .	. . .	. . .	. . .	. . .
$200	$0	$52,000	$55,000	$138, 000	$192, 000	$48, 000

NMFS Report - Net Revenue Analysis (Agenda Item F.2.b, NMFS Report)

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. . .	. . .	. . .	. . .	. . .	. . .	. . .
$200	$0	$52,000	$55,000	$138, 000	$192, 000	$48, 000
$200	$5,000	$47,000	$50, 000	$133, 000	$187, 000	$43, 000

NMFS Report - Net Revenue Analysis (Agenda Item F.2.b, NMFS Report)

Table 4.	(page 6)	Per Vessel Annual Total Cost Net Revenue				
EM Variable Cost Per Day	EM Fixed Cost Per Year	Small Vessel (<60')	Med Vessel (60'-80')	Large Vessel (>80')	Fished in AK	Only West Coast
$0	$0	$58,000	$63,000	$145, 000	$200, 000	$55, 000
. . .	. . .	. . .	. . .	. . .	. . .	. . .
$200	$0	$52,000	$55,000	$138, 000	$192, 000	$48, 000
$200	$5,000	$47,000	$50, 000	$133, 000	$187, 000	$43, 000
. . .	. . .	. . .	. . .	. . .	. . .	. . .
$400	$0	$45,000	$47,000	$131,000	$185,000	$40,000

NMFS Report - Net Revenue Analysis (Agenda Item F.2.b, NMFS Report)

Table 4. (page 6)		Per Vessel Annual Total Cost Net Revenue				
EM Variable Cost Per Day	EM Fixed Cost Per Year	Small Vessel (<60’)	Med Vessel (60’-80’)	Large Vessel (>80’)	Fished in AK	Only West Coast
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. . .	. . .	. . .	. . .	. . .	. . .	. . .
$200	$0	$52,000	$55,000	$138, 000	$192, 000	$48, 000
$200	$5,000	$47,000	$50, 000	$133, 000	$187, 000	$43, 000
. . .	. . .	. . .	. . .	. . .	. . .	. . .
$400	$0	$45,000	$47,000	$131,000	$185,000	$40,000
$400	$5,000	$40,000	$42,000	$126,000	$180,000	$35,000


Questions?

PETER A. DEFAZIO
4TH DISTRICT, OREGON

NATURAL RESOURCES
RANKING MEMBER

TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEES:
AVIATION
HIGHWAYS AND TRANSIT
RAILROADS

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House of Representatives

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Ms. Dorothy Lowman
Chair, Pacific Fisheries Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Dear Ms. Lowman,

As the Chair of the Pacific Fisheries Management Council (Council), I urge you to prioritize the adoption of a regulatory framework for the use of electronic monitoring (EM) as an economically viable substitute for human observers in the West Coast Groundfish Trawl Catch Share Program at this week's Council meeting.

Since the catch share program was implemented in 2011, stocks have increased and bycatch has largely been eliminated thanks to improved personal accountability, a cornerstone of the catch share program currently achieved through 100% human observer coverage. Unfortunately, the cost of human observers is substantial and continues to grow each year. The National Marine Fisheries Service (NMFS) initially capped observer salaries at $350 per day, but today the average daily cost of an onboard observer has risen to roughly $450—36% above the national average[1]. Observer salaries exceed most crew member salaries and may constitute up to 10% of the gross earnings of small vessel operators. If the catch share program is to remain economically viable, the Council must work with NMFS to expedite the implementation of an EM program to reduce the cost of compliance monitoring.

The Council is clearly aware that the growing financial burden of human observers is unsustainable and has taken a number of steps towards developing an EM program to alleviate that burden, but final implementation of the program is not expected until January 2016. It is unclear why such a delay is necessary since NMFS has already endorsed the use of video cameras to meet monitoring and compliance needs in maximized retention fisheries[2] and the two committees (GEMPAC and GEMTAC [3]) tasked with evaluating the Council's preferred alternatives submitted their final recommendations over six months ago.

I am aware that the committees' recommendations are scheduled for review at this week's meeting, and I urge the Council to take whatever steps necessary to adopt final recommendations for NMFS as soon as possible. It is critical that the Council expedite the implementation of EM in the Groundfish Trawl Catch

[1] NMFS Observer Programs Presentation to the Council Coordination Committee, April 10, 2014
[2] NMFS Policy on Electronic Technologies and Fishery-Dependent Data Collection, May 3, 2013
[3] Groundfish Electronic Monitoring Policy Advisory Committee (GEMPAC) and Technical Advisory Committee (GEMTAC)

Share Program to reduce the cost of compliance monitoring and increase profitability, particularly for our small boat operators.

Sincerely,

Peter A. DeFazio
Ranking Member
Committee on Natural Resources

GROUNDFISH ELECTRONIC MONITORING POLICY ADVISORY COMMITTEE REPORT

Report to Council

On May 7 and 8, 2014 the Groundfish Electronic Monitoring (GEM) Policy Advisory and Technical Advisory Committees (GEM Committees) met to discuss initial alternatives adopted by the Council for analysis for an electronic monitoring (EM) program. Council staff presented draft definitions, additional draft EM components and options, and a framework for the development of a cost analysis of the potential EM program. The GEM Committees recommended definitions for total catch, discard, maximized and optimized retention, and made some modifications and additions to the Council's adopted alternatives and options for an EM program. The GEM Committees also heard from the only two west coast observer providers (Saltwalter Inc. and Alaskan Observers Inc.) regarding their current program activities, their involvement in EM pilot projects, and potential impacts of an EM program on their companies. Their general comments are provided in the Report Summary. Finally, representatives of the industry on the GEMPAC then attempted to pick preliminary preferred alternatives and options; these selections are noted in the Report Summary.

Appendix A of this report contains the GEM Committees' Proposed Agenda. Appendix B contains draft definitions from the West Coast Groundfish Observer Program (WCGOP) and Appendix C contains draft definitions developed by the GEMPAC based on the WCGOP definitions. Appendix D provides an overview of GEMPAC's recommended revisions and additions to the Council's adopted alternatives and options.

Report Summary

In November 2013, the Council adopted for analysis alternatives and options for an EM program. At the Council's April 2014 meeting the Council provided guidance for further development of the alternatives and options. Prior to the GEMPAC meeting, Council staff split these alternatives and options into fishery-specific options to begin the development of an impact analysis to provide guidance to the Council for selecting preliminary preferred alternatives in June 2014. During this process, additional components to the draft EM program for policy decision-making were identified and presented to the GEMPAC for discussion in May. Appendix D, Section 1 provides a description of the recommended revisions made to the Council's adopted alternatives and options, and Section 2 includes new EM components and options developed by the GEMPAC.

These revisions and new options can also be found in the Council's draft decision document titled "Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program" (Agenda Item F.2.a, Attachment 1). The draft decision document provides background on the development of the EM program, alternatives and options, and an initial draft impact and cost analysis.

GEMPAC Recommendations
The GEMPAC provides the following recommendations for further development of an EM program and Council consideration:

Recommendation 1: The GEMPAC recommends adopting the definitions for total catch, retained catch, discard, maximized, and optimized retention for trawl and fixed gear as noted in Appendix C for the purpose of development and analysis of an EM program.

Recommendation 2: The GEMPAC recommends revising the alternatives and options as detailed in Appendix D "Recommended Revisions and Additions to Adopted Alternatives and Options."

Potential Preliminary Preferred Alternatives (PPA)
The following alternatives and options were preliminarily recommended by representatives of the industry that participate on the GEMPAC. At the time of the GEMPAC meeting, much of the data and cost analysis was not available to make a decision on all alternatives and options, however; representatives provided a "best guess" at the time based on their knowledge of the issues, their constituents' needs, and forthcoming impact and cost analysis. The GEMPAC will review a more thorough analysis prior to the September Council meeting to provide further guidance.

Monitoring for Discards
Two action alternatives have been identified to account for fish under an EM program:

Alternative 2: Camera Recordings Used to Estimate Discard
Option A: 100% (census).
Option B: Subsample Video (% to review must be developed)

Alternative 3: Logbooks Used to Estimate Discard, with Camera Audits.

PPA: Fixed gear representatives prefer self-reporting and logbook audit (Alternative 3)
PPA: Midwater trawl whiting representatives prefer self-reporting and audit logbook (Alternative 3) at 10% review level but wants to see analysis for video subsampling/expansion option before choosing (Alternative 2, Option B)

Retention Options and Allowable Discard
For analysis purpose the GEMPAC has developed draft definitions for the retention of species under an EM program (Maximized Retention and Optimized Retention) and are described in Appendix C. The definitions include the regulatory requirements for retention and discard and some discard exceptions that may be allowed based on fishery operations. In addition, some fisheries could be allowed to discard if a species or species group can be clearly identified using video images.

At this time there are three options for retention to choose from that would govern fishery operations:

Option A: Maximize retention; generally retain all retain all catch share species, non-catch share groundfish species, non-groundfish species

Option B: Optimize retention; generally retain all retain all catch share species.

Option C: Discard at will; may discard species according to current regulations

PPA: Fixed gear and bottom trawl representatives prefer Optimized retention (Option B)
PPA: Midwater trawl whiting representatives prefer Maximize retention (Option A)

<u>Payment for Scientific Data Collection/Observations</u>
Previous to the IFQ program NMFS provided scientific data collection on roughly 20 percent of the limited entry trawl fleet. This cost was covered by the Government. Under an EM program scientific data collection will be needed from vessels without an observer. It's estimated that the WCGOP will sample roughly 20-30 percent of the EM fleet however these rates will need to be examined and a sampling scheme developed by NMFS in the future. In addition, a funding source must be identified to support the WCGOP efforts. The GEMPAC developed three options:

Option A: Government funded, same as pre-IFQ
Option B: Industry Funded
Option C: Combination of both Government and Industry

PPA: Most industry representatives would like the government to fund scientific observations on EM trips (Option A)

Summary of Observer Provider Comments
Council staff invited the only two observer providers to talk about how their company may be affected by the development of an EM program (both positive and negative) to assist the GEMPAC and Council staff in the development options and the impact analysis. For example, what are the critical policy decision points or topics of the draft EM program that may affect the provider, would they continue to provide observer coverage, what might be the thresholds for making that decision, and would you expand your program to include EM? Following the providers statements on these topics, the GEMPAC held a Q&A session with the providers.

Much of the discussions and issues that surround EM is the anticipated level of participation in an EM program and the level of need for at-sea observations in the IFQ. Overall up to 7,445 sea-days were observed in the 2013 IFQ fishery.

Sea days for 2013 were as follows:
Shoreside non-whiting (trawl and fixed gear) – 4975
Shoreside whiting – 1934
Mothership catcher vessels – 536
Total WCGOP Catch Shares – 7445
(Data Source: WCGOP)

Summary

The midwater trawl whiting fishery provides significant revenue or the only revenue to observer provider companies. A reduction in the level of observer coverage in the whiting fishery due to implementation of EM may affect observer providers ability to cover additional costs (e.g., overhead for travel and housing) in other fishery sectors. Providing services to other fishery sectors in California, in remote ports that do not require a high level of coverage, or in ports that are sporadic in the number of observers needed is costly to observer providers. Some vessels only need 2 to 5 sea days per month or only one observer is needed in a port part time. At times a full time observer is not needed in a port; however, a vessel will need one at some point in the month. It is difficult to provide fleet support at these low levels for a profit (in California there is no profit margin) and especially difficult to plan the future if the level of EM participation is unknown. Providers are planning their efforts up to 3 years in advance and it's difficult to plan for observer coverage if exempted fishing permits are provided in 2015 in large numbers. One provider suggested limiting the number of EFPs to lessen the impact on all participants in the IFQ program.

Observer providers want to provide the coverage but may need to increase their billable costs if revenue is lost from ports that drastically reduce their demand for observers. They are sensitive to daily costs that may cause hardship to the industry and do not want to drive cost so high that it causes a vessel to tie up and not fish. One provider commented that funding from the cost recovery program of the IFQ program could alleviate increasing costs to vessels and may stabilize the situation.

One provider said it would continue to support the observer needs and does not intend to become an EM provider but looking to create efficiencies in the potential EM program. One observer provider is working on a business model to accommodate an increase in the use of EM and are working on development of open source software to support EM. If there is a reduction in the need for at-sea observations it's possible that both companies may use some observers in another capacity such as to provide review of EM data or system installation/maintenance.

Currently, many at-sea observers play the role of a shoreside catch monitor for the vessel when it offloads. However if the observer is no longer needed then someone will need to fill that catch monitor role. One provider estimated that each processors would need two full time catch monitors in each plant for 100 to 120 days for the whiting fishery, which is 15 to 18 full time positions. The same observer provider commented that when people are living in ports and only working 100 days, it's impossible to keep them there.

The dual role of observer/catch monitor creates efficiencies in the IFQ program; however, this is removed when the observer is removed from the vessel under EM. Observers are trained for at-sea observations and catch monitoring by NMFS WCGOP and PSMFC. If a person does not intend to do at-sea observations, there may be a need to develop a separate training for shoreside catch monitoring that is comprehensive enough and does not rely on the fish identification portion of the at-sea observer training.

APPENDIX A

PROPOSED AGENDA
Groundfish Electronic Monitoring
Policy Advisory and Technical Advisory Committees
DoubleTree by Hilton Seattle Airport,
18740 International Blvd.,
Seattle, WA, 97188
Telephone: 206-246-8600
May 7 - 8, 2014

WEDNESDAY, May 7, 2014 9:00 A.M.

A. Call to Order/Introductions Dave Hanson
1. Roll Call/Introductions
2. Overview/Approve Agenda
3. Council Process Update Brett Wiedoff

B. Draft Definitions
1. Policy Context – Total Mortality Accounting Brett Wiedoff
2. WCGOP definition (*Handout*)
3. Draft definitions for total catch, retained catch, discard, maximized retention, optimized retention (*Handout*)

C. Draft Alternatives – Fishery Specific Alternatives Brett Wiedoff
1. Revising the gear sector groupings
2. Review master alternatives and develop gear sector specific alternative/options
   i) Halibut retention/discard (How can viability assessments be done, can NMFS exempt required discard?)
   ii) Responsible party for data review and cost implications, industry payments for review of video (Determine what is possible and how? What are the design features that make industry payment more feasible/less feasible?)
   iii) Data – transfer process and chain of custody
   iv) Data – confidentiality, access, and ownership (Determine who, what is possible?)
   v) Examine percent video review needed (video sampling/expansion, logbook audits, risk, compliance issues, who can conduct this analysis)
   vi) Separate coral and sponges from the "other category?"
   vii) Discuss EM processes that may be NMFS responsibility:
   Observer Exemption Approval Process, List of Approved EM Providers, Type Approval (equipment, data formats/open source issue), IVMP Approval (includes plan modification provisions that require re-approval), Approval of Self-Governing Plans, WCGOP – Potential support of EM program

D. Discuss preliminary preferred alternatives (PPA) Brett Wiedoff

1. Provide Council with plausible gear sector specific PPAs

PUBLIC COMMENT PERIOD

<u>THURSDAY, MAY 8, 2014 – 9:00 A.M.</u>

E. Topics for Impact Analysis

1. Status and Overview of impact analysis — Brett Wiedoff
2. Cost analysis discussion — Jim Seger
   a. Overview of cost template
   b. Expected participation rates
   c. Other
3. Observer provider discussion
   a. Impact of potential EM program on observer provider companies

PUBLIC COMMENT PERIOD

F. Committee Report

1. Review recommendations
2. Schedule for finalizing report

G. Schedule Next Meeting – Other Administrative Matters
ADJOURN

APPENDIX B
Draft Definitions for Total Catch, Retained and Discard
Northwest Fisheries Science Center Observer Program (WCGOP)

NOTE: Information regarding the At-Sea Hake Observation Program definitions were removed from the WCGOP draft document since they do not apply to the EM program.

WCGOP Fixed Gear

Total Catch:

Observer total catch (OTC) is defined as the total sum, or extrapolated weight, of all organic and inorganic material caught by the gear.

How is it estimated?

All organic and inorganic material which breaks the surface of the water and can be reasonably attributed to the vessel is counted and identified by the observer to species, species group, or type, for all - or a subsample - of the set. Weight estimates, taken using multiple weight methods allowed under WCGOP protocol, are applied to everything counted. These weights are summed, or extrapolated to unsampled segments, to calculate the Observer Total Catch.

Retained:

Retained is any portion of the total catch that is delivered to a buyer, consumed aboard, or is used for bait or other purposes.

How is it estimated?

All retained catch or a subsample of, is counted and identified to species, species group, or type. Observer weight estimates for all retained are taken using multiple weight methods allowed under WCGOP protocol. These weight estimates are applied to the counts to determine the weight of retained catch.

Discard:

Discard is any portion of the total catch that is not delivered to a buyer or utilized for any other purposes.

How is it estimated?

All discarded catch, or a subset of, is counted and identified to species, species group, or type. Observer weight estimates for all discards are taken using multiple weight methods allowed under WCGOP protocol. These weight estimates are applied to the counts to determine the weight of discarded catch.

WCGOP Trawl Gear

Total Catch:

Total catch is defined as any organic or inorganic material confined within a trawl net as the net is being landed, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel.

How is it estimated?

Total catch estimates are estimated by an observer as the net is being landed or after the catch is dumped on deck.

Retained:

Retained is any portion of the total catch that is delivered to a buyer, consumed aboard, or is used for bait or other purposes.

How is it estimated?

Retained is estimated using a combination of vessel estimates from the vessel logbook and observer estimates (e.g. overfished species). Observer estimates are taken using multiple weight methods allowed under WCGOP protocol.

Discard:

Discard is any portion of the total catch that is not delivered to a buyer or utilized for any other purposes.

How is it estimated?

Discard estimates are taken by observers using multiple weight methods allowed under WCGOP protocol.

WCGOP Additional Information:

Observers are not able to estimate discard that they cannot see, are not aware of, or has been discarded without their knowledge. Observers do their best to communicate with vessel crew to let them know what portions of the catch they need access to.

Another challenge in estimating discarded catch are any organisms that remain trapped in the mesh of the net after the bag has been dumped and are not removed by the crew. These are commonly known as “gillers”. Their weight is not accounted for in either retained or discard since there is a potential for double-counting and the inability to associate gillers to a particular haul after multiple hauls have been made. These fish make up a very small percentage of the catch.

Catch consumed on board or used for bait is another tricky situation for catch accounting. In 2014 the WCGOP will begin recording this as discard with a unique “reason for discard” of “utilized on board” in order to track this discard from other types of discard. The reason for this is so that this catch will be reported to the vessel account system and debited from quota accounts. Currently the observer program only reports discard to the vessel account system. In previous years, this type of catch was considered retained as it was used by the vessel.

There may be discrepancies between definitions of catch (listed above and followed by observers for data collection purposes) and what is used to calculate fleet wide mortality estimates or reported to the vessel account system for catch accounting purposes (following sections in this document). For example, the fixed gear definition of catch is "..material which breaks the surface of the water…", however for catch accounting purposes catch estimates are reported for lost gear that does not break the surface of the water. The observer program recognizes these discrepancies and determines that they are necessary in order to effectively train observers to capture data at sea while adequately reporting discards for accurate quota management.

<u>WCGOP Fixed Gear</u>

Lost Gear

Partial Set Lost

Scientific Analysis/Reporting protocols- Effort (i.e., fish tickets) from these sets result in discard accounting for these sets within the fleet-wide discard estimates.

Catch Accounting Protocols (Catch share quota pounds reported to the Vessel Account system for debiting) - Retained and discard observer estimates from the haul are expanded to the total set, as it is assumed the observer data for the sampled portion of the gear (retained and discard) adequately represents the composition of the lost portion of gear. Both retained and discarded catch estimates for IFQ species occurring on the lost portion of the gear are reported as discard. Additionally, PHLB has an assumed mortality rate of "dead" when occurring in lost gear.

Full Set Lost

Scientific Analysis/Reporting protocols - Effort (i.e., fish tickets) from these sets result in discard accounting for these sets within the fleet-wide discard estimates.

Catch Accounting Protocols (Catch share quota pounds reported to the Vessel Account system for debiting) – A catch per unit of effort is determined for all retained and discarded IFQ species from other sets observed during the trip and applied to the number of units of effort (hooks, pots, etc) for the lost set. These estimates for the lost gear are summed and reported as discard. Additionally, all PHLB estimated to have occurred in the lost gear are assigned a mortality rate of "dead". In the event that no other sets were sampled within the trip, like sets from other trips made by the vessel are used. Like sets are those sets observed on the same vessel with the same gear type and target strategy occurring in a similar area, depth and time period.

Unobserved Sets

Scientific Analysis/Reporting – For fisheries outside of the trawl IFQ fishery effort (i.e., fish tickets) from these sets result in discard accounting for these sets within the fleet-wide discard estimates. For the trawl catch share fishery ratio estimators are used to apportion unsampled weight to specific species.

Catch Accounting Protocols (Catch share quota pounds reported to the Vessel Account system for debiting) – A catch per unit of effort is determined for discarded IFQ species from other sets observed during the trip and applied to the number of units of effort (hooks, pots, etc) for the unobserved set. Only discarded catch is estimated and reported as discard as the retained catch is and landed by the vessel and reported through landings/catch monitors. In the event that no sets were sampled within the trip, like sets from other trips are used. Like sets are those sets observed on the same vessel with the same gear type and target strategy occurring in a similar area, depth and time period.

Reclaimed (previously lost) Gear

Sets lost, but later found, are handled on a case by case basis taking into consideration factors such as how long the gear was lost and if any viable fish were retrieved. Generally these are handled using the partially or fully lost set protocols listed above.

WCGOP Trawl Gear

Lost Gear

Scientific Analysis/Reporting protocols- Effort (i.e., fish tickets) from these sets result in discard accounting for these sets within the fleet-wide discard estimates.

Catch Accounting Protocols (Catch share quota pounds reported to the Vessel Account system for debiting) - – A catch per unit of effort is determined for all retained and discarded IFQ species from other sets observed during the trip and applied to the number of units of effort (tow minutes) for the lost set. These estimates for the lost gear are summed and reported as discard. Additionally, all PHLB estimated to have occurred in the lost gear are assigned a mortality rate of "dead". In the event that no other sets were sampled within the trip, like sets from other trips made by the vessel are used. Like sets are those sets observed on the same vessel with the same gear type and target strategy occurring in a similar area, depth and time period.

Unobserved Hauls and Unsampled or Partially Sampled Catch

Scientific Analysis/Reporting protocols- – For fisheries outside of the trawl IFQ fishery effort (i.e., fish tickets) from these sets result in discard accounting for these sets within the fleet-wide discard estimates. For the trawl catch share fishery ratio estimators are used to apportion unsampled weight to specific species.

Catch Accounting Protocols (Catch share quota pounds reported to the Vessel Account system for debiting) – Observers are trained to at a minimum make visual estimates of the amount of IFQ and non-IFQ species in hauls that they are unable to sample (broken scales, sickness, etc.). If able, they will make estimates of each discarded species or species group and this is reported as discard to the vessel account system. When a weight estimate of total IFQ species in the haul is all that the observer was able to obtain, the ratios of all discarded IFQ species found in the other sampled hauls in the trip is applied to the IFQ weight estimate. For hauls where the observer is not able to sample or make any estimates of IFQ catch, a catch per unit of effort (tow minutes) is determined for discarded IFQ species from other sets observed during the trip and applied to the number of units of effort (tow minutes) for the unobserved set.

Only discarded catch is estimated and reported as discard as the retained catch is landed by the vessel and reported through landings/catch monitors. In the event that no sets were sampled within the trip, like sets from other trips are used. Like sets are those sets observed on the same vessel with the same gear type and target strategy occurring in a similar area, depth and time period.

APPENDIX C
Draft Definitions for Development and Analysis of an EM Program

Section 1 - Retention Definitions, Requirements, and Exceptions

For analysis purpose the GEMPAC has developed draft definitions for the retention of species under an EM program. The draft definitions were developed based on existing descriptions for maximized and optimized retention options developed in previous GEMPAC reports and adopted by the Council in November 2013. Both definitions contain the same existing regulatory requirements and discard exceptions.

The GEMPAC discussed fishery specific discard options under an optimized retention regulatory environment. The definition for optimized retention contains some fishery specific discard options, however it is difficult for the GEMPAC to select which species are appropriate for allowable discard since species identification issues while using EM limit the options. PSMFC has begun to identify species that may be identifiable for discard and further analysis of these options will need be conducted to assist the Council in choosing an initial species list that is specific to each fishery.

In the future, it's expected that recognition software programs may assist in further refinement or expansion of a species discard list under an optimized retention regulatory environment. During the GEMPAC discussions the group identified that a process to update the species discard list to accommodate advances in fish identification technology or an increase in the ability to identify more species using video review. Therefore a new component was added to the EM program options (see Appendix D Section 1.8)

Maximize Retention:
A vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species (Non-FMP and not prohibited species). The following regulatory requirements or discard exceptions apply:

Existing Regulatory Requirements
Vessels must discard prohibited, ESA-listed, and marine mammal species unless otherwise allowed to retain them by regulation or under federal exemption for scientific purposes. The following regulatory requirements apply:

- Mid-water trawl IFQ trips for whiting that deliver to shoreside processors must retain prohibited species (halibut, salmon, and Dungeness crab) unless sorting at sea.
- Mid-water trawl catcher vessels delivering to motherships must retain prohibited species (halibut, salmon, and Dungeness crab).
- Midwater trawl whiting trips that are unsorted may discard minor amounts of catch not delivered to shoreside or mothership processors. (current regulation**: "**Maximized retention vessels participating in the Pacific whiting IFQ fishery may discard minor operational amounts of catch at sea if the observer has accounted for the discard (i.e., a maximized retention fishery).")

- For LE fixed gear 22 or 24 inch lingcod must be discarded or if the vessel exceeds their non-IFQ trip limit; i.e Regulatory discards. (The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42º N. lat. and 24 inches (61 cm) total length South of 42º N. lat.) **This information would need to be verifiable under an EM system.**

Discard exceptions when fishing under maximized retention - All discards must be enumerated and reported

- The vessel may discard for safety reasons (**define?**),
- The trawl net is ripped or zipper accidentally opened, or fish fell off hook.
- Fish washed out of the trawl net or is overflowing
- Vessels may discard mud, sponges, coral, inverts, and inorganic material not generally retained for sale or use.

Optimize Retention (Retain Catch Share Species with Discard Options):
A vessel is generally required to retain all catch share species. The following regulatory requirements, discard exceptions, or allowable gear specific discards apply:

*Existing Regulatory Requirements (**Same as Maximized Retention**)*
Vessels must discard prohibited, ESA-listed, and marine mammal species unless otherwise allowed by regulation or under federal exemption for scientific purposes. The following regulatory requirements apply:

- Mid-water trawl IFQ trips for whiting that deliver to shoreside processors must retain prohibited species (halibut, salmon, and Dungeness crab) unless sorting at sea.
- Mid-water trawl catcher vessels delivering to motherships must retain prohibited species (halibut, salmon, and Dungeness crab).
- Midwater trawl whiting trips that are unsorted may discard minor amounts (**define?**) of catch not delivered to shoreside processors.
- For LE fixed gear 22 or 24 inch lingcod must be discarded or if the vessel exceeds their non-IFQ trip limit; i.e Regulatory discards. (The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42º N. lat. and 24 inches (61 cm) total length South of 42º N. lat.) T**his information would need to be verifiable under an EM system.**

*Discard exceptions when fishing under maximized retention - All discards must be enumerated and reported (**Same as Maximized Retention**)*

- The vessel may discard for safety reasons (**define?**)
- The trawl net is ripped or zipper accidentally opened, or fish fell off hook.
- Fish washed out of the trawl net or is overflowing
- Vessels may discard mud, sponges, coral, inverts, and inorganic material not generally retained for sale or use.

***Potential Gear Specific Sub-options under Optimized Retention**:*
This information would need to be verifiable under an EM system. Options here are not mutually exclusive; however, there must be adequate images for species identification and weight estimates of catch share species discards.

Midwater trawl non-whiting trips, bottomtrawl, and fixed gear trips may discard the following species if verifiable under the EM program and approved by NMFS:

a) For catch share species
   Option a – Allow discard of flatfish
   Option b – Allow discard of lingcod and sablefish
   Option c – Allow discard of all non-rockfish groundfish (full retention of rockfish only)
   Option d – Allow discard if species that are verifiable with EM
b) For non-catch share groundfish species
   Option c – Allow discard of all non-rockfish groundfish (full retention of rockfish only)
   Option d – Allow discard if species that are verifiable with EM
c) For non-groundfish (Non-FMP and not prohibited species)
   Option e – Allow discard of all non-groundfish species
   Option d – Allow discard if species that are verifiable with EM

Section 2 - Definitions for Total Catch, Retained Catch, and Discard

Under the catch shares program, total catch must be accounted for to debit individual quota share accounts and fishery allocations (Figure 1). Retained and discarded catch is combined to get total catch. Shoreside monitors are used to verify retained catch and the West Coast Groundfish Observer Program uses at-sea monitors to account for and estimate discards.

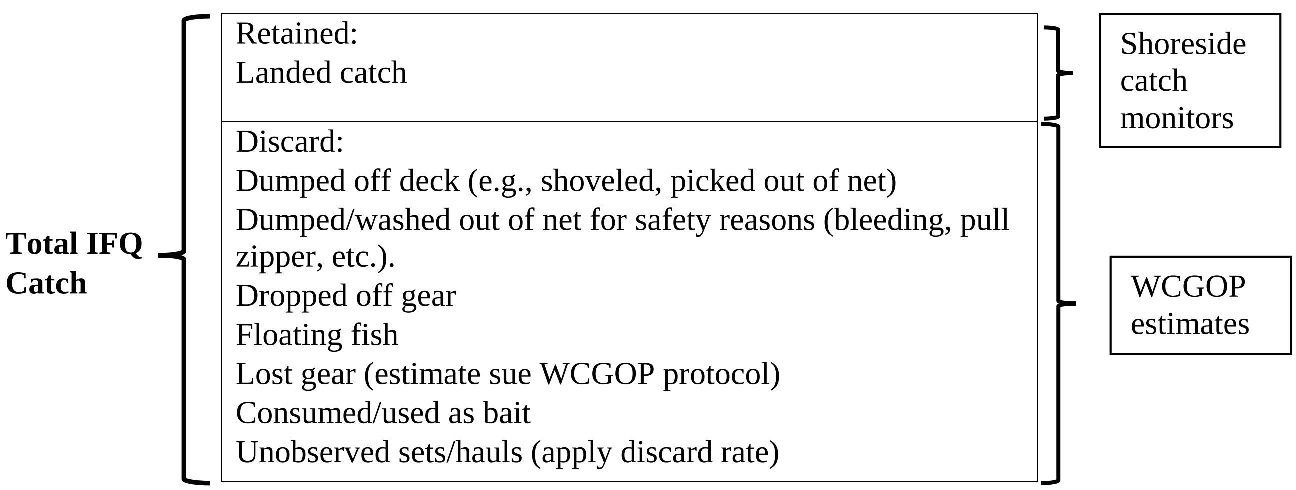

Figure 1. General depiction of total catch accounting in the Shorebased IFQ program.

WCGOP provided the GEMPAC draft definitions of total catch and discard that are specific to trawl and fixed gear. The GEMPAC consolidate the individual gear definitions for total catch and discard into the following draft definitions:

<u>Total catch for trawl: </u>Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear, to include any organic or inorganic material confined within a trawl net as the net is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel.

Total catch for fixed gear: Total catch is defined as the sum, or estimated weight, of all organic and inorganic material caught by the gear to include any fish hooked or in a pot as the gear is being landed, lost gear, as well as any visually discernible catch lost during the retrieval process that can be reasonably attributed to the vessel.

Retained catch for fixed gear and trawl: Retained catch is any portion of the total catch that is delivered to a buyer or processor.

Discard for fixed and trawl gear: Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls.

APPENDIX D
Recommended Revisions and Additions to Adopted Alternatives and Options

The GEMPAC provide the following recommended revisions and additions to the Council's adopted alternatives for an EM program. For a complete table of alternatives with the recommended revisions please see the Table 1 of the Council's decision document "Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program" (June Council meeting Agenda Item F2a, Attachment 2).

2.2.1 - Discard Documentation Technology

The GEMPAC clarified that the discard documentation option is to either use a human observer (No Action, Alternative 1) or a vessel may have the option to use cameras in lieu of human observer in both alternative 2 and 3. The following was added to the table of alternatives: "Individual Vessel Option to Use Cameras in Lieu of Human Observer"

2.3 - Discard Accounting - Individual or Fleet-wide

Under the catch shares program, total catch must be accounted for to debit individual quota share accounts and fishery allocations. Retained and discarded catch is combined to get total catch. Shoreside monitors are used to verify retained catch and the West Coast Groundfish Observer Program uses at-sea monitors to account for and estimate discards.

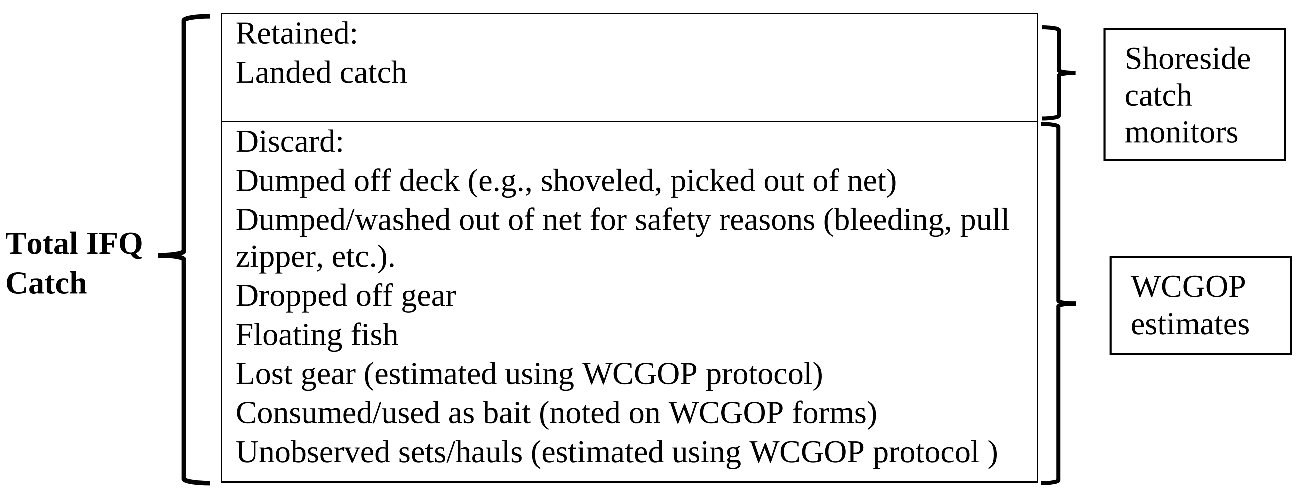

Figure 2. General depiction of total catch accounting in the Shorebased IFQ program.

Under an EM program, the estimation (speciation and weight) for these discard events would be conducted using EM rather than the WCGOP (Figure 2). However some of the discard events and scenarios noted in Figure 1 may not be captured by EM, such as lost gear, crew consuming fish onboard the vessel, using fish caught as bait, and unobserved hauls/sets that had discard (i.e., EM failed to record the discard), therefore; some other source of data may need to be used to account for the discard activity. In addition, some events may be capture by EM but are difficult to quantify or are rare, such as floating fish on the surface of the water or a fish dropped from the gear. An analysis of these events and the total discard mortality will be conducted to quantify frequency of occurrence, weight, and species conducted to examine the viability of these options for Council consideration.

If these discard events cannot be estimated using EM, then they could be estimated either annually by the WCGOP or not at all. The discard could be estimated using historical observations by the WCGOP for the time period of 2010 to 2014 to get an average number per year or through the annual observations made by WCGOP that are on vessels that do not use EM in combination with vessels that are randomly selected to have a scientific observer while the vessel uses EM.

In addition, rather than accounting for this discard at the individual level (IFQ) it's possible to account for it during the specification process for Annual Catch Limits (ACL), at the sector level or not at all. However this would remove the individual accountability of the IFQ program or not comply with MSA national standards. Assuming that the total mortality estimated at the sector level from this activity is minor amounts and would not affect individual vessels quota share accounts or other fishery participants, the estimated mortality could be deducted from the ACL prior to allocation to each sector or at the sector level to be taken "off-the-top" prior to IFQ distribution and catch allocation distributions.

Potential changes were developed in the flowing way:
1) Discard events were grouped into discard categories 1 and 2;
2) Accountability was established (i.e., IFQ, Fleetwide, or not accounted);
3) Data source were identified as either EM or the WCGOP.

Three possible options were developed for discard accounting:

Option 1: **One discard category and all discards are estimated using EM and counted against IFQ:**

- Dumped off deck (e.g., shoveled, picked out of net)
- Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
- Dropped off gear
- Floating fish
- Lost gear (not captured by EM, estimate using WCGOP protocol)
- Consumed/used as bait (not captured by EM)
- Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)

Option 2: **Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage**:

Discard 1 IFQ Accounting:

• Dumped off deck (e.g., shoveled, picked out of net)
• Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
• Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP

Discard 2 Sector or ACL accounting:
• Dropped off gear (use WCGOP estimates)
• Floating fish (use WCGOP estimates)
• Estimated from lost gear (estimate using WCGOP protocol)
• Consumed/used as bait (not captured by EM, use WCGOP estimates)

Option 3: Split into two discard categories; Category 1 count against IFQ, no accounting for discard 2 category:

Discard 1 IFQ Accounting:
• Dumped off deck (e.g., shoveled, picked out of net)
• Dumped/washed out of net for safety reasons (bleeding, pull zipper, etc.).
• Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP)

Discard 2 No accounting:
• Dropped off gear
• Floating fish
• Lost gear
• Consumed/used as bait

Council staff note: In order for option 3 to be valid it would have to comply with the MSA and National Standards. All catch and discard must be accounted to estimate total mortality estimates and ensure annual catch limits are not exceeded.

2.4 - Definitions for Total Catch Accounting - *Total Catch, Discard, Retained*
See Section 2 of Appendix C of this document.

2.6 - Halibut Retention/Discard with Fishery Specific Options

The Council had specific questions regarding the options for the retention or discard of halibut in each fishery. The GEMPAC developed fishery specific options and took into account the existing regulatory requirements, the current process for viability assessments that are normally conducted by observers, and discard mortality estimations that are applied to each type of gear. IPHC provides the mortality "keys" by fishing gear type that observers use to determine mortality of pacific halibut. The IPHC also determines what mortality rates apply to the different viabilities (Excellent, Poor, Dead for trawl and pot or Minor, Moderate, Severe, Dead for hook and line). The IPHC also has sector specific average mortality rates (i.e., longline and pot). Vessel or sector specific mortality rates based on data from the catch share program could be developed by the WCGOP.

The following gear specific options need to be examined for feasibility and IPHC may need to approve certain options. Council staff and NMFS will work with the IPHC to examine potential changes to halibut mortality assessment methods and the use of sector or vessel specific mortality rates.

For midwater trawl whiting:
Since the fishery is already a maximized retention fishery and all catch is allowed to be retained and landed, all halibut would be considered dead (100% mortality). Current regulations allow fishermen to sort whiting at sea, and if a fishermen chose to do so, would be required to discard halibut. The GEMPAC and GEMTAC believe that sorting at-sea does not occur so only one option was developed for the EM program. If the impact analysis reveals that another option is needed, Council staff will consult the GEMPAC.

For bottom trawl and non-whiting midwater trawl gear:
Option A: Use IPHC mortality rate for specific gear type: 90% mortality if discarded.
Option B: WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet
Option C: IPHC exemption to allow full retention (need to examine the feasibility of this option)
Option D: Captain and crew provide assessment (training would be required)
Option E: Use an appropriate EM viability assessment (currently conducting study, need IPHC approval)
Option F: Use vessel specific viability assessment (update rates periodically)

For Fixed gear:
Option A: Use WCGOP mortality rate for specific gear type: 16% mortality if discarded from longline; 18% mortality rate if discarded from pots.
Option B - **Option F**: same as bottom trawl and non-whiting midwater trawl gear

2.7 - Discard Species Lists Adjustments

The development of a species discard list for each fishery is a difficult task and changing technology may allow expansion of these lists after their initial creation. Each fishery will likely have a specific species discard lists. In the future, recognition software may be further developed or regulatory actions could provide the option to expand or change the species lists, therefore; a process that is efficient and flexible to change the list should be developed. The GEMPAC identified three options to account for technological changes and to streamline the revision of species discard lists for an EM program:

Option 1: NMFS to make determination and provide list to fishers through the NMFS EM Observer Exemption Process.
Option 2: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).

Option 3: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.

2.8.2 - Eligibility for Camera Use

Eligibilty criteria would be established in order to use EM. Item 4 in the list was clarified so that civil penalties must not exceed a certain dollar amount *and* timeframe. The phrase now reads as: "Initial eligibility criteria: 4. No civil penalties related to fishing activity exceeding a certain amount and timeframe**."**

2.8.5 - EM Vessel Operational Plan - IVMP Expiration

Regarding the expiration of vessel monitoring plans and at the advice of the GEMTAC, the GEMPAC added an option for an expiration date of vessel monitoring plans that is indefinite. For example the monitoring plan could be approved by NMFS for a period of 2 or 3 years rather than no expiration or an annual expiration. The following is now the current list of options:

Option A – No Expiration unless modifications are made
Option B – Annual Expiration or if modifications are made
Option C – Indefinite (ex. 2 or 3 year duration)

2.9.1 - Equipment Requirements

NMFS policy regarding electronic technologies and fishery-dependent data collection "encourages the use of electronic technologies that utilize open source code or standards that facilitate data integration and offer long-term cost savings rather than becoming dependent on proprietary software." However, the GEMPAC would like to revise the table of alternatives under the category of *EM Equipment Requirements* to clarify that both open source or proprietary software/hardware be allowed if they meet a performance criteria that provides the necessary information to document the discard and transmit the information in a manner that can be used by NMFS to accurately debit quota share accounts.

2.9.2 - Data Transfer Process

The GEMPAC, through advice of the GEMTAC removed enforcement from the potential list of entities that could remove data from a vessel and transfer it to the video reviewer. The GEMTAC thought it would be impractical since it's unlikely that enforcement officers (state or federal) would be available in a timely manner to collect the information from a vessel or too costly (monetarily and time consuming). Two options were added to the list; vessel operator and third-party contractor (possibly hired by a processor, port, or vessel). Both options seemed viable at this time. The draft list in the table of alternatives is:

(Options are not mutually exclusive)
• Crew
• Catch monitor
• PSMFC
• EM Provider
• Contractor (hired by processor, port, or fisher)
• Vessel operator

2.9.3 - Data Confidentiality (all data collected in the EM system)

The GEMPAC added that all data collected, including access to and authorization for public release of the data, is confidential according to the Magnuson-Stevens Act, NMFS internal confidentiality rules, and any new or revised rules that are proposed at this time (NMFS confidentiality Final Rule will be released in 2014).

2.9.4 - Video and Data Processing/Analysis

The GEMPAC added "Third Party" to the list of potential video reviewers. It's possible that some other entity may want to provide just video review and analysis of discard events to NMFS. The list of options is now as follows, (not mutually exclusive):

Option A: NMFS
Option B: PSMFC
Option C: EM Provider
Option D: Third Party

2.10.1 - Payment for Scientific Data Collection/Observations

Previous to the IFQ program NMFS provided scientific data collection on roughly 20 percent of the limited entry trawl fleet. This cost was covered by the Government. Under an EM program scientific data collection will be needed from vessels without an observer. It's estimated that the WCGOP will sample roughly 20-30 percent of the EM fleet however these rates will need to be examined and a sampling scheme developed by NMFS in the future. In addition, a funding source must be identified to support the WCGOP efforts. The GEMPAC developed three options:

Option A: Government funded, same as pre IFQ
Option B: Industry Funded
Option C: Combination of both Government and Industry [Need to consider allocating costs]

2.11 - NMFS Processes

While working through the development of the alternatives and options certain components or portions of the EM program were identified for NMFS to develop. For example, NMFS will need to set up an internal process to conduct a “type-approval” process that authorizes vessels to use certain EM equipment on a vessel, and set up a process for applicants to submit an “Observer Exemption Application” to request use of EM in lieu of an observer.

A list of NMFS processes are identified here; however it’s expected that some of the development will be done in consultation with the GEMPAC or other technical advisors. In addition, regulations will need to be developed to provide specific guidance to fishermen and EM providers, or observer providers (e.g., fill out applications, make changes to individual vessel monitoring plans, or for compliance with program rules). The development of these processes and associated regulations would likely involve a Council deeming process for the Council to review the draft regulations before they go into the proposed rule stage. Approval from the Office of Management and Budget for the collection of information under the Paperwork Reduction Act (PRA) will be needed when appropriate and are preliminarily identified in the list below. The list may be updated as the decision document is developed and the impact analysis expanded.

- Observer Exemption Process (including an application for fishermen, PRA)
- Individual Vessel Monitoring Plan Approval (including a form for submission to NMFS for review, PRA)
- Equipment Type Approval (including a list of specifications for EM providers to accommodate, PRA)
- Approved EM Provider List (including a list of specific criteria for providers to demonstrate their capability and standards, PRA)
- Eligibility Criteria (Initial and Continued)
- Declaration Process to Use EM (possibly including port hail in/out process, PRA)
- Confidentiality Rules (if different from status quo)
- WCGOP Scientific Observation Sampling Scheme

2.12 - Spatial Variation for High Bycatch Areas

The initial set of alternatives provided three options for spatial management while using EM:

Option A - No special provisions
Option B - Fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM in high bycatch areas
Option C - Under this option, if you chose to fish in a high bycatch area, a higher level of EM review may be required

The GEMPAC understand the possible utility of this type of management, however; this type of spatial management may add too much complexity to the management of the IFQ fishery and would require identifying additional management areas which in turn may be difficult and costly to manage.

Therefore, the GEMPAC recommends removal of Option B and C for spatial management options.

Agenda Item F.2.b
NMFS Report
June 2014

Net Revenue Analysis for Electronic Monitoring on the West Coast

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Contents

1 Introduction

The vessels that participate on the West Coast Groundfish Trawl Catch Share Program are very diverse. Target species in the fishery range from $0.10 per pound to upwards of $3.00 per pound, different species are targeted by different vessels, participation ranges from Southern California to Northern Washington, and vessel length ranges from less than 60 feet to more than 100 feet. These characteristics and others result in different profit margins. It therefore follows that changing the cost structure for monitoring fisheries could have varying effects on different sectors of the fisheries.

We have divided the catch share program into five fisheries: At-sea Pacific whiting, Shoreside Pacific whiting, DTS trawl with trawl endorsement, Non-whiting, non-DTS trawl with trawl endorsement, and Groundfish fixed gear with trawl endorsement. The first section provides summaries for all fisheries, then there is a separate fishery specific section. In the fishery specific sections, we first summarize the data by home port, vessel length, and whether the vessel fished in Alaska. In many cases, some of these "breakouts" are not shown in order to prevent displaying confidential information.

After the summaries, we then calculate the variable cost net revenue and total cost net revenue at various levels of daily electronic monitoring costs and annual electronic monitoring costs. For our purposes, we consider the daily monitoring costs to include the cost of maintaining the equipment and reviewing the data collection by the equipment on-board. The annual cost would include either the cost of renting the equipment or purchasing the equipment, depending on how the final program is implemented. For all statistics shown, observer costs are not included, however, the variable cost net revenue and total cost net revenue with observer coverage can be found by looking at the variable EM costs where the fixed EM costs are zero.

1.1 Data

Estimating the net revenue earned by operating a commercial fishing vessel requires data on vessel revenues and costs. Since the same entity that owns a commercial fishing vessel may also be engaged in any number of other fishing related or non-related activities, it is important to define which revenues and costs are included in the measurement of net revenue.

The NWFSC Economic Data Collection (EDC) program focuses on collecting revenue and cost information directly related to the operation of a commercial fishing vessel. There are a variety of costs that are associated with running a catcher vessel that are not requested on the form because it is difficult to determine the share of the cost associated with the vessel. These costs include items that can be used for activities other than fishing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, pickup trucks, storage of equipment, professional fees, and marketing. In general, the data collection forms attempt to capture costs that are directly related to vessel maintenance and fishing operations, and not costs that are related to activities or equipment off the vessel. For these reasons, the aggregated measures of costs (variable costs, fixed costs, and total costs) underestimate the true costs of operating a business. Therefore, the measures of net revenye overstate actual net revenue.

Net revenue is calculated two ways: using only variable costs, and using variable costs plus fixed costs (total costs). The first calculation is called *variable cost net revenue*, while the second is called *total cost net revenue*. Variable cost net revenue is useful to examine changes in fishery operations that are not so great as to affect fixed costs. For example, the cost of fishing an additional day, or catching an additional metric ton of fish, is better represented by only considering variable costs. Total cost net revenue is usually a better summary measure of financial gain or loss for an entire year, season, or fishery. For these analyses, we focus on total cost net revenue.

Since most vessels operate in multiple fisheries, much of the available cost data pertain to multiple fisheries. While some of the costs, such as vessel repairs and maintenance, are joint costs, other costs, such as fuel, are not necessarily joint costs but are not reported separately by fishery in the survey. While it is not necessary to disaggregate costs in order to analyze net revenue for all vessel operations, it is necessary in order to analyze net revenue associated with operations in the West Coast groundfish fishery (or any other individual fishery). The methods used for disaggregation can be found in the Economic Data Collection Program Catcher Vessel Report 2009-11.[1]

1.2 Data Sources

For the shoreside sector, landings and ex-vessel revenue were obtained from state fish tickets. The at-sea sector deliveries to motherships were obtained from the NORPAC database and the ex-vessel revenues were obtained from the NWFSC Economic Data Collection (EDC) Program. All cost data were obtained from the EDC Program.

The costs were categorized into variable costs and fixed costs. Note that costs related to obtaining a limited entry trawl permit and quota are not included.

Variable Costs

- Bait
- Captain
- Communications
- Crew
- Fishing association dues
- Food
- Freight
- Fuel and lubrication
- Ice
- License fees
- Observer costs
- Offloading
- Supplies
- Travel
- Trucking

Fixed Costs

- Fishing gear
- Processing equipment
- Vessel and on-board equipment
- Insurance premium payments
- Moorage

[1]Steiner, E., A. Harley, and T.Lee. 2014. Economic Data Collection Program Catcher Vessel Report 2009-11, Northwest Fisheries Science Center. Available at www.nwfsc.noaa.gov/research/divisions/fram/economic/economic_data.cfm.

1.3 Simulating Costs for Electronic Monitoring

In order to analyze the potential effects of the costs of electronic monitoring on the annual profitability of vessels by fishery, we first calculate the total cost net revenue including all fishing revenue and all fishing costs as described above. **Each statistic reported represents the average vessel while participating in that fishery.** The costs and earnings associated with that vessel will be apportioned to each of the fisheries in which it participates. The average total cost net revenue is first reported in the fishery summary tables, and includes the cost of observers. In the electronic monitoring cost tables, the cost of observer coverage was not included and therefore the first row in each of these tables where EM variable costs per day and EM fixed costs per year shows the total cost net revenue assuming that the vessel paid $0 for monitoring, whether the monitoring was observer coverage or electronic monitoring. We chose a set of variable costs per day, $0, $200, $400, $600, $800, $1,000, and annual fixed costs $0, $5,000, $10,000, $15,000, $20,000. This assumes that the fixed costs paid are only for the vessels' operation in that fishery.

2 West Coast Groundfish Catch Share fisheries

We use data from PacFIN and the Economic Data Collection (EDC) program to calculate 2011 revenue and 2011 variable costs. Due to the patchiness of fixed costs, an average of 2009-2011 was used.

2.1 West Coast Groundfish Catch Share fisheries summary

Table 1: Number of vessels per fishery in 2011. A vessel will be counted in all fisheries in which they participated.

	N
At-sea Pacific whiting	18
Shoreside Pacific whiting	26
DTS trawl with trawl endorsement	64
Non-whiting, non-DTS trawl with trawl endorsement	48
Groundfish fixed gear with trawl endorsement	24

Table 2: Average revenue, variable costs, fixed costs, variable cost net revenue, and total cost net revenue ($). Revenues and variable costs are 2011 values, fixed costs are the average of 2009-2011 fixed costs.

	Revenue	Variable costs	Fixed costs	Variable cost net revenue	Total cost net revenue
At-sea Pacific whiting	624,685	257,634	145,517	365,813	220,297
Shoreside Pacific whiting	837,866	407,470	231,491	426,624	195,133
DTS trawl with trawl endorsement	315,167	184,363	69,556	128,802	59,245
Non-whiting, non-DTS trawl with trawl endorsement	104,676	61,762	20,664	42,178	21,514
Groundfish fixed gear with trawl endorsement	288,449	141,997	64,536	144,907	80,371

Table 3: Average variable cost and variable net revenue per day and per pound.

	Variable cost per day	Variable cost per pound	Variable net revenue per day	Variable net revenue per 1,000 lbs
At-sea Pacific whiting	8,498	43	11,456	58
Shoreside Pacific whiting	8,375	55	8,144	52
DTS trawl with trawl endorsement	4,422	451	2,884	239
Non-whiting, non-DTS trawl with trawl endorsement	4,136	414	2,958	265
Groundfish fixed gear with trawl endorsement	4,172	1,637	3,934	1,288

2.2 West Coast Groundfish Catch Share fisheries EM costs

Table 4: Average total cost net revenue for all vessels in the 5 groundfish fisheries, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped in vessel length classes and also by whether the vessel also fished in Alaska. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Small vessel (< 60 ft)	Medium vessel (> 60 ft, <= 80 ft)	Large vessel (> 80 ft)	Fished in AK	Only West Coast
0.00	0	58,385	62,623	144,969	199,797	54,903
0.00	5,000	53,385	57,623	139,969	194,797	49,903
0.00	10,000	48,385	52,623	134,969	189,797	44,903
0.00	15,000	43,385	47,623	129,969	184,797	39,903
0.00	20,000	38,385	42,623	124,969	179,797	34,903
200.00	0	51,913	54,812	137,785	192,433	47,651
200.00	5,000	46,913	49,812	132,785	187,433	42,651
200.00	10,000	41,913	44,812	127,785	182,433	37,651
200.00	15,000	36,913	39,812	122,785	177,433	32,651
200.00	20,000	31,913	34,812	117,785	172,433	27,651
400.00	0	45,441	47,000	130,602	185,070	40,399
400.00	5,000	40,441	42,000	125,602	180,070	35,399
400.00	10,000	35,441	37,000	120,602	175,070	30,399
400.00	15,000	30,441	32,000	115,602	170,070	25,399
400.00	20,000	25,441	27,000	110,602	165,070	20,399
600.00	0	38,969	39,189	123,419	177,706	33,147
600.00	5,000	33,969	34,189	118,419	172,706	28,147
600.00	10,000	28,969	29,189	113,419	167,706	23,147
600.00	15,000	23,969	24,189	108,419	162,706	18,147
600.00	20,000	18,969	19,189	103,419	157,706	13,147
800.00	0	32,497	31,377	116,236	170,343	25,895
800.00	5,000	27,497	26,377	111,236	165,343	20,895
800.00	10,000	22,497	21,377	106,236	160,343	15,895
800.00	15,000	17,497	16,377	101,236	155,343	10,895
800.00	20,000	12,497	11,377	96,236	150,343	5,895
1000.00	0	26,025	23,565	109,053	162,979	18,644
1000.00	5,000	21,025	18,565	104,053	157,979	13,644
1000.00	10,000	16,025	13,565	99,053	152,979	8,644
1000.00	15,000	11,025	8,565	94,053	147,979	3,644
1000.00	20,000	6,025	3,565	89,053	142,979	-1,356

Table 5: Average total cost net revenue for all vessels in the 5 groundfish fisheries, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped by home port. Some ports were grouped together to protect confidential data. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Washington	Astoria	Newport	Charleston or Coos Bay	Brookings	Crescent City or Eureka	Fort Bragg	Other California
0.00	0	107,857	72,622	140,174	39,254	108,378	73,058	20,124	59,705
0.00	5,000	102,857	67,622	135,174	34,254	103,378	68,058	15,124	54,705
0.00	10,000	97,857	62,622	130,174	29,254	98,378	63,058	10,124	49,705
0.00	15,000	92,857	57,622	125,174	24,254	93,378	58,058	5,124	44,705
0.00	20,000	87,857	52,622	120,174	19,254	88,378	53,058	124	39,705
200.00	0	99,454	64,053	133,645	31,477	101,369	66,758	14,961	53,332
200.00	5,000	94,454	59,053	128,645	26,477	96,369	61,758	9,961	48,332
200.00	10,000	89,454	54,053	123,645	21,477	91,369	56,758	4,961	43,332
200.00	15,000	84,454	49,053	118,645	16,477	86,369	51,758	-39	38,332
200.00	20,000	79,454	44,053	113,645	11,477	81,369	46,758	-5,039	33,332
400.00	0	91,052	55,485	127,116	23,701	94,360	60,458	9,797	46,959
400.00	5,000	86,052	50,485	122,116	18,701	89,360	55,458	4,797	41,959
400.00	10,000	81,052	45,485	117,116	13,701	84,360	50,458	-203	36,959
400.00	15,000	76,052	40,485	112,116	8,701	79,360	45,458	-5,203	31,959
400.00	20,000	71,052	35,485	107,116	3,701	74,360	40,458	-10,203	26,959
600.00	0	82,649	46,916	120,588	15,925	87,351	54,158	4,633	40,585
600.00	5,000	77,649	41,916	115,588	10,925	82,351	49,158	-367	35,585
600.00	10,000	72,649	36,916	110,588	5,925	77,351	44,158	-5,367	30,585
600.00	15,000	67,649	31,916	105,588	925	72,351	39,158	-10,367	25,585
600.00	20,000	62,649	26,916	100,588	-4,075	67,351	34,158	-15,367	20,585
800.00	0	74,247	38,348	114,059	8,148	80,342	47,858	-530	34,212
800.00	5,000	69,247	33,348	109,059	3,148	75,342	42,858	-5,530	29,212
800.00	10,000	64,247	28,348	104,059	-1,852	70,342	37,858	-10,530	24,212
800.00	15,000	59,247	23,348	99,059	-6,852	65,342	32,858	-15,530	19,212
800.00	20,000	54,247	18,348	94,059	-11,852	60,342	27,858	-20,530	14,212
1000.00	0	65,844	29,779	107,530	372	73,333	41,558	-5,694	27,839
1000.00	5,000	60,844	24,779	102,530	-4,628	68,333	36,558	-10,694	22,839
1000.00	10,000	55,844	19,779	97,530	-9,628	63,333	31,558	-15,694	17,839
1000.00	15,000	50,844	14,779	92,530	-14,628	58,333	26,558	-20,694	12,839
1000.00	20,000	45,844	9,779	87,530	-19,628	53,333	21,558	-25,694	7,839

3 At-sea whiting

In 2011, there were 18 vessels that participated in the At-sea Pacific whiting fishery. Most of those vessels also fished in Alaska and had home ports in either Newport or Seattle, other ports cannot be shown to protect confidential information.

3.1 At-sea whiting summary

Table 6: Number of vessels per length category in the At-sea Pacific whiting fishery

	N
Small vessel ($<$ 90 ft)	5
Medium vessel ($>$ 90 ft, $<=$ 110 ft)	6
Large vessel ($>$ 110 ft)	7

Table 7: Number of vessels per port in the At-sea Pacific whiting fishery, some ports are not shown to protect confidential data.

	N
Seattle	7
Newport	9

Table 8: Average At-sea Pacific whiting vessels by vessel length class.

	Small vessel (< 90 ft)	Medium vessel (> 90 ft, <= 110 ft)	Large vessel (> 110 ft)
Revenue ($)	590,768	680,806	600,807
Variable costs ($)	259,305	268,887	246,795
Fixed costs ($)	113,498	108,015	200,532
Variable cost net revenue ($)	328,992	411,182	353,227
Total cost net revenue ($)	215,494	303,167	152,695
Variable cost ($) per day	7,938	7,965	9,354
Variable cost ($) per 1,000 lbs	47	40	43
Variable cost net revenue ($) per day	8,421	11,931	13,216
Variable cost net revenue ($) per 1,000 lbs	50	64	59
Landings (lbs)	6,012,428	6,597,562	5,866,860
Days at sea	33	35	28

Table 9: Average at-sea whiting vessels by home port. Some ports are not shown to protect confidential information.

	Newport	Seattle
Revenue ($)	556,898	635,071
Variable costs ($)	229,394	250,522
Fixed costs ($)	116,486	172,270
Variable cost net revenue ($)	325,921	383,403
Total cost net revenue ($)	209,435	211,133
Variable cost ($) per day	8,089	7,316
Variable cost ($) per 1,000 lbs	43	40
Variable cost net revenue ($) per day	10,509	10,963
Variable cost net revenue ($) per 1,000 lbs	57	60
Landings (lbs)	5,522,191	6,310,637
Days at sea	30	35

3.2 At-sea whiting EM costs

Table 10: Average total cost net revenue for at-sea whiting vessels, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Some ports are not shown to protect confidential data. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Small vessel (< 90 ft)	Medium vessel (> 90 ft, <= 110 ft)	Large vessel (> 110 ft)	Seattle	Newport
0.00	0	217,965	303,904	153,481	212,280	211,018
0.00	5,000	212,965	298,904	148,481	207,280	206,018
0.00	10,000	207,965	293,904	143,481	202,280	201,018
0.00	15,000	202,965	288,904	138,481	197,280	196,018
0.00	20,000	197,965	283,904	133,481	192,280	191,018
200.00	0	211,324	296,992	147,961	205,327	205,089
200.00	5,000	206,324	291,992	142,961	200,327	200,089
200.00	10,000	201,324	286,992	137,961	195,327	195,089
200.00	15,000	196,324	281,992	132,961	190,327	190,089
200.00	20,000	191,324	276,992	127,961	185,327	185,089
400.00	0	204,683	290,080	142,440	198,375	199,160
400.00	5,000	199,683	285,080	137,440	193,375	194,160
400.00	10,000	194,683	280,080	132,440	188,375	189,160
400.00	15,000	189,683	275,080	127,440	183,375	184,160
400.00	20,000	184,683	270,080	122,440	178,375	179,160
600.00	0	198,042	283,167	136,920	191,423	193,230
600.00	5,000	193,042	278,167	131,920	186,423	188,230
600.00	10,000	188,042	273,167	126,920	181,423	183,230
600.00	15,000	183,042	268,167	121,920	176,423	178,230
600.00	20,000	178,042	263,167	116,920	171,423	173,230
800.00	0	191,401	276,255	131,400	184,470	187,301
800.00	5,000	186,401	271,255	126,400	179,470	182,301
800.00	10,000	181,401	266,255	121,400	174,470	177,301
800.00	15,000	176,401	261,255	116,400	169,470	172,301
800.00	20,000	171,401	256,255	111,400	164,470	167,301
1000.00	0	184,761	269,343	125,880	177,518	181,372
1000.00	5,000	179,761	264,343	120,880	172,518	176,372
1000.00	10,000	174,761	259,343	115,880	167,518	171,372
1000.00	15,000	169,761	254,343	110,880	162,518	166,372
1000.00	20,000	164,761	249,343	105,880	157,518	161,372

4 Shoreside Pacific whiting

In 2011, there were 26 vessels that participated in the Shoreside Pacific whiting fishery. About half of those vessels also fished in Alaska and none had home ports in California.

4.1 Shoreside Pacific Whiting summary

Table 11: Number of vessels per length category in the Shoreside Pacific whiting fishery

	N
Small vessel (< 80 ft)	6
Medium vessel (> 80 ft, <= 90 ft)	9
Large vessel (> 90 ft)	11

Table 12: Number of vessels by state in the Shoreside Pacific whiting fishery.

	N
Oregon	20
Washington	6
California	0

Table 13: Number of vessels in the Shoreside Pacific whiting fishery who either only fished on the West Coast or also fished in Alaska.

	N
Fished in AK	15
Only West Coast	11

Table 14: Average Shoreside Pacific whiting vessels by vessel length class.

	Small vessel (< 90 ft)	Medium vessel (> 90 ft, <= 110 ft)	Large vessel (> 110 ft)
Revenue ($)	602,289	826,602	975,579
Variable costs ($)	308,750	414,194	455,815
Fixed costs ($)	133,207	205,533	306,338
Variable cost net revenue ($)	291,336	406,639	516,768
Total cost net revenue ($)	158,129	201,106	210,431
Variable cost ($) per day	5,396	8,389	9,987
Variable cost ($) per 1,000 lbs	58	58	51
Variable cost net revenue ($) per day	4,957	8,046	9,963
Variable cost net revenue ($) per 1,000 lbs	54	53	51
Landings (lbs)	5,334,104	7,314,004	9,064,569
Days at sea	55	53	47

Table 15: Average Shoreside Pacific Whiting vessels by home port.

	Oregon	Washington
Revenue ($)	840,738	828,293
Variable costs ($)	404,919	415,971
Fixed costs ($)	197,178	345,867
Variable cost net revenue ($)	433,044	405,225
Total cost net revenue ($)	235,866	59,358
Variable cost ($) per day	8,146	9,137
Variable cost ($) per 1,000 lbs	55	54
Variable cost net revenue ($) per day	8,222	7,887
Variable cost net revenue ($) per 1,000 lbs	55	45
Landings (lbs)	7,542,730	7,781,053
Days at sea	52	47

4.2 Shoreside Pacific whiting EM costs

Table 16: Average total cost net revenue for Shoreside Pacific whiting vessels, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Small vessel (< 80 ft)	Medium vessel (> 80 ft, <= 90 ft)	Large vessel (> 90 ft)	Washington	Oregon	Fished in AK	Only West Coast
0.00	0	160,331	206,874	213,427	66,456	238,641	284,611	82,035
0.00	5,000	155,331	201,874	208,427	61,456	233,641	279,611	77,035
0.00	10,000	150,331	196,874	203,427	56,456	228,641	274,611	72,035
0.00	15,000	145,331	191,874	198,427	51,456	223,641	269,611	67,035
0.00	20,000	140,331	186,874	193,427	46,456	218,641	264,611	62,035
200.00	0	149,233	196,296	203,947	57,033	228,164	274,422	71,740
200.00	5,000	144,233	191,296	198,947	52,033	223,164	269,422	66,740
200.00	10,000	139,233	186,296	193,947	47,033	218,164	264,422	61,740
200.00	15,000	134,233	181,296	188,947	42,033	213,164	259,422	56,740
200.00	20,000	129,233	176,296	183,947	37,033	208,164	254,422	51,740
400.00	0	138,134	185,718	194,466	47,611	217,686	264,233	61,445
400.00	5,000	133,134	180,718	189,466	42,611	212,686	259,233	56,445
400.00	10,000	128,134	175,718	184,466	37,611	207,686	254,233	51,445
400.00	15,000	123,134	170,718	179,466	32,611	202,686	249,233	46,445
400.00	20,000	118,134	165,718	174,466	27,611	197,686	244,233	41,445
600.00	0	127,035	175,139	184,986	38,189	207,209	254,044	51,151
600.00	5,000	122,035	170,139	179,986	33,189	202,209	249,044	46,151
600.00	10,000	117,035	165,139	174,986	28,189	197,209	244,044	41,151
600.00	15,000	112,035	160,139	169,986	23,189	192,209	239,044	36,151
600.00	20,000	107,035	155,139	164,986	18,189	187,209	234,044	31,151
800.00	0	115,937	164,561	175,505	28,766	196,732	243,854	40,856
800.00	5,000	110,937	159,561	170,505	23,766	191,732	238,854	35,856
800.00	10,000	105,937	154,561	165,505	18,766	186,732	233,854	30,856
800.00	15,000	100,937	149,561	160,505	13,766	181,732	228,854	25,856
800.00	20,000	95,937	144,561	155,505	8,766	176,732	223,854	20,856
1000.00	0	104,838	153,983	166,025	19,344	186,254	233,665	30,561
1000.00	5,000	99,838	148,983	161,025	14,344	181,254	228,665	25,561
1000.00	10,000	94,838	143,983	156,025	9,344	176,254	223,665	20,561
1000.00	15,000	89,838	138,983	151,025	4,344	171,254	218,665	15,561
1000.00	20,000	84,838	133,983	146,025	-656	166,254	213,665	10,561

5 DTS trawl with trawl endorsement

In 2011, there were 64 vessels that participated in the DTS trawl with trawl endorsement fishery. Of those, only three fished in Alaska. Home ports were located throughout the entire West Coast. Using 2011 revenues, costs, and days at sea, the vessels that also fished in Alaska had negative total cost net revenue in 2011, and in our simulations of electronic monitoring costs, small vessels (<65 feet) started generating negative total cost net revenue when variable costs reached $600/day. The average vessel in Newport, Charleston and Fort Bragg experience negative net revenue at relatively low levels of electronic monitoring costs. The average vessel in Washington, Astoria, Brookings, and Crescent City/Eureka never generated negative total cost net revenue in our simulations.

5.1 DTS trawl with trawl endorsement summary

Table 17: Number of vessels per length category in the DTS trawl with trawl endorsement and whether the vessels also fished in Alaska

	Fished in AK	Only West Coast
Large vessel (> 75 ft)	3	21
Medium vessel (> 65 ft, <= 75 ft)	0	21
Small vessel (< 65 ft)	0	19

Table 18: Number of vessels by port/state in the DTS trawl with trawl endorsement fishery.

	N
Washington	5
Astoria	15
Newport	9
Charleston or Coos Bay	9
Brookings	6
Crescent City or Eureka	10
Fort Bragg	6
Other California	4

Table 19: Average DTS trawl with trawl endorsement vessels split by whether the vessels fished only on the West Coast or who also fished in Alaska.

	Fished in AK	Only West Coast
Revenue ($)	72,844	327,085
Variable costs ($)	105,121	188,260
Fixed costs ($)	36,051	71,204
Variable cost net revenue ($)	-36,502	136,931
Total cost net revenue ($)	-72,553	65,727
Variable cost ($) per day	5,397	4,374
Variable cost ($) per 1,000 lbs	1,126	418
Variable cost net revenue ($) per day	-213	3,037
Variable cost net revenue ($) per 1,000 lbs	-269	264
Landings (lbs)	111,874	511,383
Days at sea	36	47

Table 20: Average DTS trawl with trawl endorsement vessels by vessel length class.

	Small vessel (< 65 ft)	Medium vessel (> 65 ft, <= 75 ft)	Large vessel (> 75 ft)
Revenue ($)	224,608	310,464	390,975
Variable costs ($)	130,964	179,682	230,734
Fixed costs ($)	64,851	81,953	62,435
Variable cost net revenue ($)	91,916	128,909	157,910
Total cost net revenue ($)	27,065	46,956	95,475
Variable cost ($) per day	3,443	3,978	5,585
Variable cost ($) per 1,000 lbs	391	380	562
Variable cost net revenue ($) per day	2,449	2,835	3,273
Variable cost net revenue ($) per 1,000 lbs	270	263	194
Landings (lbs)	341,986	519,892	588,105
Days at sea	40	48	50

Table 21: Average DTS trawl with trawl endorsement vessels by home port. Some ports are not shown to protect confidential information.

	Washington	Astoria	Newport	Charleston or Coos Bay	Brookings	Crescent City or Eureka	Fort Bragg	Other California
Revenue ($)	364,917	391,704	172,220	254,250	442,749	341,685	315,185	166,966
Variable costs ($)	219,424	224,538	101,257	171,760	268,491	170,245	200,470	90,166
Fixed costs ($)	52,918	65,773	59,404	76,576	80,422	74,504	100,530	36,461
Variable cost net revenue ($)	143,984	164,328	70,010	79,839	172,186	169,583	113,286	75,291
Total cost net revenue ($)	91,065	98,556	10,605	3,263	91,764	95,079	12,756	38,831
Variable cost ($) per day	3,335	3,918	4,632	3,792	6,189	4,204	6,342	3,624
Variable cost ($) per 1,000 lbs	583	334	453	566	433	421	545	430
Variable cost net revenue ($) per day	1,273	2,820	2,462	2,078	4,167	4,070	3,178	2,574
Variable cost net revenue ($) per 1,000 lbs	97	237	223	112	278	345	322	299
Landings (lbs)	499,720	733,296	279,656	389,867	624,116	499,474	374,996	254,202
Days at sea	69	58	26	51	45	43	35	36

5.2 DTS trawl with trawl endorsement EM costs

Table 22: Average total cost net revenue for DTS trawl with trawl endorsement vessels, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped in vessel length classes and also by whether the vessel also fished in Alaska. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Small vessel (< 65 ft)	Medium vessel (> 65 ft, <= 75 ft)	Large vessel (> 75 ft)	Fished in AK	Only West Coast
0.00	0	28,794	48,828	97,807	-68,328	67,620
0.00	5,000	23,794	43,828	92,807	-73,328	62,620
0.00	10,000	18,794	38,828	87,807	-78,328	57,620
0.00	15,000	13,794	33,828	82,807	-83,328	52,620
0.00	20,000	8,794	28,828	77,807	-88,328	47,620
200.00	0	20,838	39,280	87,762	-75,579	58,259
200.00	5,000	15,838	34,280	82,762	-80,579	53,259
200.00	10,000	10,838	29,280	77,762	-85,579	48,259
200.00	15,000	5,838	24,280	72,762	-90,579	43,259
200.00	20,000	838	19,280	67,762	-95,579	38,259
400.00	0	12,882	29,731	77,717	-82,829	48,899
400.00	5,000	7,882	24,731	72,717	-87,829	43,899
400.00	10,000	2,882	19,731	67,717	-92,829	38,899
400.00	15,000	-2,118	14,731	62,717	-97,829	33,899
400.00	20,000	-7,118	9,731	57,717	-102,829	28,899
600.00	0	4,926	20,183	67,673	-90,080	39,538
600.00	5,000	-74	15,183	62,673	-95,080	34,538
600.00	10,000	-5,074	10,183	57,673	-100,080	29,538
600.00	15,000	-10,074	5,183	52,673	-105,080	24,538
600.00	20,000	-15,074	183	47,673	-110,080	19,538
800.00	0	-3,030	10,634	57,628	-97,330	30,177
800.00	5,000	-8,030	5,634	52,628	-102,330	25,177
800.00	10,000	-13,030	634	47,628	-107,330	20,177
800.00	15,000	-18,030	-4,366	42,628	-112,330	15,177
800.00	20,000	-23,030	-9,366	37,628	-117,330	10,177
1000.00	0	-10,986	1,085	47,583	-104,581	20,816
1000.00	5,000	-15,986	-3,915	42,583	-109,581	15,816
1000.00	10,000	-20,986	-8,915	37,583	-114,581	10,816
1000.00	15,000	-25,986	-13,915	32,583	-119,581	5,816
1000.00	20,000	-30,986	-18,915	27,583	-124,581	816

Table 23: Average total cost net revenue for DTS trawl with trawl endorsement vessels, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped by home port. Some ports were grouped together to protect confidential data. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Washington	Astoria	Newport	Charleston or Coos Bay	Brookings	Crescent City or Eureka	Fort Bragg	Other California
0.00	0	92,575	101,394	11,558	5,914	93,835	96,935	14,184	40,339
0.00	5,000	87,575	96,394	6,558	914	88,835	91,935	9,184	35,339
0.00	10,000	82,575	91,394	1,558	-4,086	83,835	86,935	4,184	30,339
0.00	15,000	77,575	86,394	-3,442	-9,086	78,835	81,935	-816	25,339
0.00	20,000	72,575	81,394	-8,442	-14,086	73,835	76,935	-5,816	20,339
200.00	0	78,831	89,847	6,417	-4,375	84,762	88,324	7,105	33,105
200.00	5,000	73,831	84,847	1,417	-9,375	79,762	83,324	2,105	28,105
200.00	10,000	68,831	79,847	-3,583	-14,375	74,762	78,324	-2,895	23,105
200.00	15,000	63,831	74,847	-8,583	-19,375	69,762	73,324	-7,895	18,105
200.00	20,000	58,831	69,847	-13,583	-24,375	64,762	68,324	-12,895	13,105
400.00	0	65,087	78,300	1,275	-14,664	75,689	79,712	26	25,872
400.00	5,000	60,087	73,300	-3,725	-19,664	70,689	74,712	-4,974	20,872
400.00	10,000	55,087	68,300	-8,725	-24,664	65,689	69,712	-9,974	15,872
400.00	15,000	50,087	63,300	-13,725	-29,664	60,689	64,712	-14,974	10,872
400.00	20,000	45,087	58,300	-18,725	-34,664	55,689	59,712	-19,974	5,872
600.00	0	51,344	66,754	-3,866	-24,953	66,616	71,100	-7,053	18,639
600.00	5,000	46,344	61,754	-8,866	-29,953	61,616	66,100	-12,053	13,639
600.00	10,000	41,344	56,754	-13,866	-34,953	56,616	61,100	-17,053	8,639
600.00	15,000	36,344	51,754	-18,866	-39,953	51,616	56,100	-22,053	3,639
600.00	20,000	31,344	46,754	-23,866	-44,953	46,616	51,100	-27,053	-1,361
800.00	0	37,600	55,207	-9,008	-35,242	57,543	62,488	-14,133	11,406
800.00	5,000	32,600	50,207	-14,008	-40,242	52,543	57,488	-19,133	6,406
800.00	10,000	27,600	45,207	-19,008	-45,242	47,543	52,488	-24,133	1,406
800.00	15,000	22,600	40,207	-24,008	-50,242	42,543	47,488	-29,133	-3,594
800.00	20,000	17,600	35,207	-29,008	-55,242	37,543	42,488	-34,133	-8,594
1000.00	0	23,856	43,660	-14,149	-45,531	48,470	53,876	-21,212	4,172
1000.00	5,000	18,856	38,660	-19,149	-50,531	43,470	48,876	-26,212	-828
1000.00	10,000	13,856	33,660	-24,149	-55,531	38,470	43,876	-31,212	-5,828
1000.00	15,000	8,856	28,660	-29,149	-60,531	33,470	38,876	-36,212	-10,828
1000.00	20,000	3,856	23,660	-34,149	-65,531	28,470	33,876	-41,212	-15,828

6 Non-whiting, non-DTS trawl with trawl endorsement

In 2011, there were 48 vessels that participated in the Non-whiting, non-DTS trawl with trawl endorsement fishery. Of those, only four fished in Alaska. Home ports were located throughout the entire West Coast. The vessels that also fished in Alaska had negative total cost net revenue in 2011, and in our simulations of electronic monitoring costs, small vessels (¡65 feet) started generating negative total cost net revenue when variable costs reached $600/day. The average vessel in Newport, Charleston and Fort Bragg experience negative net revenue at relatively low levels of electronic monitoring costs. The average vessel in Washington, Astoria, Brookings, and Crescent City/Eureka never generated negative total cost net revenue in our simulations.

6.1 Non-whiting, non-DTS trawl with trawl endorsement summary

Table 24: Number of vessels per length category in the Non-whiting, non-DTS trawl with trawl endorsement and whether the vessels also fished in Alaska

	Fished in AK	Only West Coast
Large vessel ($>$ 75 ft)	4	16
Medium vessel ($>$ 65 ft, $<=$ 75 ft)	0	11
Small vessel ($<$ 65 ft)	0	17

Table 25: Number of vessels by port/state in the DTS trawl with trawl endorsement fishery.

	N
Washington	5
Astoria	14
Newport	8
Charleston or Coos Bay	6
Brookings	3
Crescent City or Eureka	4
Fort Bragg	4
Other California	4

Table 26: Average Non-whiting, non-DTS trawl with trawl endorsement vessels by vessel length class.

	Small vessel (< 65 ft)	Medium vessel (> 65 ft, <= 75 ft)	Large vessel (> 75 ft)
Revenue ($)	99,368	95,449	114,262
Variable costs ($)	52,511	52,514	74,712
Fixed costs ($)	20,548	25,691	17,997
Variable cost net revenue ($)	45,928	42,230	38,961
Total cost net revenue ($)	25,380	16,539	20,965
Variable cost ($) per day	3,180	3,615	5,235
Variable cost ($) per 1,000 lbs	420	385	425
Variable cost net revenue ($) per day	2,802	2,998	3,069
Variable cost net revenue ($) per 1,000 lbs	327	320	181
Landings (lbs)	157,265	161,178	190,106
Days at sea	24	17	16

Table 27: Non-whiting, non-DTS trawl with trawl endorsement vessels by home port. Some ports are not shown to protect confidential information.

	Washington	Astoria	Newport	Charleston or Coos Bay	Brookings	Crescent City or Eureka	Fort Bragg	Other California
Revenue ($)	172,247	165,888	68,447	63,816	20,723	31,607	118,038	62,387
Variable costs ($)	112,632	94,033	36,889	33,376	12,325	14,170	86,269	37,716
Fixed costs ($)	27,706	29,894	14,637	16,899	3,642	4,073	23,630	23,644
Variable cost net revenue ($)	58,806	70,677	31,066	29,764	8,296	17,323	31,260	23,675
Total cost net revenue ($)	31,100	40,783	16,428	12,865	4,654	13,250	7,630	31
Variable cost ($) per day	4,073	3,573	3,137	3,486	6,859	5,515	5,938	3,937
Variable cost ($) per 1,000 lbs	406	315	381	433	433	474	465	681
Variable cost net revenue ($) per day	2,272	2,539	1,415	2,660	5,097	6,821	2,378	3,931
Variable cost net revenue ($) per 1,000 lbs	232	230	135	327	307	453	231	405
Landings (lbs)	268,966	302,847	129,742	81,259	27,797	34,709	173,644	55,401
Days at sea	30	27	14	19	2	3	13	24

6.2 Non-whiting, non-DTS trawl with trawl endorsement EM costs

Table 28: Average total cost net revenue for Non-whiting, non-DTS trawl with trawl endorsement vessels, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped in vessel length classes and also by whether the vessel also fished in Alaska. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Small vessel (< 65 ft)	Medium vessel (> 65 ft, <= 75 ft)	Large vessel (> 75 ft)	Fished in AK	Only West Coast
0.00	0	26,308	17,245	21,554	2,993	24,001
0.00	5,000	21,308	12,245	16,554	-2,007	19,001
0.00	10,000	16,308	7,245	11,554	-7,007	14,001
0.00	15,000	11,308	2,245	6,554	-12,007	9,001
0.00	20,000	6,308	-2,755	1,554	-17,007	4,001
200.00	0	21,481	13,882	18,338	1,441	19,974
200.00	5,000	16,481	8,882	13,338	-3,559	14,974
200.00	10,000	11,481	3,882	8,338	-8,559	9,974
200.00	15,000	6,481	-1,118	3,338	-13,559	4,974
200.00	20,000	1,481	-6,118	-1,662	-18,559	-26
400.00	0	16,653	10,519	15,123	-110	15,948
400.00	5,000	11,653	5,519	10,123	-5,110	10,948
400.00	10,000	6,653	519	5,123	-10,110	5,948
400.00	15,000	1,653	-4,481	123	-15,110	948
400.00	20,000	-3,347	-9,481	-4,877	-20,110	-4,052
600.00	0	11,826	7,157	11,907	-1,661	11,922
600.00	5,000	6,826	2,157	6,907	-6,661	6,922
600.00	10,000	1,826	-2,843	1,907	-11,661	1,922
600.00	15,000	-3,174	-7,843	-3,093	-16,661	-3,078
600.00	20,000	-8,174	-12,843	-8,093	-21,661	-8,078
800.00	0	6,998	3,794	8,692	-3,212	7,895
800.00	5,000	1,998	-1,206	3,692	-8,212	2,895
800.00	10,000	-3,002	-6,206	-1,308	-13,212	-2,105
800.00	15,000	-8,002	-11,206	-6,308	-18,212	-7,105
800.00	20,000	-13,002	-16,206	-11,308	-23,212	-12,105
1000.00	0	2,171	431	5,476	-4,763	3,869
1000.00	5,000	-2,829	-4,569	476	-9,763	-1,131
1000.00	10,000	-7,829	-9,569	-4,524	-14,763	-6,131
1000.00	15,000	-12,829	-14,569	-9,524	-19,763	-11,131
1000.00	20,000	-17,829	-19,569	-14,524	-24,763	-16,131

Table 29: Average total cost net revenue for Non-whiting, non-DTS trawl with trawl endorsement, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped by home port. Some ports were grouped together to protect confidential data. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Washington	Astoria	Newport	Charleston or Coos Bay	Brookings	Crescent City or Eureka	Fort Bragg	Other California
0.00	0	31,909	41,962	16,920	13,541	4,756	13,364	8,140	1,027
0.00	5,000	26,909	36,962	11,920	8,541	-244	8,364	3,140	-3,973
0.00	10,000	21,909	31,962	6,920	3,541	-5,244	3,364	-1,860	-8,973
0.00	15,000	16,909	26,962	1,920	-1,459	-10,244	-1,636	-6,860	-13,973
0.00	20,000	11,909	21,962	-3,080	-6,459	-15,244	-6,636	-11,860	-18,973
200.00	0	25,888	36,615	14,057	9,782	4,387	12,844	5,508	-3,783
200.00	5,000	20,888	31,615	9,057	4,782	-613	7,844	508	-8,783
200.00	10,000	15,888	26,615	4,057	-218	-5,613	2,844	-4,492	-13,783
200.00	15,000	10,888	21,615	-943	-5,218	-10,613	-2,156	-9,492	-18,783
200.00	20,000	5,888	16,615	-5,943	-10,218	-15,613	-7,156	-14,492	-23,783
400.00	0	19,868	31,269	11,194	6,023	4,017	12,323	2,877	-8,593
400.00	5,000	14,868	26,269	6,194	1,023	-983	7,323	-2,123	-13,593
400.00	10,000	9,868	21,269	1,194	-3,977	-5,983	2,323	-7,123	-18,593
400.00	15,000	4,868	16,269	-3,806	-8,977	-10,983	-2,677	-12,123	-23,593
400.00	20,000	-132	11,269	-8,806	-13,977	-15,983	-7,677	-17,123	-28,593
600.00	0	13,847	25,922	8,331	2,265	3,648	11,803	246	-13,403
600.00	5,000	8,847	20,922	3,331	-2,735	-1,352	6,803	-4,754	-18,403
600.00	10,000	3,847	15,922	-1,669	-7,735	-6,352	1,803	-9,754	-23,403
600.00	15,000	-1,153	10,922	-6,669	-12,735	-11,352	-3,197	-14,754	-28,403
600.00	20,000	-6,153	5,922	-11,669	-17,735	-16,352	-8,197	-19,754	-33,403
800.00	0	7,827	20,575	5,467	-1,494	3,279	11,283	-2,385	-18,214
800.00	5,000	2,827	15,575	467	-6,494	-1,721	6,283	-7,385	-23,214
800.00	10,000	-2,173	10,575	-4,533	-11,494	-6,721	1,283	-12,385	-28,214
800.00	15,000	-7,173	5,575	-9,533	-16,494	-11,721	-3,717	-17,385	-33,214
800.00	20,000	-12,173	575	-14,533	-21,494	-16,721	-8,717	-22,385	-38,214
1000.00	0	1,806	15,229	2,604	-5,252	2,910	10,762	-5,017	-23,024
1000.00	5,000	-3,194	10,229	-2,396	-10,252	-2,090	5,762	-10,017	-28,024
1000.00	10,000	-8,194	5,229	-7,396	-15,252	-7,090	762	-15,017	-33,024
1000.00	15,000	-13,194	229	-12,396	-20,252	-12,090	-4,238	-20,017	-38,024
1000.00	20,000	-18,194	-4,771	-17,396	-25,252	-17,090	-9,238	-25,017	-43,024

7 Groundfish fixed gear with trawl endorsement

In 2011, there were 24 vessels that participated in the Groundfish fixed gear with trawl endorsement fishery. Of those, only four fished in Alaska. Home ports were located throughout the entire West Coast. Using 2011 revenues, costs, and days at sea, the average vessel fishing in Northern Oregon had negative net revenue, all other vessels had positive total cost net revenue, ranging, on average, from $33 thousand to $75 thousand. Taking into account the potential costs of electronic monitoring, small and medium sized vessels ($\leq$ 60 feet) maintained positive total cost net revenue, while, large vessels when electronic monitoring costs reached $800/day and annual fixed costs were at least $15 thousand. Aside from Northern Oregon vessels which had negative total cost net revenue before electronic monitoring costs were taken into account, Southern California was the only other group by vessels that experienced negative total cost net revenue once electronic monitoring costs were taken into account.

7.1 Groundfish fixed gear with trawl endorsement summary

Table 30: Number of vessels per length category in the Groundfish fixed gear with trawl endorsement.

	N
Small vessel (< 50 ft)	8
Medium vessel (> 50 ft, <= 60 ft)	8
Large vessel (> 60 ft)	8

Table 31: Number of Groundfish fixed gear with trawl endorsement vessels that fished in Alaska or only on the West Coast.

	N
Fished in AK	4
Only West Coast	20

Table 32: Number of vessels by port/state in the DTS trawl with trawl endorsement fishery.

	N
Washington	5
Northern Oregon	5
Southern Oregon	6
Northern California	4
Southern California	4

Table 33: Average Groundfish fixed gear with trawl endorsement vessels by vessel length class.

	Small vessel (< 50 ft)	Medium vessel (> 50 ft, <= 60 ft)	Large vessel (> 60 ft)
Revenue ($)	163,820	360,959	340,568
Variable costs ($)	79,464	166,213	180,315
Fixed costs ($)	27,926	46,376	119,305
Variable cost net revenue ($)	83,175	192,188	159,359
Total cost net revenue ($)	55,249	145,811	40,053
Variable cost ($) per day	2,363	5,311	4,842
Variable cost ($) per 1,000 lbs	1,635	1,595	1,680
Variable cost net revenue ($) per day	2,046	5,992	3,764
Variable cost net revenue ($) per 1,000 lbs	1,190	1,575	1,098
Landings (lbs)	62,029	117,743	110,257
Days at sea	33	30	33

Table 34: Groundfish fixed gear with trawl endorsement vessels by home port.

	Washington	Northern Oregon	Southern Oregon	Northern California	Southern California
Revenue ($)	293,922	353,793	364,083	182,748	192,178
Variable costs ($)	121,891	222,909	154,817	67,689	121,071
Fixed costs ($)	69,453	150,966	33,918	23,883	36,930
Variable cost net revenue ($)	170,169	129,304	208,535	112,578	69,721
Total cost net revenue ($)	100,716	-21,662	174,617	88,695	32,791
Variable cost ($) per day	4,065	4,288	5,561	2,911	3,339
Variable cost ($) per 1,000 lbs	1,442	1,801	1,725	1,403	1,774
Variable cost net revenue ($) per day	4,321	2,473	6,916	3,152	1,587
Variable cost net revenue ($) per 1,000 lbs	1,563	984	1,909	873	805
Landings (lbs)	82,170	153,163	94,455	65,107	79,103
Days at sea	31	39	27	25	40

7.2 Groundfish fixed gear with trawl endorsement EM costs

Table 35: Average total cost net revenue for Groundfish fixed gear with trawl endorsement vessels, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped in vessel length classes and also by whether the vessel also fished in Alaska. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Small vessel (< 50 ft)	Medium vessel (> 50 ft, <= 60 ft)	Large vessel (> 60 ft)	Fished in AK	Only West Coast
0.00	0	56,430	148,370	40,948	186,074	61,084
0.00	5,000	51,430	143,370	35,948	181,074	56,084
0.00	10,000	46,430	138,370	30,948	176,074	51,084
0.00	15,000	41,430	133,370	25,948	171,074	46,084
0.00	20,000	36,430	128,370	20,948	166,074	41,084
200.00	0	49,745	142,335	34,340	177,606	55,047
200.00	5,000	44,745	137,335	29,340	172,606	50,047
200.00	10,000	39,745	132,335	24,340	167,606	45,047
200.00	15,000	34,745	127,335	19,340	162,606	40,047
200.00	20,000	29,745	122,335	14,340	157,606	35,047
400.00	0	43,061	136,301	27,732	169,137	49,010
400.00	5,000	38,061	131,301	22,732	164,137	44,010
400.00	10,000	33,061	126,301	17,732	159,137	39,010
400.00	15,000	28,061	121,301	12,732	154,137	34,010
400.00	20,000	23,061	116,301	7,732	149,137	29,010
600.00	0	36,376	130,266	21,123	160,669	42,972
600.00	5,000	31,376	125,266	16,123	155,669	37,972
600.00	10,000	26,376	120,266	11,123	150,669	32,972
600.00	15,000	21,376	115,266	6,123	145,669	27,972
600.00	20,000	16,376	110,266	1,123	140,669	22,972
800.00	0	29,691	124,231	14,515	152,201	36,935
800.00	5,000	24,691	119,231	9,515	147,201	31,935
800.00	10,000	19,691	114,231	4,515	142,201	26,935
800.00	15,000	14,691	109,231	-485	137,201	21,935
800.00	20,000	9,691	104,231	-5,485	132,201	16,935
1000.00	0	23,007	118,197	7,907	143,733	30,898
1000.00	5,000	18,007	113,197	2,907	138,733	25,898
1000.00	10,000	13,007	108,197	-2,093	133,733	20,898
1000.00	15,000	8,007	103,197	-7,093	128,733	15,898
1000.00	20,000	3,007	98,197	-12,093	123,733	10,898

Table 36: Average total cost net revenue for Groundfish fixed gear with trawl endorsement, the EM variable costs represent the per day cost to the vessel, the EM fixed costs represent an annual cost for leasing or purchasing the EM equipment. Vessels are grouped by home port. Some ports were grouped together to protect confidential data. The costs related to observer coverage were not included, however, the daily EM variable costs can be used as a proxy for observer coverage.

EM variable costs per day	EM fixed costs per year	Washington	Northern Oregon	Southern Oregon	Northern California	Southern California
0.00	0	102,578	-20,082	175,348	91,176	34,177
0.00	5,000	97,578	-25,082	170,348	86,176	29,177
0.00	10,000	92,578	-30,082	165,348	81,176	24,177
0.00	15,000	87,578	-35,082	160,348	76,176	19,177
0.00	20,000	82,578	-40,082	155,348	71,176	14,177
200.00	0	96,327	-27,798	169,917	86,102	26,202
200.00	5,000	91,327	-32,798	164,917	81,102	21,202
200.00	10,000	86,327	-37,798	159,917	76,102	16,202
200.00	15,000	81,327	-42,798	154,917	71,102	11,202
200.00	20,000	76,327	-47,798	149,917	66,102	6,202
400.00	0	90,077	-35,515	164,486	81,028	18,226
400.00	5,000	85,077	-40,515	159,486	76,028	13,226
400.00	10,000	80,077	-45,515	154,486	71,028	8,226
400.00	15,000	75,077	-50,515	149,486	66,028	3,226
400.00	20,000	70,077	-55,515	144,486	61,028	-1,774
600.00	0	83,827	-43,231	159,054	75,954	10,251
600.00	5,000	78,827	-48,231	154,054	70,954	5,251
600.00	10,000	73,827	-53,231	149,054	65,954	251
600.00	15,000	68,827	-58,231	144,054	60,954	-4,749
600.00	20,000	63,827	-63,231	139,054	55,954	-9,749
800.00	0	77,577	-50,947	153,623	70,880	2,275
800.00	5,000	72,577	-55,947	148,623	65,880	-2,725
800.00	10,000	67,577	-60,947	143,623	60,880	-7,725
800.00	15,000	62,577	-65,947	138,623	55,880	-12,725
800.00	20,000	57,577	-70,947	133,623	50,880	-17,725
1000.00	0	71,326	-58,663	148,192	65,806	-5,700
1000.00	5,000	66,326	-63,663	143,192	60,806	-10,700
1000.00	10,000	61,326	-68,663	138,192	55,806	-15,700
1000.00	15,000	56,326	-73,663	133,192	50,806	-20,700
1000.00	20,000	51,326	-78,663	128,192	45,806	-25,700

Agenda Item F.2.b
PSMFC Report
June 2014

Final Report
Electronic Monitoring Program: Review of the 2013 Season

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Contents

Fixed Gear

Comparing on-board compliance monitor haul level retained and discarded catch estimates with video reviewer estimates of IFQ species aggregated to the haul level. No weight estimates were made in 2012.

Bottom Trawl

Comparing on-board compliance monitor haul level retained and discarded catch estimates with video reviewer estimates of IFQ species aggregated to the haul level. No weight estimates were made in 2012.

Overview/History

The objective of the Electronic Monitoring (EM) program is to test the viability of Electronic Monitoring as a source of data to document individual accountability of catch and bycatch in the Pacific Trawl Rationalization Program.

Pacific States Marine Fisheries Commission (PSMFC) launched the Electronic Monitoring program in 2012 in anticipation of the Pacific Fishery Management Council (PFMC) considering EM as a compliance monitoring tool in the newly implemented Pacific Trawl Rationalization Program.

In order to effectively and accurately debit discarded catch from individual fishing quota (IFQ) holder accounts, the PFMC instituted 100% human observer coverage on all trips for all vessels participating in the IFQ fishery. The cost of this program was regulated to transition from federally subsidized to industry funded over the course of the first 3 years of the program. The industry is interested in finding a less costly and more flexible method to monitor catch and discards at sea.

During the April 2013 PFMC meeting, "the Council indicated their desire to move ahead with consideration of electronic monitoring (EM) by stating that **compliance monitoring, rather than the collection of biological data, would be the primary focus for EM in the trawl catch share program**[...]"

The electronic monitoring program is meant to address some key questions, including: can video monitoring be used effectively to track an individual's catch to be debited from a quota account; and how much would such a program cost the industry as compared to the human compliance monitor program?

The expectation is that the West Coast Groundfish Observer Program (WCGOP) will continue to administer a level of scientific observer coverage to provide stock assessors and other scientists the necessary scientific data for effective management of the various West Coast fisheries. The EM program is not meant to replace scientific observers. This program is solely meant to explore the ability of electronic monitoring systems to estimate the at-sea discards of vessels for the purposes of effectively debiting quota accounts throughout the fishing season, therefore replacing the need for 100% at-sea human compliance monitor coverage. For this reason, throughout this document we will use the term observer when we are referring to the tasks performed by a WCGOP observer for the purposes of science data collection and refer to at-sea Compliance Monitors (CMs) when reporting data related to the compliance monitoring role.

Finalized 2012 and 2013 at-sea compliance monitoring data were received from the WCGOP for comparison to the video data. Since retained catch is weighed and accounted for by fish dealers at the dock, discards were the main concern for at-sea catch accounting of IFQ species on this project. While analysis of both retained and discarded data are presented in this report, the discard analysis should be more closely scrutinized for this reason.

Providers

PSMFC contracted with Archipelago Marine Research (AMR) in 2012 and both AMR and Saltwater, Inc. in 2013 to provide and install electronic monitoring (EM) systems on volunteer fishing vessels in the midwater trawl, bottom trawl, and fixed gear fisheries, collect data drives from the vessels, train PSMFC video reviewers, and provide logistical support. AMR also provided Electronic Monitoring Interpret™ Pro (EMI) software for converting the raw data into usable catch information.

Archipelago Marine Research

The on-board AMR system includes sensors for drum movement, hydraulic pressure, and GPS locations from which the speed of the vessel is calculated, and 1-4 cameras. To aid in review and interpretation of the video data, the sensor, GPS and video output are integrated within the EMI software mentioned above. A GPS location along with any sensor data was recorded every ten seconds during a trip. Sensor data was recorded at all times that the vessel's power was on. Gaps therefore occurred when in port and the vessel was powered down or the system was turned off manually to prevent the system from draining the vessel's battery when in port. On midwater and bottom trawl vessels, the system was configured to trigger recording video when the vessel moved outside of a "port area" geo-fence designated by AMR and continue recording imagery until they returned to port. On fixed gear vessels, systems were configured to trigger recording video when the hydraulic pressure exceeded a threshold that was set by the technician that installed the equipment and was specific to each vessel. Imagery recording would then continue for 20 minutes in 2012 and 30 minutes in 2013 past the last use of those hydraulics to allow for all catch handling to be captured for each haul.

When the raw sensor and video data were received by PSMFC, annotations were made using the AMR software EMI. Start and end dates, times, and locations, for trips and hauls as well as gear and catch information were captured using EMI. The annotation data were imported into a Microsoft Access Database for analysis.

Saltwater, Inc.

The on-board Saltwater system includes a sensor for hydraulic pressure, a GPS for location data which is stamped on the video of one camera, and 2 cameras. One camera is situated high above to capture the entire deck in a single view, while the second camera is positioned closer to the fishing activity to get a better view for the identification of retained and discarded fish. The cameras are capable of initializing and recording either 100% of the time or only when the hydraulic sensor achieves a pressure level preset by the technician and for 15 minutes after the pressure drops below that set level. The sensor and video data are not integrated.

When the raw sensor and video data were received by PSMFC, Mobotix software was used to identify trips and hauls. Since no data capturing tool was provided, video reviewers recorded all information on sheets of paper that will be data entered into a database by PSMFC. Start and end dates, times, and locations, for trips and hauls as well as gear and catch information were captured.

Saltwater, Inc. data are not presented in this report.

Definition of Catch

For the purposes of EM review, catch is anything that we see that breaks the surface, excluding sea birds and marine mammals that are swimming freely alongside the vessel. If it is kept on the vessel, it is recorded as retained. If it is not kept on the vessel, it is recorded as discard. Discard includes marine organisms that wash out of the net before the net comes onboard the vessel, that fall off or out of fishing gear before it makes it on the vessel, or are free floating on the surface.

Hake

Methods

EM systems were installed on 6 volunteer hake trawl vessels fishing IFQ quota out of Newport and Astoria, Oregon in 2012 and 4 in 2013. All fishing vessels carried the EM system for most of the fishing seasons. In 2012, all 6 made both shoreside and mothership deliveries. In 2013, less than three made mothership deliveries, barring our ability to report results for that fishery. Results for 2013 shoreside hake delivery trips are reported.

Retained catch, or catch transferred to the mothership, was calculated by video reviewers by counting the number of straps of the codend that contained fish. This number was then multiplied by an estimated weight per strap in 2012, and a known weight per strap supplied by the skipper in 2013, to get the total weight of retained fish in the codend.

While compliance monitors make independent estimates of total catch and discards, they are advised to use skipper hailed weights recorded in the vessel's logbook for retained catch when they are available and to make individual estimates of retained catch only when a vessel logbook is not available (Ryan Shama, personal communication, March 19, 2013).

While specific protocols are in place to try to accurately estimate the weight of discards, general methods can be described here. One method is visualizing how many round baskets the discarded fish may fill. With the conversion of 80 lbs of hake per basket, the video reviewer is able to calculate an estimate of total weight. A second method is using the codend and the supplied weight per strap values to visually estimate the weight of fish lost. If the video show approximately one strap worth of fish spilling out of the net and the known weight per strap for that codend is 2,000 pounds then the video reviewer will record 2,000 pounds of discard. Estimating weight of discards that are floating on the surface of the water with no real reference is more subjective. Video reviewers will use a variety of methods to try estimating the weight as closely as possible, including visualizing how many round baskets the fish would fill and taking into account how densely packed the fish are on the surface.

Compliance monitor and video hauls were matched using vessel ID, set date, and order of haul on that fishing date. For example, haul 3 of a fishing day in the compliance monitor data was matched to haul 3 of the same fishing day for the same vessel in the video data. This was necessary since there could be multiple hauls in a day and the haul times did not match exactly. The quality of the match was then confirmed manually in excel and adjustments were made where necessary. Adjustments were only necessary if a time gap occurred in the electronic data that led to the EM system missing a haul, a haul occurred near the midnight time mark causing a different date in each of the datasets, if the EM data recorded an individual haul with very little catch (~5000lbs) that was put in the hold when the observer data did not, or if the EM data recorded a net cleaning where the observer data did not.

Most hauls in the EM data had corresponding hauls in the compliance monitor data. It was therefore possible to compare catch at the haul level.

Of all the hake trips reviewed by EM to date, 15 were mothership catcher-vessel trips in 2012 and 236 were shoreside delivery hake trips with 154 from 2012 and 82 from 2013. One trip in the 2012 dataset included one mothership delivery haul and the catch from the remaining hauls of the trip was stored onboard and delivered shoreside (Table 1).

In 2012 and 2013 a total of 75 hake trips were missing electronic data entirely, 65 of which were due to skippers not turning the system on when they went fishing. This was a concentrated occurrence with a small number of vessels. Three were due to improper activation of the system by a technician. Seven were from a single vessel that had a technical problem with the EM system interfering with the VMS system. Since VMS is mandatory, the EM system was kept turned off until the issue was resolved.

Official haul level catch amounts delivered to motherships were available from NORPAC data in PacFIN. Since fish tickets are not available for this fishery, the NORPAC dataset is the best estimate for total catch amounts delivered from the catcher vessels to the motherships. The NORPAC official total catch weight of a haul is the aggregated total weight of retained and discarded fish of that haul. To extract the weight of the codend that was delivered to the mothership from the official total catch weight, the WCGOP recorded discards were subtracted from the official total catch weight of the haul.

Official trip level landed weights were available for the shoreside deliveries from the state landing receipts in PacFIN. These were matched based on vessel ID and return date. All hauls or trips had corresponding official retained catch amounts.

To address concerns voiced in the PFMC Electronic Monitoring Workshop about quality of EM discard estimation with night light versus day light, hauls brought on board in day light and night light were differentiated in the figures where possible. Hauls brought onboard between 6 AM and 6 PM were labeled day hauls, and hauls brought onboard between 6 PM and 6 AM the next day were labeled night hauls.

Results and Discussion

Shoreside Hake
(2012 and 2013)

Results
Retained

Retained catch estimated by the video compared to the compliance monitor data and the official catch data on fish tickets from PacFIN had very similar patterns (Figures 2, 4, 6 and 7). In both 2012 and 2013, the trend line qualitatively tracked the video = compliance monitor reference line closely. In 2012, the trend line hovered just above the reference line.

Discard

In 2012, the compliance monitor data contained a larger number of discard events than the video data. Despite this, the total amount of discarded weight captured by the video was estimated to be almost double the discarded weight captured by the compliance monitor (Table 2). Most discard events were very small (Figures 3 and 5). In 2012, only six observations of discards occurred during the night and all were from the compliance monitor dataset. There were only 4 hauls where discards were recorded in both datasets.

In 2013, the video data contained a larger number of discard events than the compliance monitor data. Again, the total amount of discarded weight captured by the video was estimated to be almost double the discarded weight captured by the compliance monitor (Table 2). Most discard events were very small (Figures 3 and 5). In 2013, both datasets observed discard events during the night. There were only 15 hauls where discards were recorded in both datasets

Discussion
The shoreside hake haul level retained weights were on average (using the trend line as a gauge) accurate but had variability when assessing at the trip level (Figures 6 and 7). In 2012 the variability was higher with the EM estimates larger on average. This was likely due to vessel to vessel variability of nets and codend capacity and the lack of information about each vessel that the video reviewers had available to them when estimating catch. In 2013, with skipper provided net capacities, variability was lower with the trend lines tracking the reference line very closely.

The discarded catch estimates were more variable than in the at-sea catcher vessel fishery with only 4 of the 30 total discard observations in 2012 and 15 of the 100 total discard observations in 2013 overlapping in both datasets (Table 2). Most of the discard observations were only detected in one of the two datasets. The magnitude of most of these discard events were generally small at less than 2,000 pounds (Figures 3 and 5).

In 2012, there were four discard events that were larger than 2,000 pounds that were recorded by the video but not the compliance monitor. Two of these were blowout panel discards prior to the net boarding the vessel. The other two were due to deck washing of fish. The one discard event recorded in the compliance monitor data but not in the video data that was larger than 2,000 pounds was also a deck washing event.

In 2013, there were four discard events that were larger than 2,000 pounds that were recorded by the video but not the compliance monitor. All four were blowout panel discards prior to the net boarding the vessel. This means that the discard occurred as the codend was approaching the stern of the vessel. The one discard event recorded in the compliance monitor data but not in the video data that was larger than 2,000 pounds was not evident upon a second review of the video data.

Discussion with WCGOP suggested that while additional training is in order to ensure discards are not missed, some of these discard events not being recorded is due to safety concerns, and the difficulty to see and quantify discards that are in the water from the low angle of standing on the deck of the boat. It is important to note that the EM system has cameras mounted on the aft gantry that provide a long field of view behind the vessel that the CM cannot get. Also, the EM system has multiple views of the vessel and the water at once and can be reviewed multiple times if needed to get an accurate estimate of total discards.

Mothership Catcher Vessels
(*2012 Only, 2013 is Confidential)*

Results
Retained

Retained catch estimated by the video compared to the compliance monitor data and the official catch data from NORPAC had very similar patterns (Figure 8). Again, the relationship of video to compliance monitor retained estimates was consistent regardless of whether the haul was retrieved in night-time or day-time lighting. The relationship between video and compliance monitor retained estimates fell across the video = compliance monitor/NORPAC reference line. Video retained catch estimates tended to be higher than compliance monitor estimates on loads smaller than 50,000 pounds, and tended to be lower than compliance monitor estimates on loads larger than 50,000 pounds (Figure 8).

Discard

The video data contained a larger number of discard events than the compliance monitor data, and those discard events were estimated by the video to be larger than the compliance monitor estimate (Figure 9). Most discard events were very small. The relationship of video to compliance monitor discard estimates was consistent regardless of whether the haul was retrieved in night-time or day-time lighting.

Discussion
No information was obtained from the vessels in 2012 about the capacity of their nets or the dimensions of their vessel to aid in catch estimation from the camera view prior to video reviewing. Obtaining this information in 2013 helped with the accuracy of estimation of retained catch weight in codends.

Discard events were much more abundant in the video data than in the compliance monitor data for this fishery (Table 2). The majority of the discard events recorded in the video data were of a magnitude smaller than 2,000 pounds. This suggests that compliance monitors were not recording discards in most instances when the magnitude was considered small. In 2012, compliance monitors were instructed to only record discard events that were larger than 2-3 baskets or more than 100 pounds. Protocols were revised just prior to the 2013 season so that all discard events, regardless of their size, were recorded.

In 2012, there were five large discard events above 2,000 pounds, ranging from 3,000 to 16,000 pounds not reported in the compliance monitor data. All five of these events were net bleeds due to the codend being overcapacity, making it impossible to tie the codend off prior to transfer to the mothership. When WCGOP reviewed video of such events they agreed that there was a large discard. Compliance monitors reported that they were instructed by the Captain to stand amidships rather than near the stern due to safety concerns. This might have prevented them from seeing some discard events which happened very close to the stern ramp, causing there to be no record of a discard in the WCGOP data.

Fixed Gear

(*2012 and 2013)*

Methods

The electronic monitoring system was installed on volunteer fixed gear vessels (5 in 2012 and 5 in 2013) fishing IFQ quota out of Morro Bay, CA, Half Moon Bay, CA, Coos Bay, OR and Newport, OR. All but two of the vessels fished pot gear solely. Two vessels fished both pot and longline gear.

Two definitions for fixed gear hauls are presented in the WCGOP manual for the IFQ fishery:

> "A set begins at a buoy and ends at a buoy. The set includes all of the hooks or pots in between the two buoys." (NWFSC 2012, Section 5-8)
>
> "Small pieces of gear with individual buoys are often set haphazardly in a general area or fishing spot. The gear is frequently set and retrieved over and over again, with individual pieces of gear soaking for as little as 5 minutes between retrievals. If each retrieval was considered a set, one day of fishing could have over fifty sets, with each set only having one or two fish caught. Obviously, this would create an unreasonable quantity of paperwork for the amount of data collected. Therefore, individual pieces of gear can be grouped to form a single set using a standard set of criteria." (NWFSC 2012, Section 6-10)

Since strings of gear were distinguishable by the EM system, the former definition was used. The compliance monitor used the second method to define a haul on some of the corresponding trips.

On many trips, the haul count in the compliance monitor data was much lower than the count from the video data (Table 1). This difference in haul definition at the data level led to an inability to assess catch at the EM haul level and thus catch data were compared to compliance monitor data at the compliance monitor haul level. EM hauls were aggregated to correspond to the compliance monitor haul designation and were matched manually in excel. All trips monitored electronically had corresponding trips in the compliance monitor data.

In the two years of fixed gear participation in the EM project four trips did not have any EM data recorded. Three trips were due to the skipper failing to turn the system on and one was due to a system failure (Table 1).

In-season feedback

In 2012, fishermen and technicians were not given in-season feedback on how to maximize data quality for the video project. Thus, there were instances where the fishermen or the compliance monitors stood with their backs to the camera while sorting, or sorting of catch was conducted out of camera view, or cameras were poorly placed, which made counting and classifying catch into species groupings impossible.

In 2013, fishermen and technicians were given in-season feedback on how to maximize data quality for the video project. Increased communication greatly reduced technical and behavioral issues that would hinder catch identification and quantification.

Weights or counts

In 2012, weights were not directly estimated by the video reviewer. Instead, counts of individual pieces for each species or grouping were recorded. All fish seen on the video were counted by the reviewer including fish that dropped off of the line before being pulled onto the fishing vessel and fish that were damaged or partially eaten. Fish whose fate could not be determined due to being taken or thrown out of camera view or the video ending before fish were put into the hold or discarded were recorded as disposition 'unknown'.

In 2013, in addition to counts, weights were also estimated. Weight estimation was done by either obtaining information from the skippers on the hold capacity of discrete areas on their vessel where they tended to sort fish, or by obtaining information on how much a standard round basket weighed when filled with specific species. This information aided in converting visual estimates of volumes of fish to weights.

Weights recorded by the compliance monitor were based on actual or average weights collected during each trip.

Compliance monitor data contained more species specific information than was possible to collect from the video data. Data were therefore aggregated to different levels of groupings to aid in comparisons of catch quantities.

Excluded data

Some compliance monitor hauls were subsampled, and then the counts and weights were expanded to the full haul. Since these numbers were not true counts and weights, hauls that were expanded were excluded from the catch comparison.

Other reasons for exclusion include gear problems, if a clean haul merge was not possible between the CM and video data, or if the condition of the video data was not usable.

Filtering left 952 (620 from 2012 and 332 from 2013) of the total 1,256 EM recorded hauls to be included in the analysis.

Retained and discarded counts and weights of fish were compared to compliance monitor data at the haul and IFQ complex and species group level. Results for the IFQ groupings sablefish, rockfish, thornyheads, and flatfish are reported in this document.

Since only two vessels used longline gear, results could not be reported by fixed gear types (pot vs. longline) due to confidentiality rules. Both pot and longline gears were therefore reported on the same figures.

Results

Three general patterns emerge for all results. The first is that video reviewers had higher species identification success in 2013 than they did in 2012. The second is that in 2013, the relationship between CM and video reviewer weight estimates showed more variability than the relationship between counts. Finally, discarded catch had lower speciation and quantification success than the retained catch.

For the target species of this fishery, sablefish, compliance monitor and video reviewer estimates of retained and discarded catch tracked the reference line closely in both 2012 and 2013 (Figure 10).

For Pacific hake, no retained hake were recorded in either datasets. The CM record shows 30 fish discarded on observed hauls in 2013 while the video reviewer only recorded 10 (Table 3). There were four instances of CM recorded hake where the video review recorded none.

For flatfish, quantification of retained counts improved from 2012 to 2013. Fewer discards were recorded in 2013 than in 2012 (Table 3, Figure 11a).

Dover sole were the most frequently seen flatfish in the fixed gear fishery. In 2012, CM recorded more dover sole retained than the video reviewer. This aggregate trend reversed in 2013 (Table 3). Video recorded fewer discards in both years (Table 3, Figure 11a). Records of 11 discarded and retained petrale sole recorded in 2013 by the CM were not recorded by the video reviewer (Table 3). Similarly, records of 8 arrowtooth flounder in the EM dataset in 2012 had no corresponding record in the CM dataset. Record of one discarded arrowtooth in the

CM dataset was recorded as retained in the EM dataset. Number of unidentified flatfish decreased from 2012 to 2013 (Table 3, Figure 11c).

For rockfish, fewer rockfish were recorded as unidentified in the EM data in 2013 (Table 3, Figure 12). In 2012, all of the rockfish recorded by the CM were from the minor slope rockfish complex; most of these were recorded as unidentified rockfish by the video reviewer. In the 2013 CM dataset, all except one of the rockfish seen in this fishery were from the Minor Slope Rockfish complex (Table 3, Figure 12). A single Pacific ocean perch rockfish was recorded in the CM dataset. This fish was recorded as unidentified in the EM dataset. There were 5 fish identified as darkblotched rockfish in the EM dataset but recorded as minor slope rockfish in the CM dataset (blackgill or rougheye rockfish). At the haul level, the trend line for retained minor slope rockfish in 2013 tracked the reference line closely for counts and was slightly above for weights (Figure 12).

For thornyheads, longspine thornyheads were consistently recorded as mixed thornyheads in the EM dataset (Table 3, Figure 13b). Retained haul level shortspine thornyhead and total thornyhead counts in both 2012 and 2013 tracked the reference line very closely (Figures 13a). There were few discards of thornyheads yet the EM data recorded fewer individuals than the CM dataset. Some of these thornyheads were identified as “Red rockfish” in the EM data.

Discussion

Video reviewers’ higher species identification success in 2013 than in 2012 could be due to multiple factors. First, AMR cameras were upgraded from analog to digital at the beginning of the 2013 season. This means that the video reviewers were working with higher resolution video and an ability to zoom into the camera views. Second, the video reviewers had moved up the learning curve, improving their species identification by camera. Third, feedback to fishers and technicians was a focus during the 2013 season, improving camera angles, video coverage of the deck, and fisher or compliance monitor behavior.

The higher variability in the relationship between CM and video reviewer weight estimates than between count estimates is simple. Compliance monitors weigh fish on scales while video reviewers are making educated estimates of the weight of fish that they see. Using onboard measuring boards to assist in converting length to weight for some species is being tested along with testing accuracy of volume estimates and establishing tested volumetric weight conversions. Results are not available.

Video reviewers have noted that speciation of discards was more difficult than retained catch due to the nature of where the CM work station was on the deck of the vessel. The CM was often in a corner of the deck further from the camera than where retained catch was being sorted. Although efforts were made to place a camera focused on the part of the deck where the CM typically worked, this location was not always constant between trips or even hauls on a trip.

Fish can generally be identified to the species group level (flatfish or rockfish) successfully (Figures 11a and 12), but this is not sufficient for the IFQ fishery. Since quota is tracked at the IFQ complex level, including a number of individual flatfish and rockfish species, discards must be tracked at the IFQ grouping level. In the fixed gear fishery, identification to the IFQ complex greatly improved between 2012 and 2013, especially for the larger volume IFQ species seen in the fishery, such as sablefish, dover sole, and minor slope rockfish.

Bottom Trawl

(2013 Only, no volunteers in 2012)

Methods

The AMR electronic monitoring system was installed on 6 volunteer bottom trawl vessels fishing IFQ quota out of Morro Bay, CA, Coos Bay, OR and Newport, OR. Some were not installed until after the shrimping season in November of 2013.

EM hauls were matched to the compliance monitor hauls manually based on vessel, haul date and time.

Nine trips did not have any EM data recorded. All 9 were due to interference with the VMS system onboard two of the vessels (Table 1). The skippers intentionally kept the systems turned off until the problem could be resolved.

In-season feedback

In 2013, fishermen and technicians were given in-season feedback on how to maximize data quality for the video project. Increased communication greatly reduced technical and behavioral issues that would hinder catch identification and quantification. Despite this, the bottom trawl fishery is a high volume mixed species fishery. In this fishery, catch is sorted onboard and there can be large amounts of selective discarding at sea. This means that larger changes in fisher behavior are required to accurately speciate and quantify catch.

Weights or counts

Counts were not estimated by the video reviewer for all catch due to the nature of this fishery. Instead, weights and species of catch were estimated.

All fish seen on the video were estimated by the reviewer including fish that spilled from the net before being pulled onto the fishing vessel. Fish whose fate could not be determined due to being taken or thrown out of camera view or the video ending before fish were put into the hold or discarded were recorded as fate 'unknown'. Weight estimation was done by either obtaining information from the skippers about how much areas on their vessel that they tended to sort fish into could hold, or by obtaining information on how much a standard round basket weighed when filled with specific species. This information aided in converting visual estimates of volumes of fish to weights.

Compliance monitor data contained more species specific information than was possible to collect from the video data. Data were therefore aggregated to different levels of groupings to aid in comparisons of catch quantities.

Excluded data

Some hauls were excluded from the catch comparisons. Reasons for exclusion include gear problems, if a clean haul merge was not possible between the CM and video data, or if the condition of the video data was not usable. Filtering left 247 of the total 274 EM recorded hauls to be included in the analysis.

Retained and discarded weights of fish were compared to compliance monitor data at the haul and IFQ complex and species group level. Results for the IFQ groupings sablefish, rockfish, thornyheads, and flatfish are reported in this document.

Results

Reminder: Weight estimates were made in the bottom trawl fishery from video data. As seen in the fixed gear fishery, weight estimates can have more variability than counts since there is no direct way to measure the weight of the fish. Therefore, all of the results will show noise around the trend lines. Counts were not recorded in all instances due to the high volume nature of the fishery. Counts are therefore not used in this report.

Also, in most cases, discarded IFQ fish were being sorted by the on board catch monitor prior to discarding. If subsampling occurred, the remainder of the discarded catch was pushed overboard unsorted. These data therefore represent accuracy of speciation and quantification of sorted discarded catch.

For sablefish, lingcod and Pacific halibut (Figure 14), compliance monitor and video reviewer estimates of retained and discarded catch tracked the reference line closely on average. There was one halibut that was recorded by the CM as discard that was recorded as retained in the EM dataset (Table 3, Figure 14). According to the observer, this PHLB was discarded via a scupper that was off camera. There was a different halibut that was recorded by the CM as a discard but was missed by the video reviewer.

For Pacific hake, the discard estimates tracked the reference line but the retained estimates were far off (Table 3, Figure 14). The EM data estimated 3,565 pounds of retained weight for the bottom trawl fishery where the CM data recorded only 480 pounds. Fish tickets recorded 3,603 lbs of Pacific hake.

For flatfish, in aggregate at the flatfish group level, both retained and discard estimates from the video data were lower than measurements in the CM data (Table 3, Figure 15). There are a number of clustered points in the retained figure on the X- axis giving the appearance that there are a number of hauls where the EM data did not see more than 2000 pounds of catch. These fish were recorded by the video reviewer but were categorized as unidentified groundfish (or mixed groundfish). These were cases where the crew did not sort their retained catch on board but pushed mixed catch into the hold. This behavior makes it impossible for the video reviewer to identify and quantify the retained catch. When sorting is done prior to retained catch being stowed in the hold, identification and quantification is more successful.

For the larger magnitude species, arrowtooth flounder and petrale sole, the retained and discard trend line falls on or slightly below the reference line for retained catch and below the reference line for discarded catch (Figure 15). For dover sole, retained catch is quantified effectively with the trend line falling on the reference line whereas discarded catch is not captured by the video reviewer, with the CM data reporting 793 pounds of discards and the EM data reporting only 245 pounds (Table 3).

For rockfish, in aggregate at the haul level, quantification of both discards and retained catch tracked the reference line (Table 3, Figure 16a). There are a number of data points clustered on the Y-axis with the EM data having record of 200-500 pounds of retained rockfish that were not recorded by the CM. Many of these data points were instances where the video reviewer categorized the catch as unidentified rockfish but could not see the species, and the CM recorded them as longspine thornyheads. The trend line for discarded rockfish fell slightly below the reference line due to a number of hauls where the CM data reported rockfish but the EM data did not. All of these were due to lack of sorting of discarded catch, with large volumes of catch that were subsampled by the observer being shoveled off of the deck and pushed out the scuppers.

Splitnose rockfish was consistently recorded as unidentified rockfish (Table 3, Figure 16a).

Retained chilipepper rockfish were accurately identified and quantified (Table 3, Figure 16a).

Retained minor slope rockfish were accurately categorized for most hauls with only three hauls of large magnitude being categorized as unidentified rockfish causing the trend line to fall below the reference line (Figure 16b).

Discarded minor slope and minor shelf rockfish were consistently recorded as unidentified rockfish by the video reviewer (Table 3).

For thornyheads, longspine thornyheads were consistently recorded as mixed thornyheads or unidentified rockfish in the EM dataset (Table 3, Figure 17). Retained haul level total thornyhead weights tracked the reference line very closely (Figure 17). The trend line for retained shortspine thornyhead was slightly low. Discards of thornyheads were all recorded as 70 pounds or less on any given haul.

Discussion

As in the fixed gear fishery, fish can generally be identified to the species group level (rockfish, thornyheads or flatfish) successfully with bottom trawl gear (Figures 11a, 12, and 13a). Since quota is tracked at the IFQ complex level, including a number of individual flatfish and rockfish species, discards must be recorded at the IFQ complex level. With the exception of minor slope, minor shelf, splitnose rockfish and longspine thornyheads, other IFQ complexes were successfully identified by video reviewers with the current technology available. Weight estimation could be improved using other methods that will be tested in the coming months.

When complete sorting of discards and retained fish occurred on deck, most of the flatfish species were identified effectively to the IFQ complex. For rockfish, identification was less successful with most of the rockfish being categorized as unidentified rockfish by the video reviewer. Video reviewers have noted that if they cannot identify a rockfish to the species level, it is not possible with the current camera views to categorize them into broader categories such as minor slope, minor shelf, or neither. Speciation was even more difficult for discarded catch due to the nature of where the CM work station was on the deck of the vessel. The CM was often in a corner or at the end of the trawl alley further from the camera than where retained catch was being sorted. Although efforts were made to place a camera focused on the part of the deck where the CM typically worked, this location was not always constant between trips or even hauls within a trip.

Sorting discards in a specific location of the deck may improve the video reviewer’s ability to consistently identify discarded IFQ rockfish. Video reviewers, however, still could not identify almost all of the splitnose rockfish that were retained or discarded when the catch was sorted. Preliminary results of a discard chute study indicate that identification of splitnose is possible using a discard chute where it is not possible on the same haul using other camera views. Whether identification is accurate is yet to be determined. Results from that study will be published at a later date.

Finally, longspine thornyheads were impossible to identify to the species level. When in hand, a longspine thornyhead often requires careful examination to confirm its identity. Shortspine thornyheads are easier to identify due to the larger size that they can achieve. This means that if the video reviewers see what looks like a thornyhead and the specimen is larger than a longspine could be, they are able to use the size of the fish to categorize it as a shortspine thornyhead, explaining the higher success of identification for shortspine thornyheads. Despite this, thornyheads are red, spiny fish and sometimes cannot be differentiated from a red rockfish on the deck.

Acknowledgements

We would like to thank the owners, skippers, and crew of the volunteer fishing vessels for volunteering and helping this project. We would like to thank the West Coast Groundfish Observer Program for providing data for this report.

References

Northwest Fisheries Science Center (NWFSC). 2012. West Coast Groundfish Observer Program 2013 Catch Shares Training Manual. West Coast Groundfish Observer Program. NWFSC, 2725 Montlake Blvd. East, Seattle, Washington, 98112.

Tables

Table 1. Summary of data including: number of vessels, number of trips, trip length, number of hauls, haul level distribution of confidence in data from video, reasons for low confidence or no confidence (unusable), and reasons for no video and missing trips.

	Bottom Trawl	Fixed Gear		Mothership Catcher Vessel		Shoreside Hake	
Number of Vessels	**2013**	**2012**	**2013**	**2012**	**2013**	**2012**	**2013**
Total	6	5	5	6	-	6	4
Fishery Total	68	25	18	16	-	24	25
Trips							
Number of Trips							
Video	43	72	27	15	-	154	82
Compliance Monitor	52	74	29	16	-	185	124
Fishery Total	1,222	281	122	37	-	719	948
Sea Days Per Trip							
Minimum	1	1	1	2	-	1	1
Median	2	1	3	12	-	2	3
Mean	3	1	3	11	-	3	3
Maximum	5	3	6	18	-	5	11
Total	112	104	79	170	-	386	220
Fishery Total	4,340	913	465	530	-	1,881	2,053
Hauls							
Number of Hauls							
Video	274	873	383	299	-	391	202
Compliance Monitor	340	290	247	341	-	473	319
Fishery Total	10,230	2,214	1,300	956	-	1,599	1,763
Confidence in Data from Video (Number of Hauls)							
High	75	610	342	180	-	265	143
Medium	128	200	31	85	-	93	37
Low	62	47	0	32	-	16	0
Unusable	6	15	3	0	-	0	0
No Video	3	1	7	2	-	17	22
Reason for Low Confidence in Data from Video (Number of Hauls / Number of Vessels)							
Corrupt Video Files	0	1 / 1	0	0	-	2 / 2	0
Crew Catch Handling - Not in Camera View	0	34 / 2	0	0	-	0	0
Poor Image Quality - Glare	7 / 1	1 / 1	0	0	-	0	0
Poor Image Quality - Night Lighting	10 / 2	6 / 1	0	6 / 3	-	13 / 1	0
Poor Image Quality - Out of Focus	7 / 1	0	0	0	-	0	0
Poor Image Quality - Poor Camera Angles	1 / 1	3 / 1	0	24 / 1	-	1 / 1	0
Poor Image Quality - Poor Camera Resolution	28 / 1	0	0	0	-	0	0
Poor Image Quality - Water Spots	9 / 1	0	0	2 / 2	-	0	0
Unclosed Video Files	0	2 / 1	0	0	-	0	0
Total	62 / 4	47 / 2	0	32 / 3	-	16 / 2	0
Reason for Unusable Data from Video (Number of Hauls / Number of Vessels)							
Camera Failure - Incomplete data	6 / 2	15 / 3	2 / 1	0	-	0	0
Poor Image Quality - Night Lighting	0	0	0	0	-	0	0
Poor Image Quality - Poor Camera Angles	0	0	1 / 1	0	-	0	0
Total	6 / 2	15 / 3	3 / 1	0	-	0	0
Reason for No Video - System is recording sensor data but video has failed (Number of Hauls / Number of Vessels)							
Complete Power Failure	0	1 / 1	0	0	-	3 / 1	2 / 1
Drive Filled	2 / 1	0	0	2 / 1	-	14 / 2	0
Installation Error - Video Recording Not Activated	0	0	0	0	-	0	9 / 1
Power Failure to Cameras	0	0	7 / 1	0	-	0	11 / 1
VMS Interference	1 / 1	0	0	0	-	0	0
Total	3 / 2	1 / 1	7 / 1	2 / 1	-	17 / 3	22 / 2
Reason for Missed Trips (Number of Trips / Number of Vessels)							
Behavioral - System Not On	0 / 0	2 / 1	1 / 1	1 / 1	-	31 / 3 *	33 / 1
Technical - Recording Not Activated	0 / 0	0 / 0	0 / 0	0 / 0	-	0 / 0	3 / 1
Technical - System Failure	0 / 0	0 / 0	1 / 1	0 / 0	-	0 / 0	0 / 0
Technical - VMS Interference	9 / 2	0 / 0	0 / 0	0 / 0	-	0 / 0	7 / 1
Total	9 / 2	2 / 1	2 / 1	1 / 1	-	31 / 3	43 / 3

- Confidential data

* 27 from one vessel

Table 2. Summary of number of discard events (haul counts) in the compliance monitor and video data, total number of hauls included in the analysis, and the retained and discarded catch weight that they represent in the mothership catcher vessel and shoreside hake fisheries.

	Mothership Catcher Vessel - 2012		Shoreside Hake - 2012		Shoreside Hake - 2013	
Discard event recorded in both datasets	**Number of Discard Events**	**Discard (lbs)**	**Number of Discard Events**	**Discard (lbs)**	**Number of Discard Events**	**Discard (lbs)**
	22		8		15	
Compliance Monitor		24,650		64,830		45,709
Video		52,840		78,600		55,233
Hauls with discard event recorded in the Compliance Monitor Dataset but not the Video Dataset						
	4	5,000	14	12,359	26	7,579
Hauls with discard event recorded in the Video Dataset but not the Compliance Monitor Dataset						
	119	84,056	16	55,931	59	34,500
Total Number of Discard Events in Each Dataset						
Compliance Monitor	26	29,650	22	77,189	41	53,288
Video	141	136,896	24	134,531	74	89,733
Total Number of Merged Video and Compliance Monitor Hauls Included in Analysis						
	297		373		177	
Total Retained Catch Weight from Included Hauls		**Retained (lbs)**		**Retained (lbs)**		**Retained (lbs)**
Compliance Monitor		21,146,048		33,800,751		21,374,850
Video		17,450,730		39,127,050		20,891,594

Table 3. Summary of aggregated recorded catch by the catch monitor and the video reviewer in 2012 Fixed gear (counts only), 2013 fixed gear (counts and weights), and 2013 bottom trawl (weights only).

	BottomTrawl - 2013				FixedGear - 2012				FixedGear - 2013							
	Weight				Count				Count				Weight			
	Discarded		Retained		Discarded		Retained		Discarded		Retained		Discarded		Retained	
IFQ Complex	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video
Lingcod	3,494	3,488	3,868	4,021												
Pacific Hake	11,053	12,172	480	3,565					30	10			61	16		
Pacific Halibut	1,609	1,344		12												
Sablefish	123	205	61,028	62,595	372	373	36,407	35,652	1,435	1,361	51,401	52,042	6,493	5,067	272,926	258,283
Flatfish																
Arrowtooth Flounder	7,693	5,897	14,400	16,905		4		4	1			1	15			6
Dover Sole	793	245	146,690	163,574	83	53	97	21	28	22	82	84	55	49	124	146
English Sole	734	709	3,878	2,712												
Petrale Sole	32	16	157,812	120,441					2		9		3		14	
Starry Flounder		3	70	40												
Other Flatfish	3,009	1,360	16,776	22,010					3		1	13	2		1	24
Unidentified Flatfish		907		5,485		21		41				1				1
NonIFQ	2,377	2,257		6					5	3	1	1	6	6	1	1
Flatfish Total	14,636	11,392	339,626	331,173	83	78	97	66	39	25	93	100	81	55	140	178
Rockfish and Thornyheads																
Rockfish																
Bocaccio Rockfish			632	413												
Canary Rockfish			257	286												
Chilipepper Rockfish	12	3	5,415	5,973												
Cowcod Rockfish			33	44												
Darkblotched Rockfish	9	5	8,158	6,860								5				12
Pacific Ocean Perch Rockfish	8	1	1,280	915							1				2	
Splitnose Rockfish	15,009	29	1,535													
Widow Rockfish			27	15												
Yelloweye Rockfish			7	8												
Yellowtail Rockfish			60	25												
Minor Shelf Rockfish	1,257	1	48	300								1				2
Minor Slope Rockfish	473	6	20,252	14,116	191	1	3,522	20	47	37	1,856	1,799	93	75	3,913	4,709
NonIFQ	15															
Rockfish Total	16,784	44	37,704	28,954	191	1	3,522	20	47	37	1,857	1,805	93	75	3,914	4,723
Thornyheads	203		84,625	812	6				36				15			
Longspine Thornyhead																
Shortspine Thornyhead	413	6	47,945	31,701	18	6	99	84	11	8	57	48	43	48	222	154
Mixed Thornyhead		395		87,160		7		6		22		13		12		25
Thornyheads Total	616	401	132,570	119,673	24	13	99	90	47	30	57	61	57	60	222	178
Unidentified Rockfish		12,404	6,385	19,823		173		3,261		17		77		25		184
Rockfish and Thornyheads Total	17,399	12,849	176,659	168,450	215	187	3,621	3,371	94	84	1,914	1,943	151	160	4,136	5,085
Unidentified Groundfish		3		33,501												
Grand Total	48,314	41,453	581,661	603,316	670	638	40,125	39,089	1,598	1,480	53,408	54,085	6,785	5,298	277,202	263,545

Figures

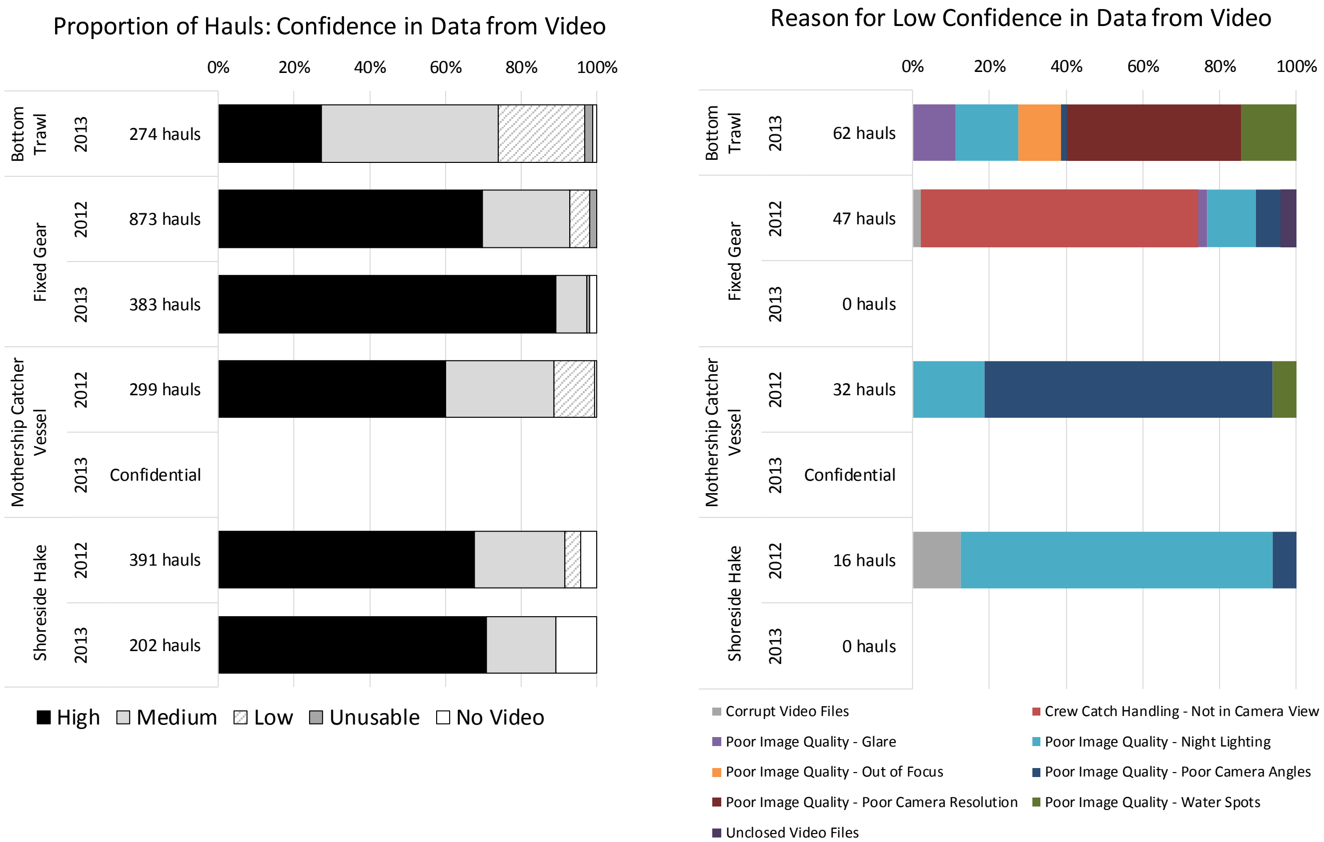

Figure 1. Distribution of confidence in data from video in all fisheries in all years (left). For hauls labeled low confidence, distribution of reason for low confidence in video (right).

<u>Note for the following figures (figures 2 through 17):</u>

For all catch comparison figures (figures 2 through 17), the dashed grey line is the video = compliance monitor (or official catch) line. If video and compliance monitor counts agreed, the point would fall on the dashed line. The solid line is a fitted trend line to give a snapshot of the relationship between the two datasets. If the trend line falls below the video = compliance monitor line, compliance monitor estimates tend to be larger than video estimates. If the trend line falls above the video = compliance monitor line, compliance monitor estimates tend to be smaller than video estimates.

For fixed gear and bottom trawl catch comparison figures (figures 10 through 17), points are partially transparent, with the lightest shade of grey indicating one point and black indicating 4 or more points.

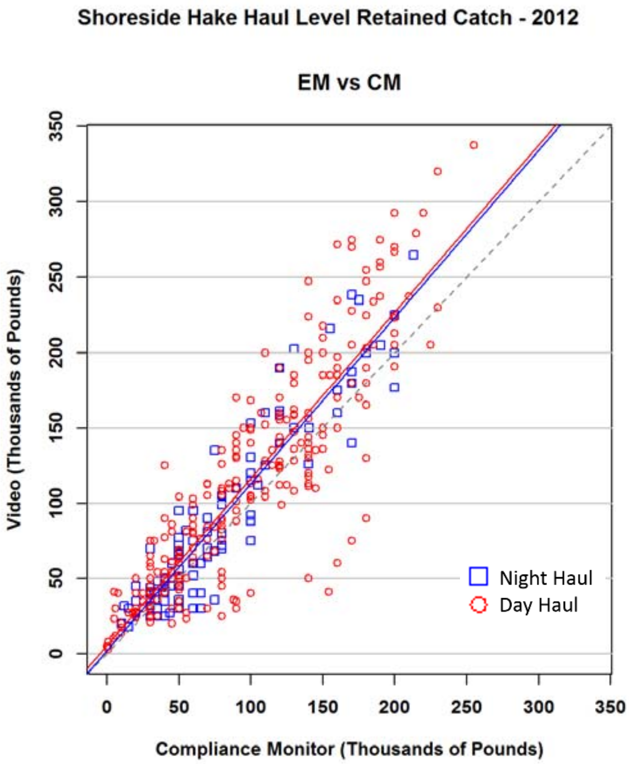

Figure 2. Shoreside Hake 2012. Comparing on-board compliance monitor haul level retained catch estimates with video reviewer estimates of all species aggregated to the haul level.

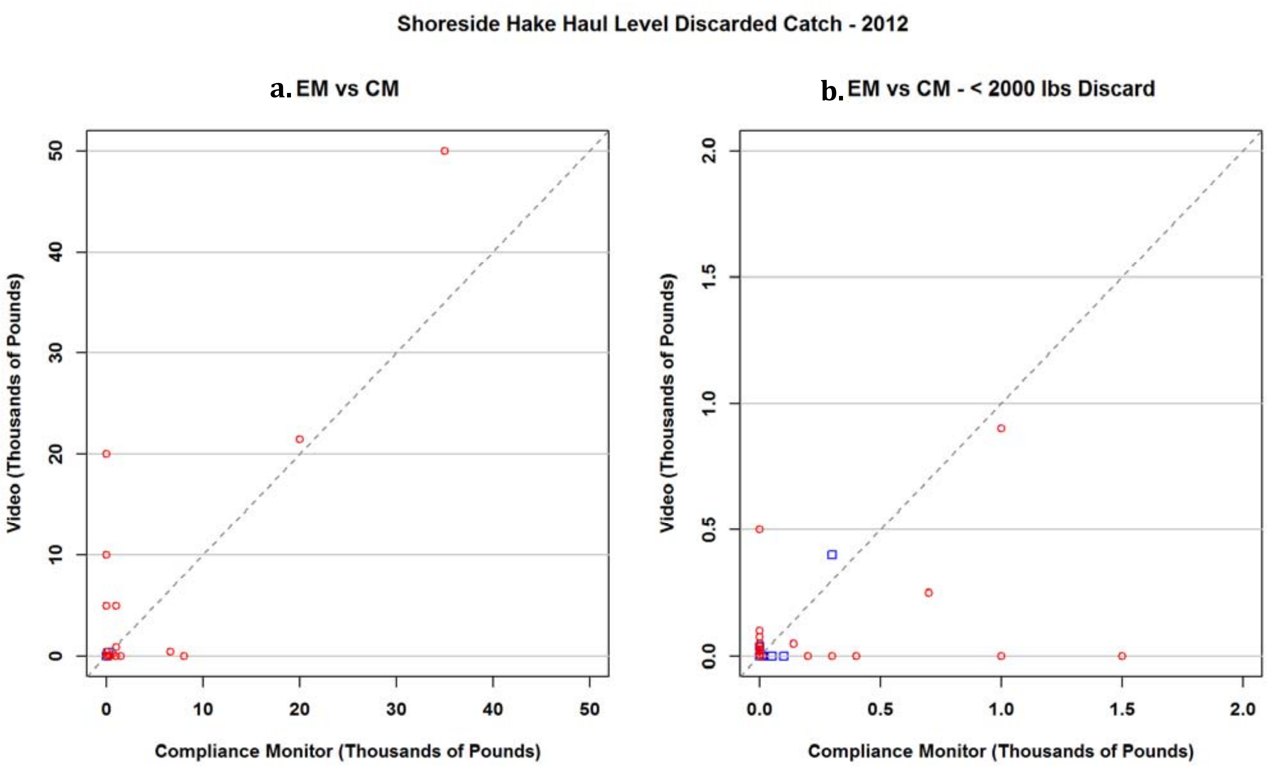

Figure 3. Shoreside Hake 2012. Comparing on-board compliance monitor haul level discarded catch estimates with video reviewer estimates of all species aggregated to the haul level. Figure b. is the same data as figure a. with different axis scales to show the data clustered in the bottom left corner of figure a.

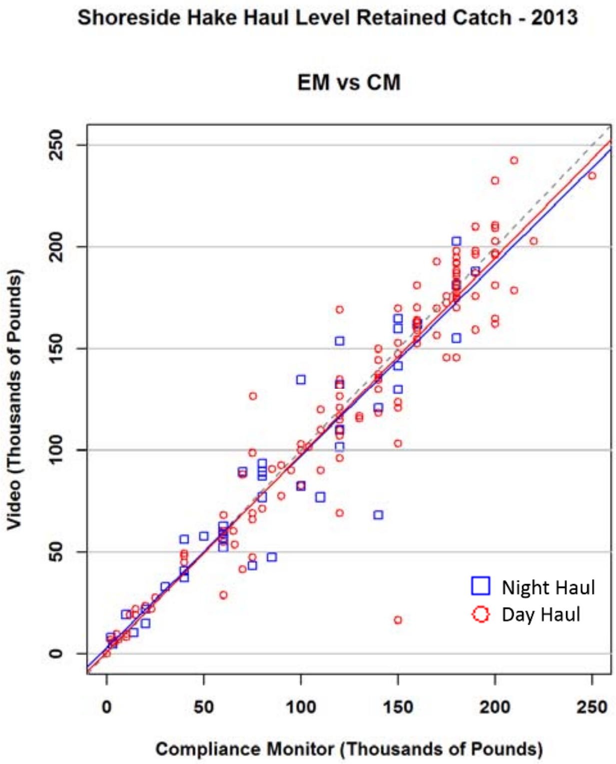

Figure 4. Shoreside Hake 2013. Comparing on-board compliance monitor haul level retained catch estimates with video reviewer estimates of all species aggregated to the haul level.

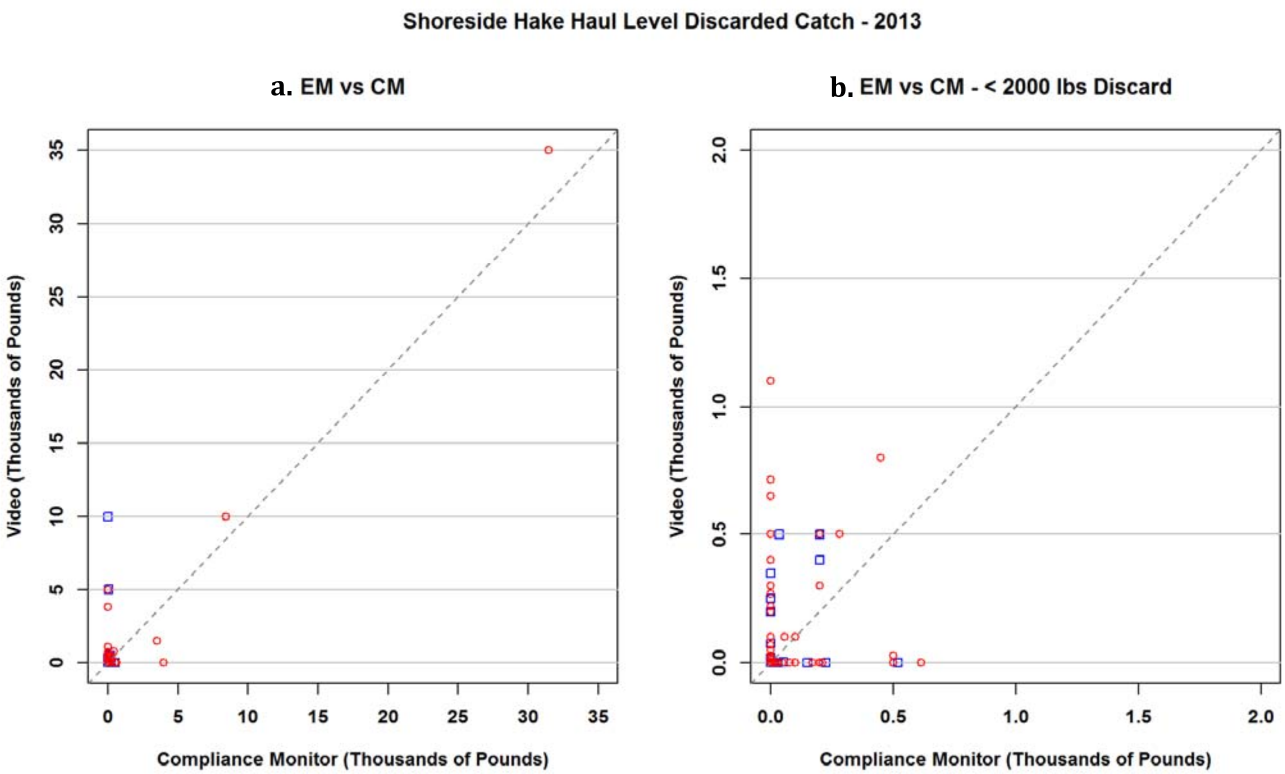

Figure 5. Shoreside Hake 2013. Comparing on-board compliance monitor haul level discarded catch estimates with video reviewer estimates of all species aggregated to the haul level. Figure b. is the same data as figure a. with different axis scales to show the data clustered in the bottom left corner of figure a.

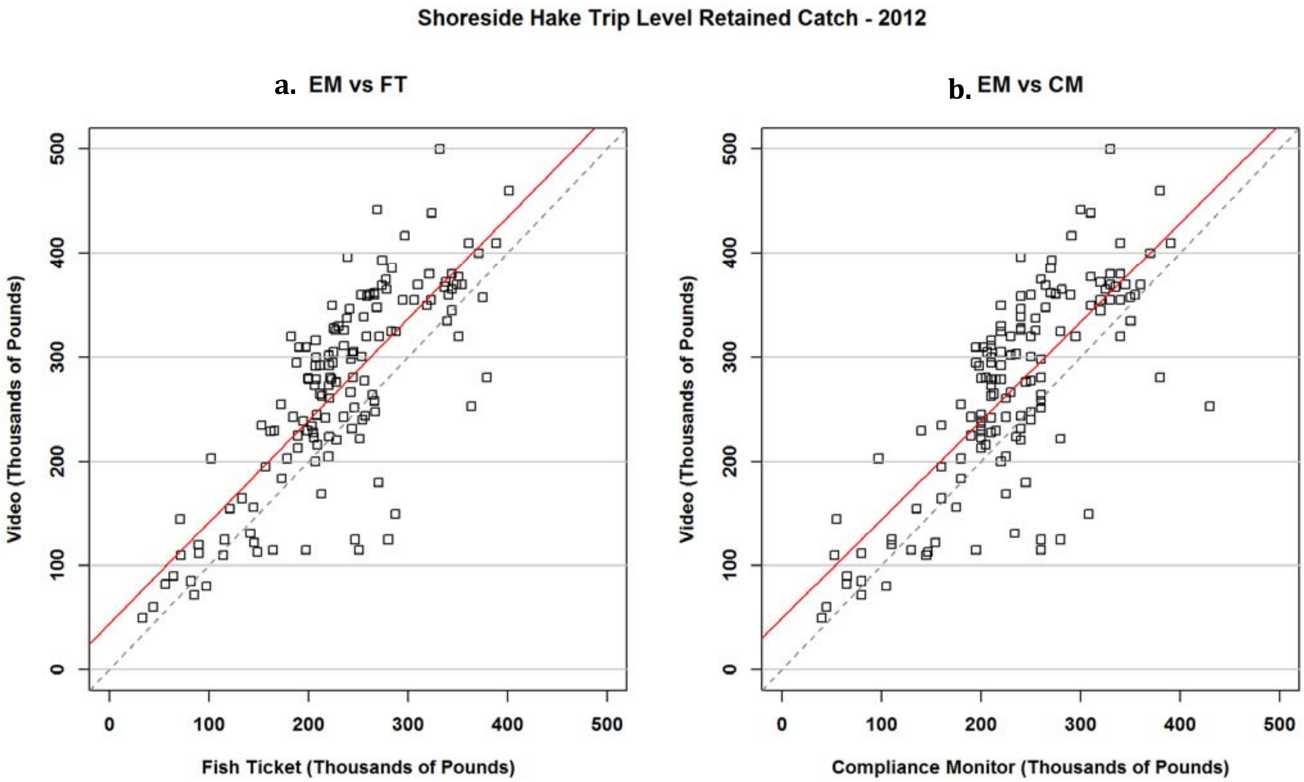

Figure 6. Shoreside Hake 2012. Comparison of video retained catch weight to: a. official landings on fish tickets (FT) and b. compliance monitor retained catch weight of all species aggregated to the trip level.

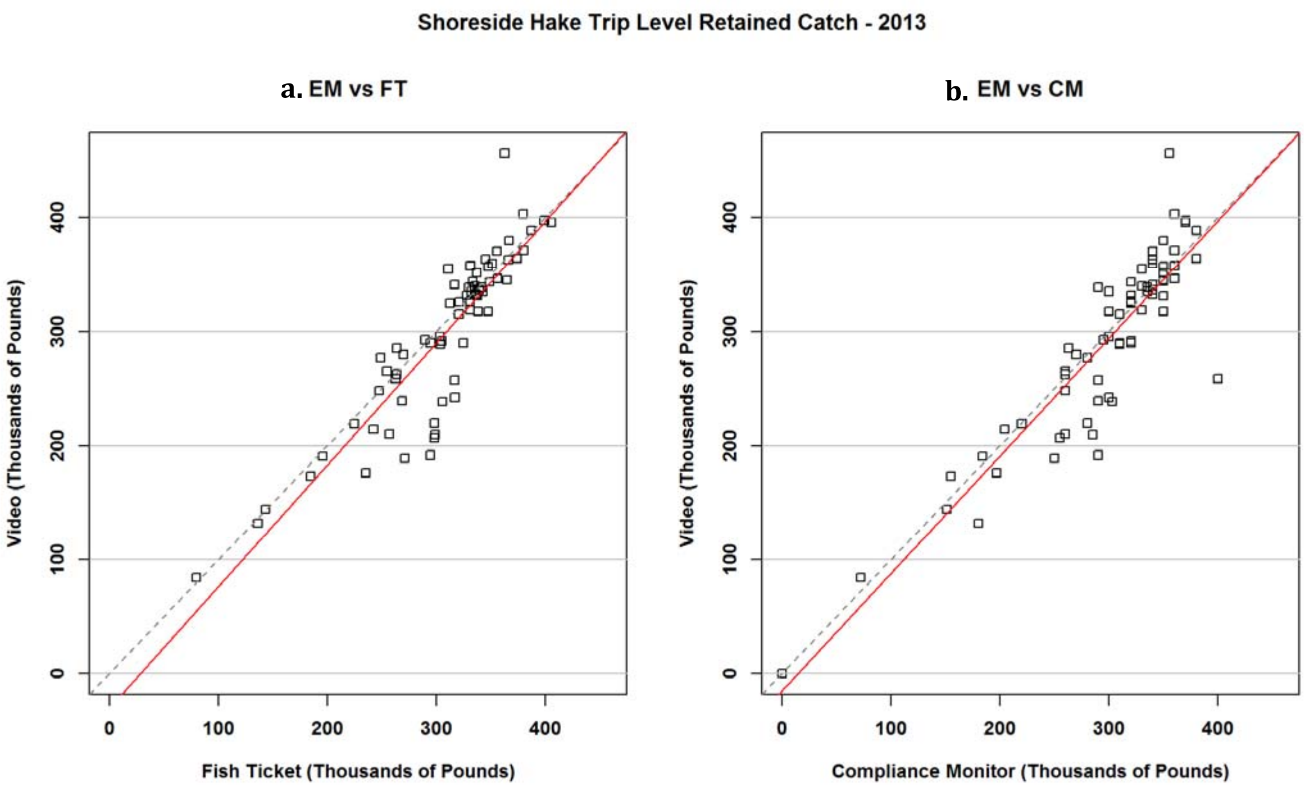

Figure 7. Shoreside Hake 2013. Comparison of video retained catch weight to: a. official landings on fish tickets (FT) and b. compliance monitor retained catch weight of all species aggregated to the trip level.

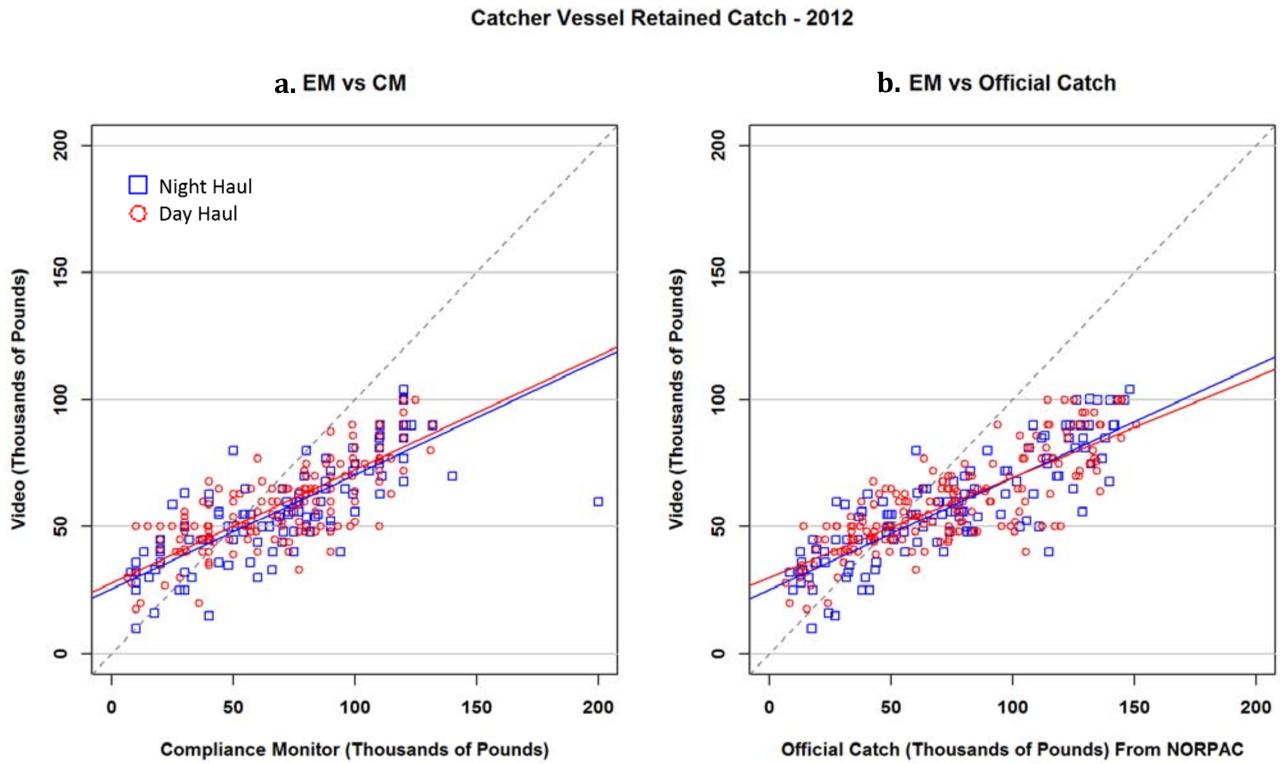

Figure 8. Mothership Catcher Vessel 2012. Comparison of video retained catch weight to: a. compliance monitor and b. official catch from NORPAC retained catch weight of all species aggregated to the haul level.

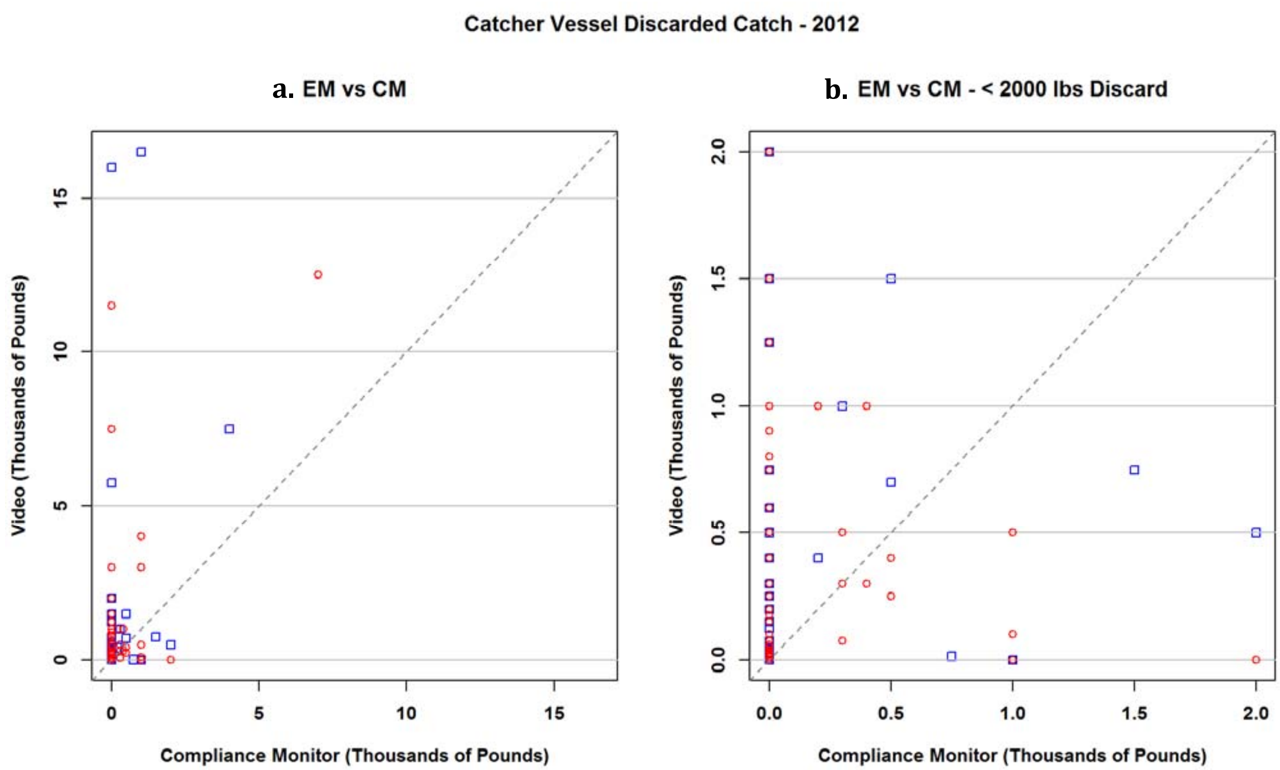

Figure 9. Mothership Catcher Vessel 2012. Comparison of compliance monitor and video discarded catch weight of all species aggregated to the haul level. Figure b. is the same data as figure a. with different axis scales to show the data clustered in the bottom left corner of figure a.

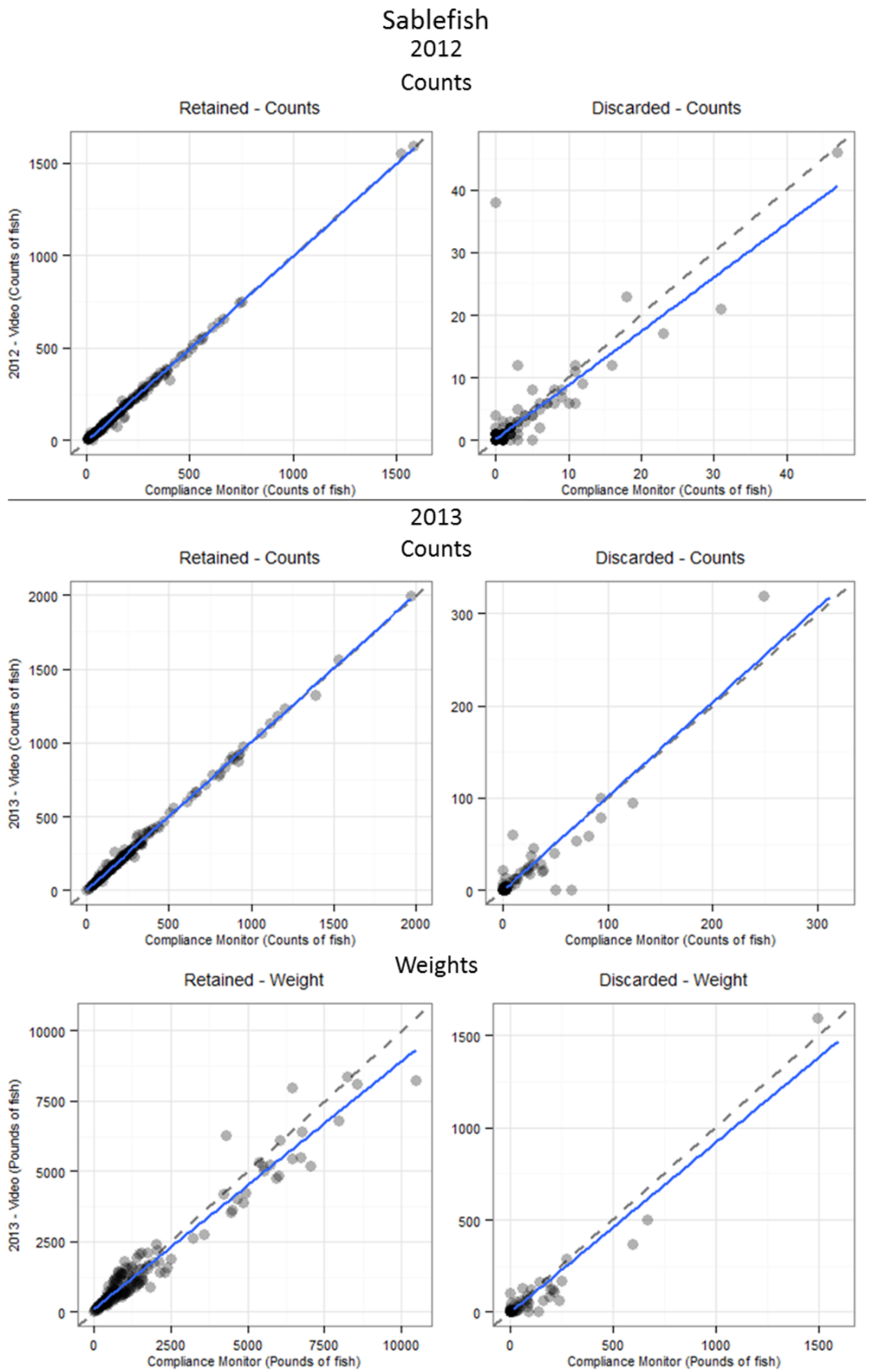

Figure 10. Fixed Gear. Sablefish. Comparison of compliance monitor and video retained and discarded catch counts and weights of Sablefish at the haul level. No weight estimates were made in 2012.

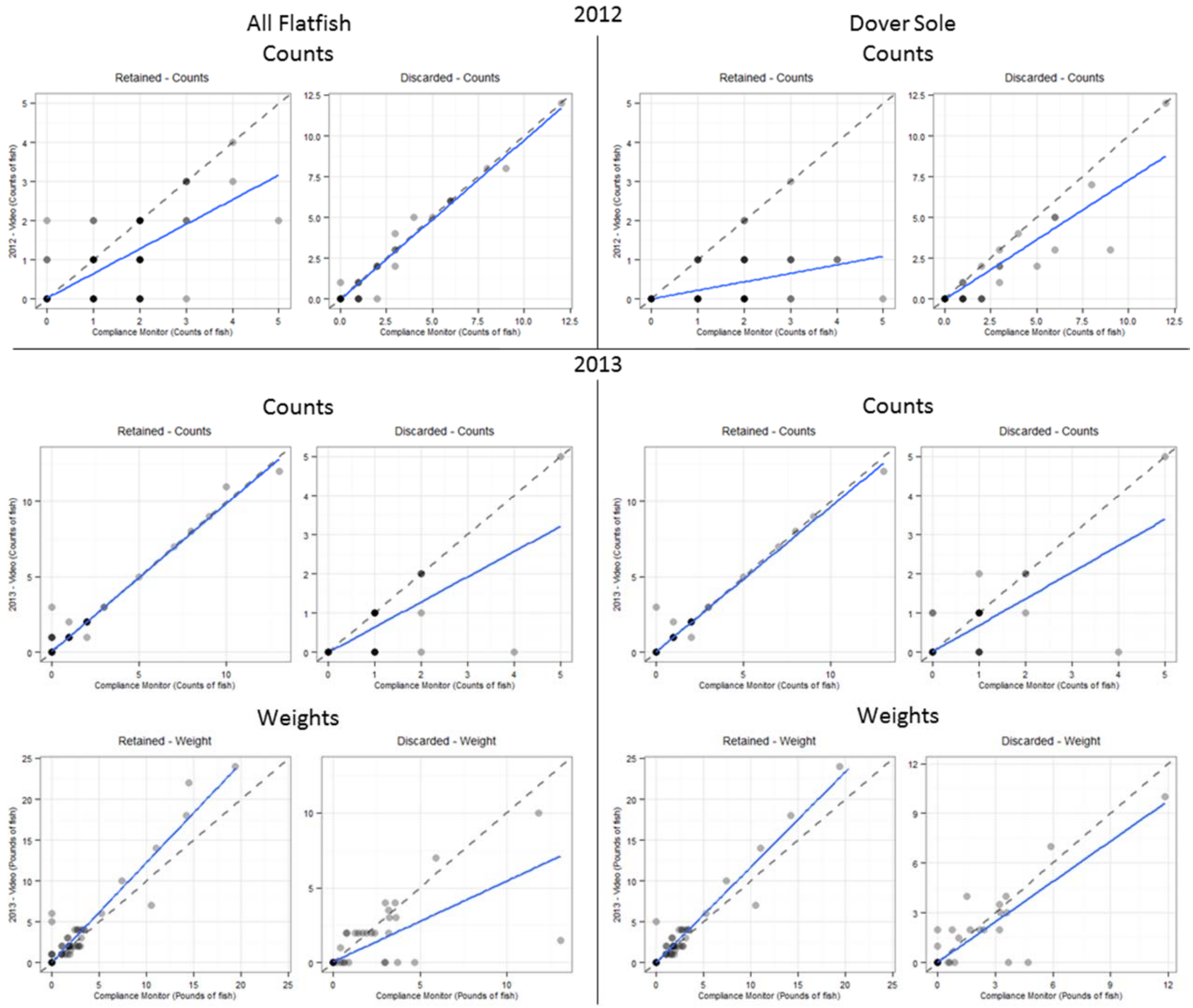

Figure 11a. Fixed Gear. Flatfish. 2012 and 2013. Comparison of compliance monitor and video retained and discarded catch counts and weights of Flatfish aggregated to the group and the individual component IFQ complexes at the haul level. No weight estimates were made in 2012.

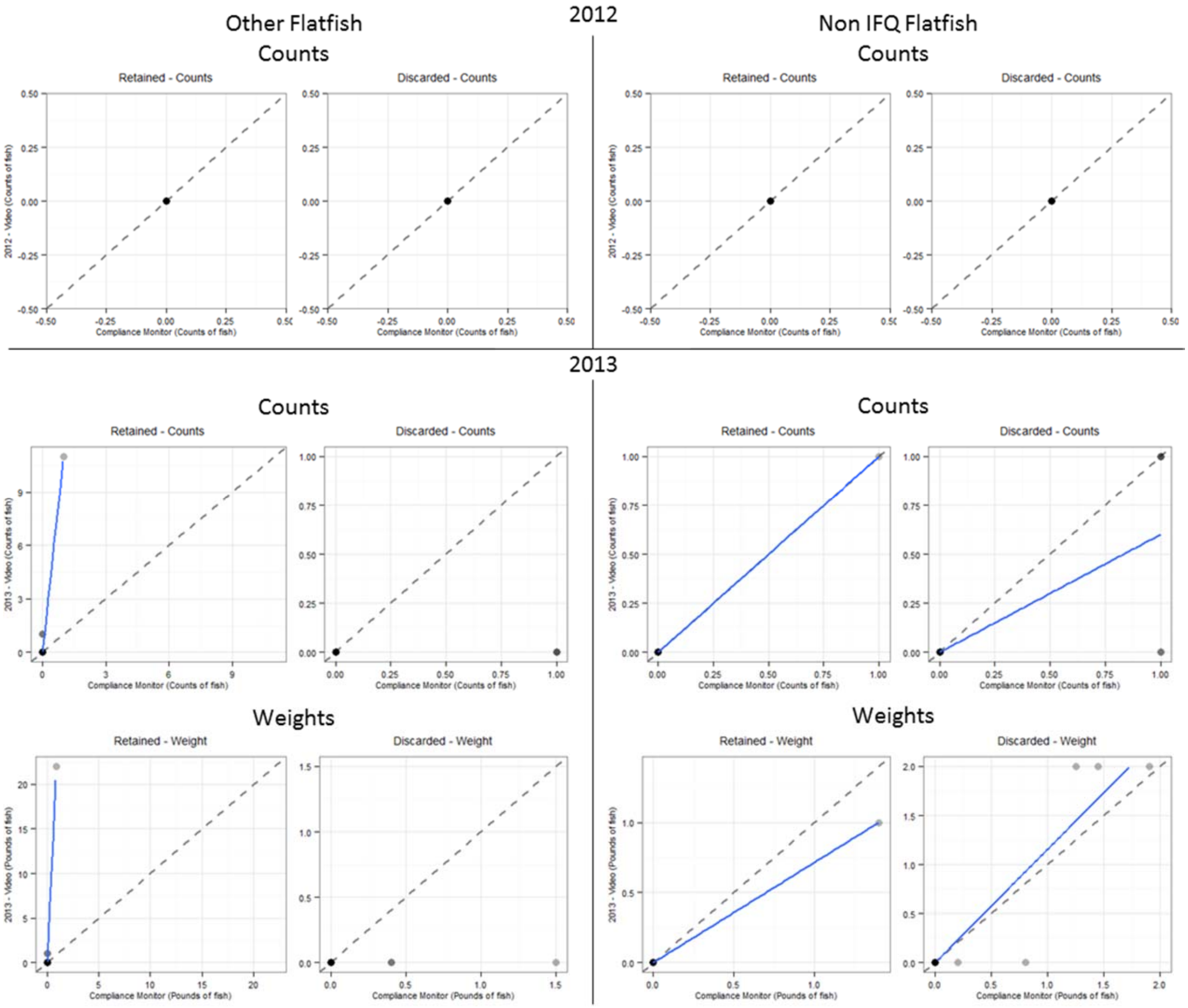

Figure 11b. Fixed Gear. Flatfish. 2012 and 2013. Continued.

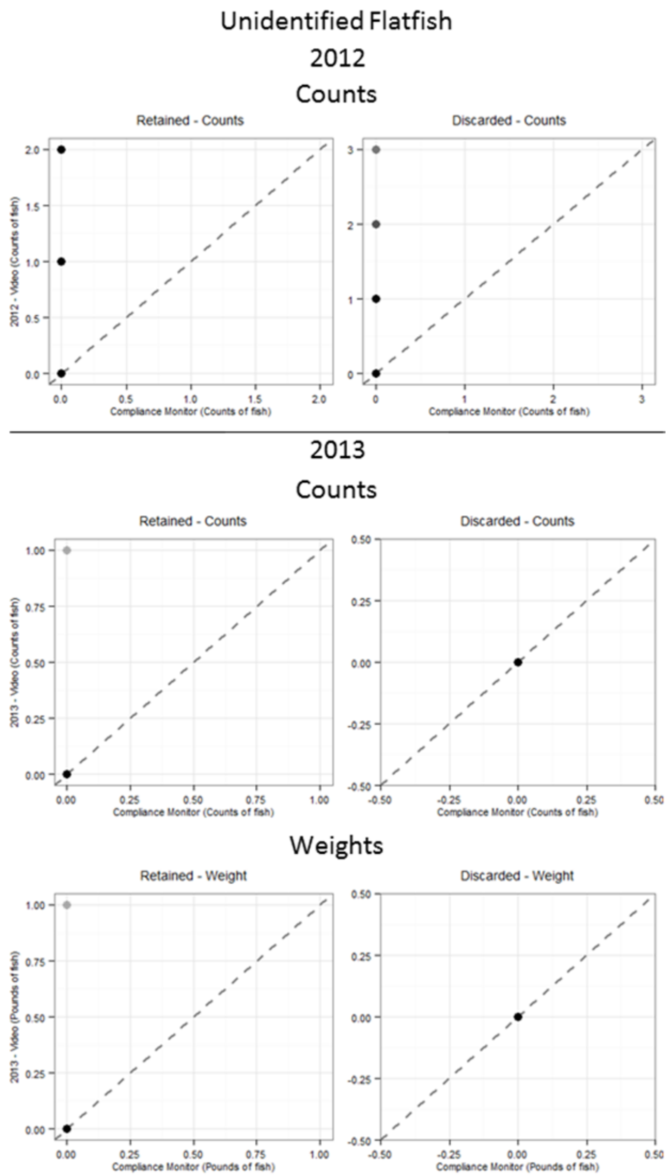

Figure 11c. Fixed Gear. Flatfish. 2012 and 2013. Continued.

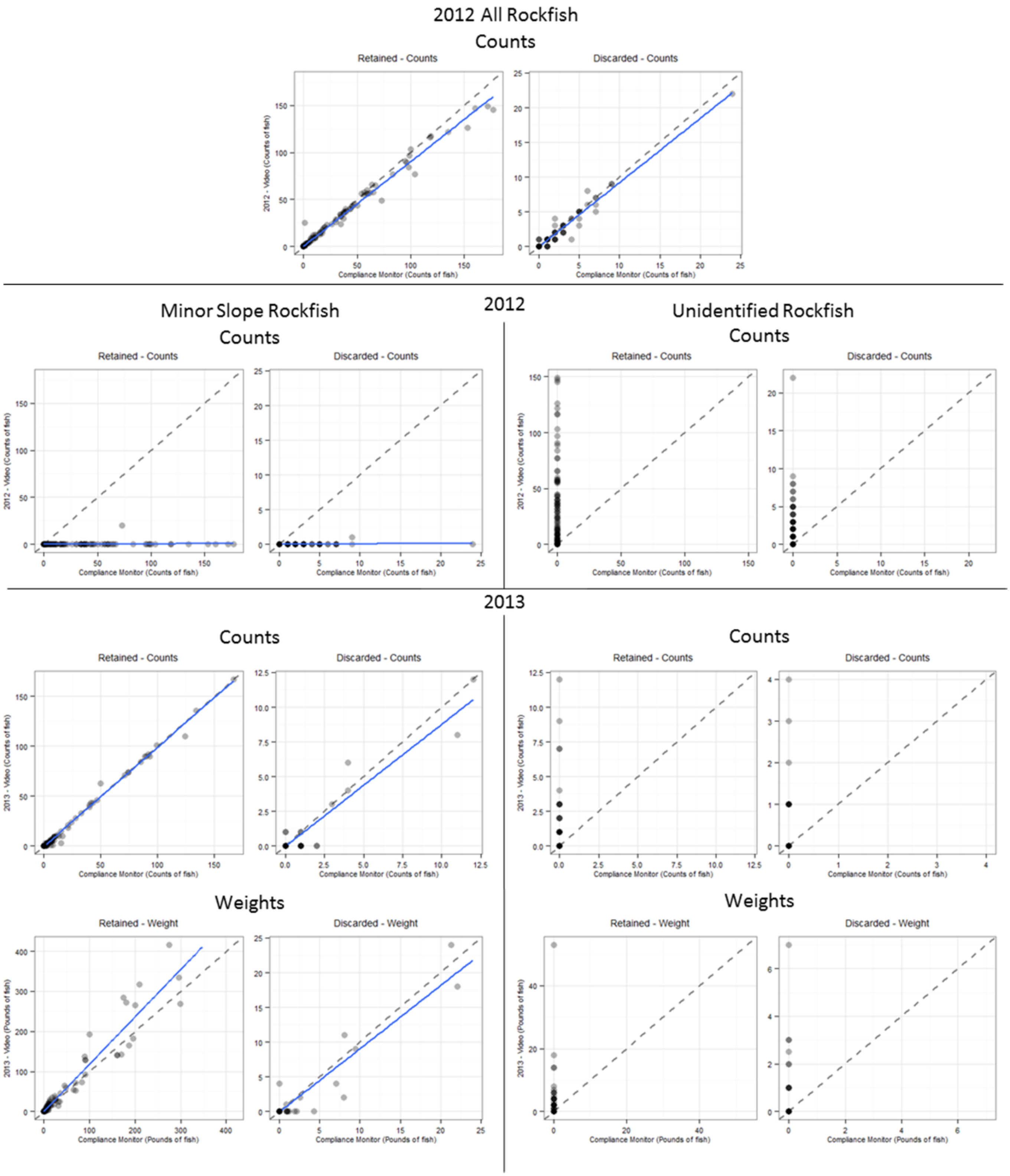

Figure 12. Fixed Gear. Rockfish. 2012 and 2013. Comparison of compliance monitor and video retained and discarded catch counts and weights of Rockfish aggregated to the group and the individual component IFQ complexes at the haul level. No weight estimates were made in 2012.

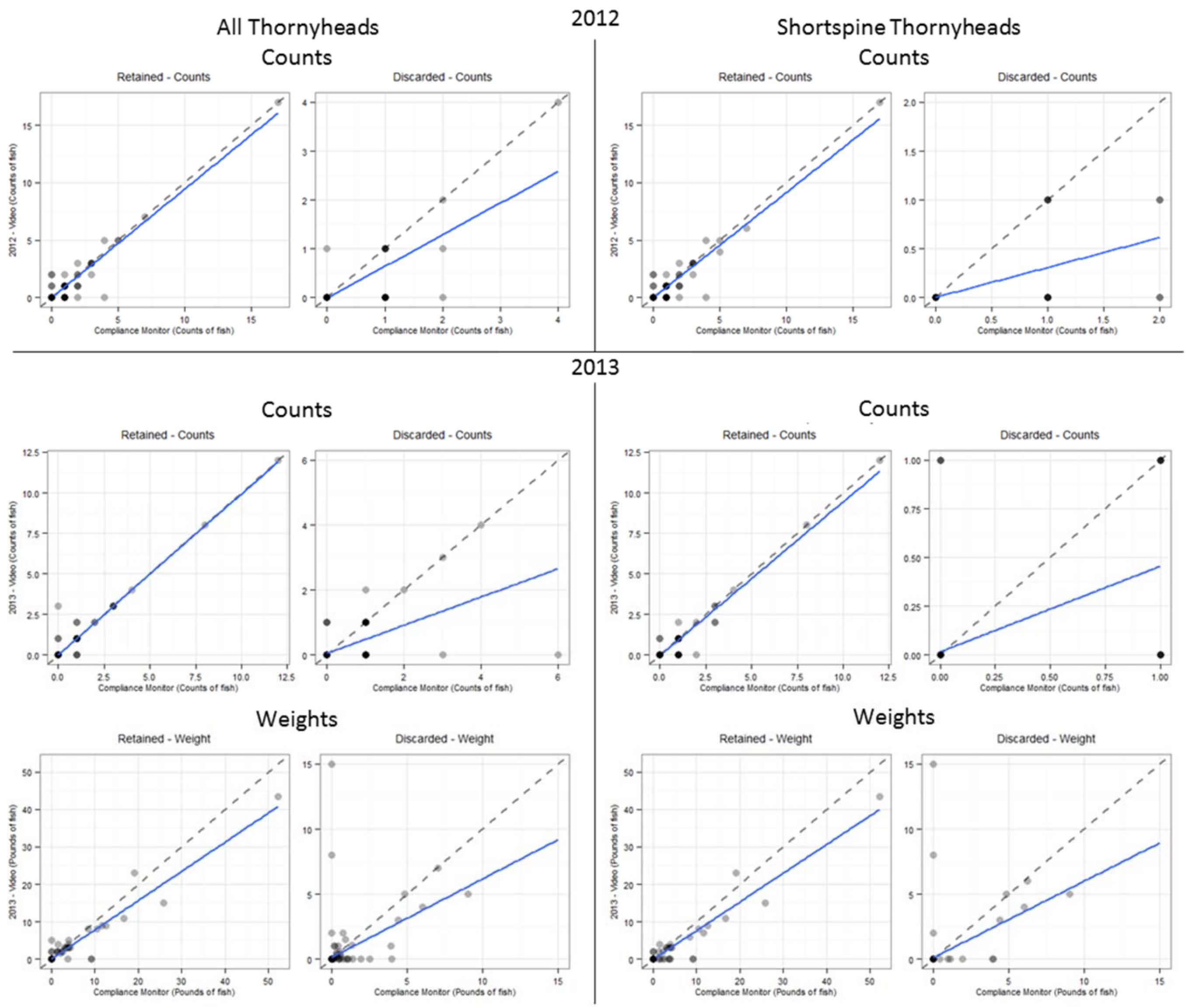

Figure 13a. Fixed Gear. Thornyheads. 2012 and 2013. Comparison of compliance monitor and video retained and discarded catch counts and weights of Thornyheads aggregated to the group and the individual component IFQ complexes at the haul level. No weight estimates were made in 2012.

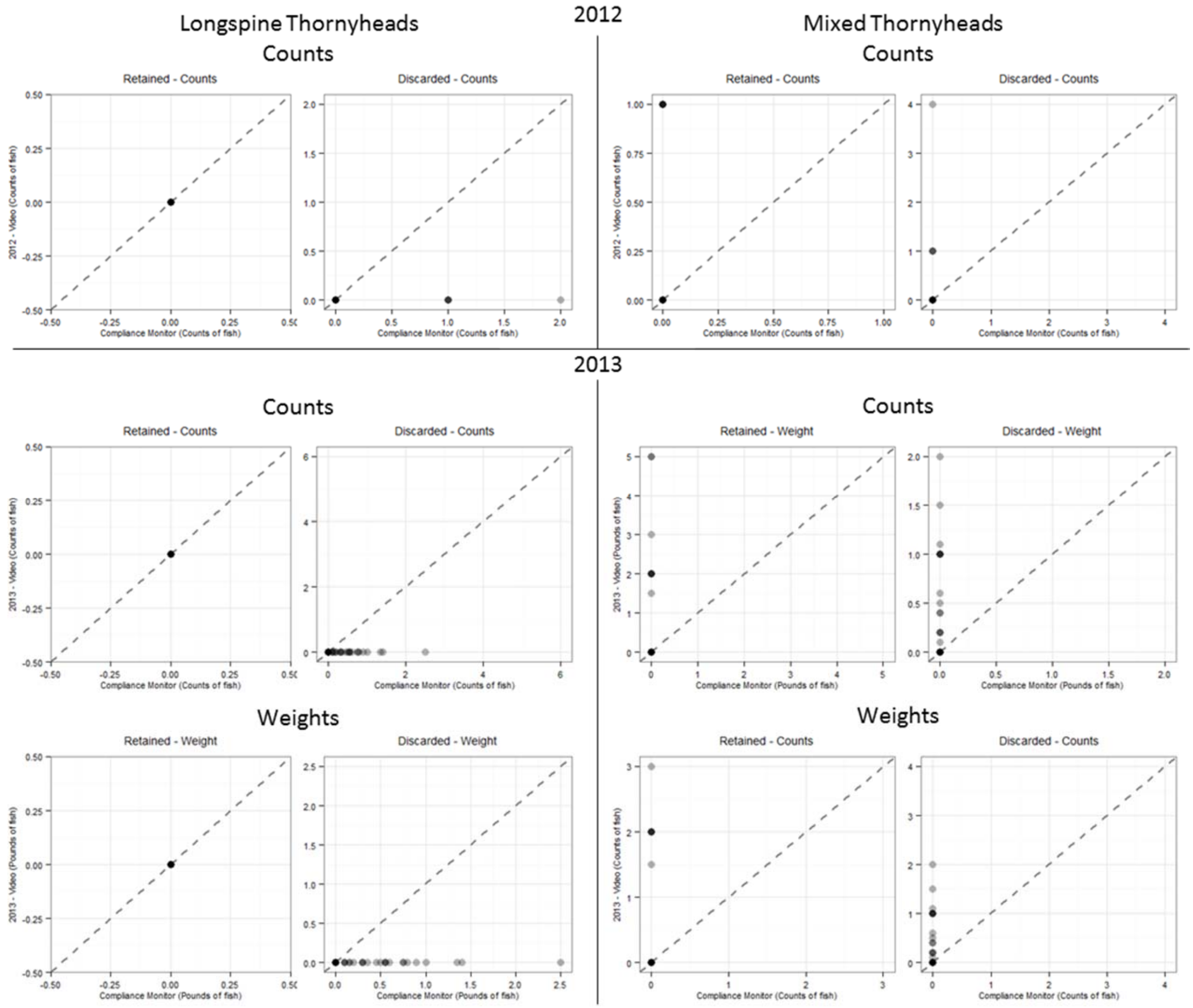

Figure 13b. Fixed Gear. Thornyheads. 2012 and 2013. Continued.

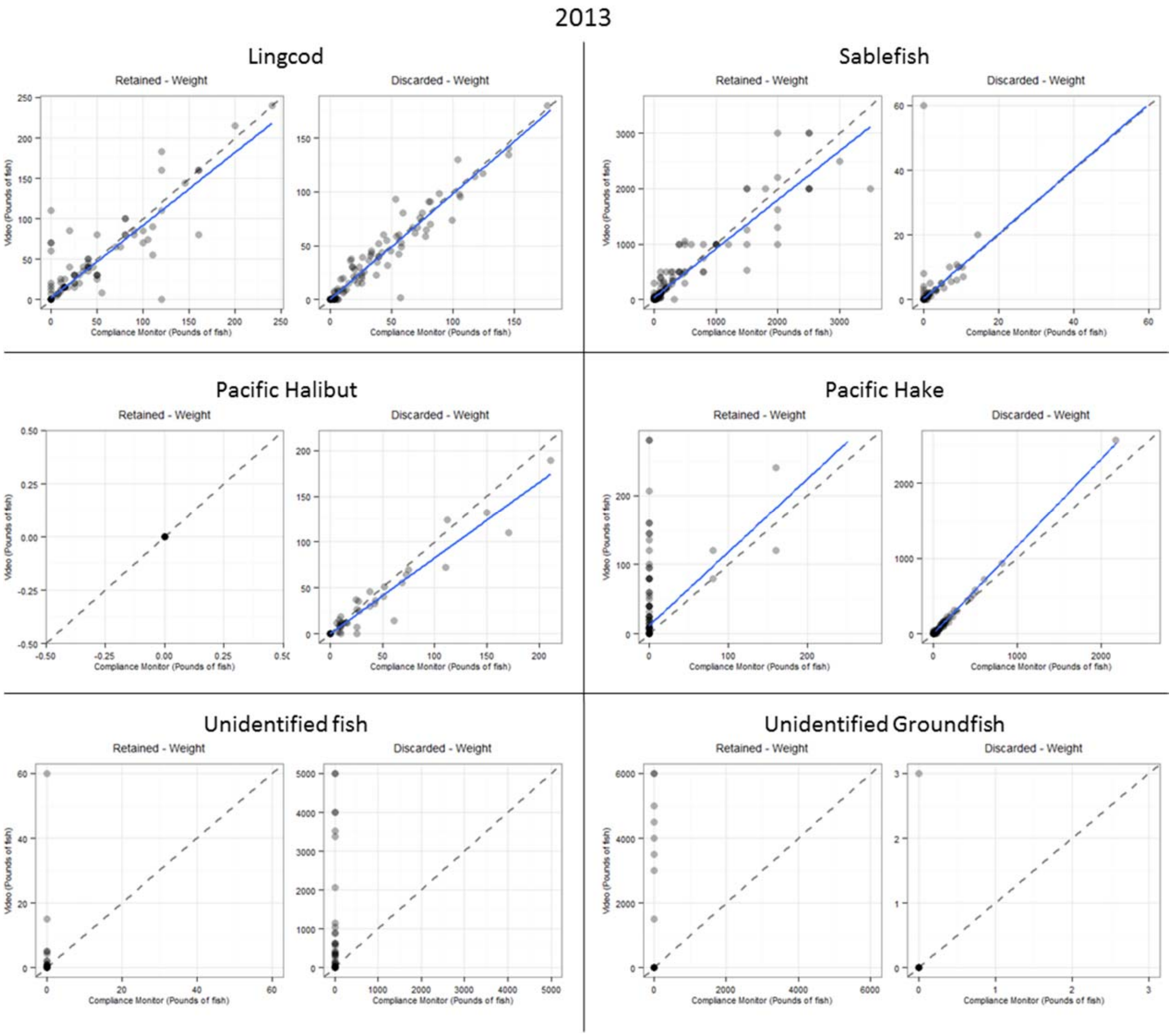

Figure 14. Bottom Trawl. Roundfish. 2013. Comparison of compliance monitor and video retained and discarded catch weights of individual roundfish IFQ complexes at the haul level. Unidentified fish and unidentified groundfish categories are provided for reference. Most instances of unidentified fish and groundfish are due to lack of sorting by the fishers on the vessel.

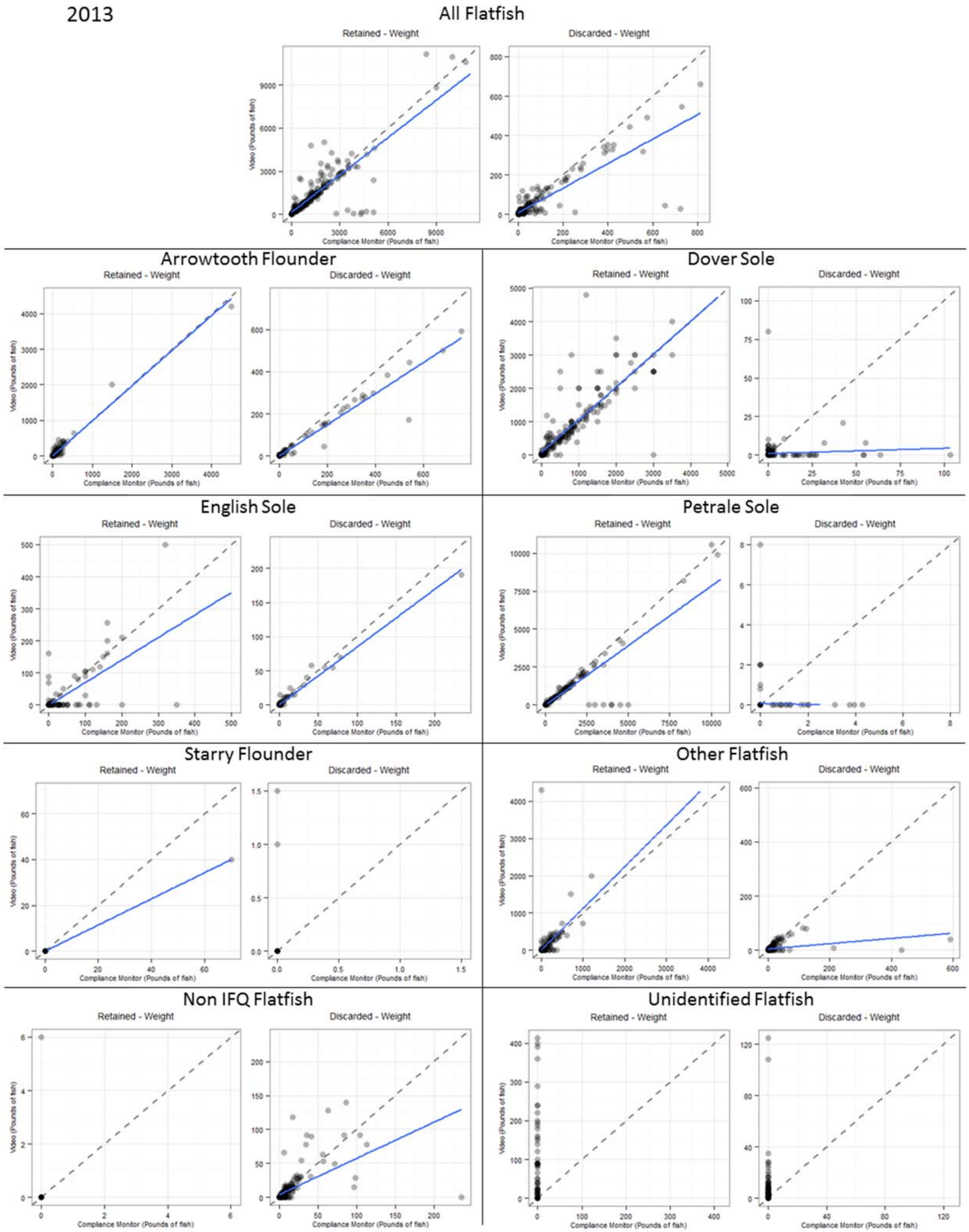

Figure 15. Bottom Trawl. Flatfish. 2013. Comparison of compliance monitor and video retained and discarded catch weights of Flatfish aggregated to group and individual IFQ complexes at the haul level.

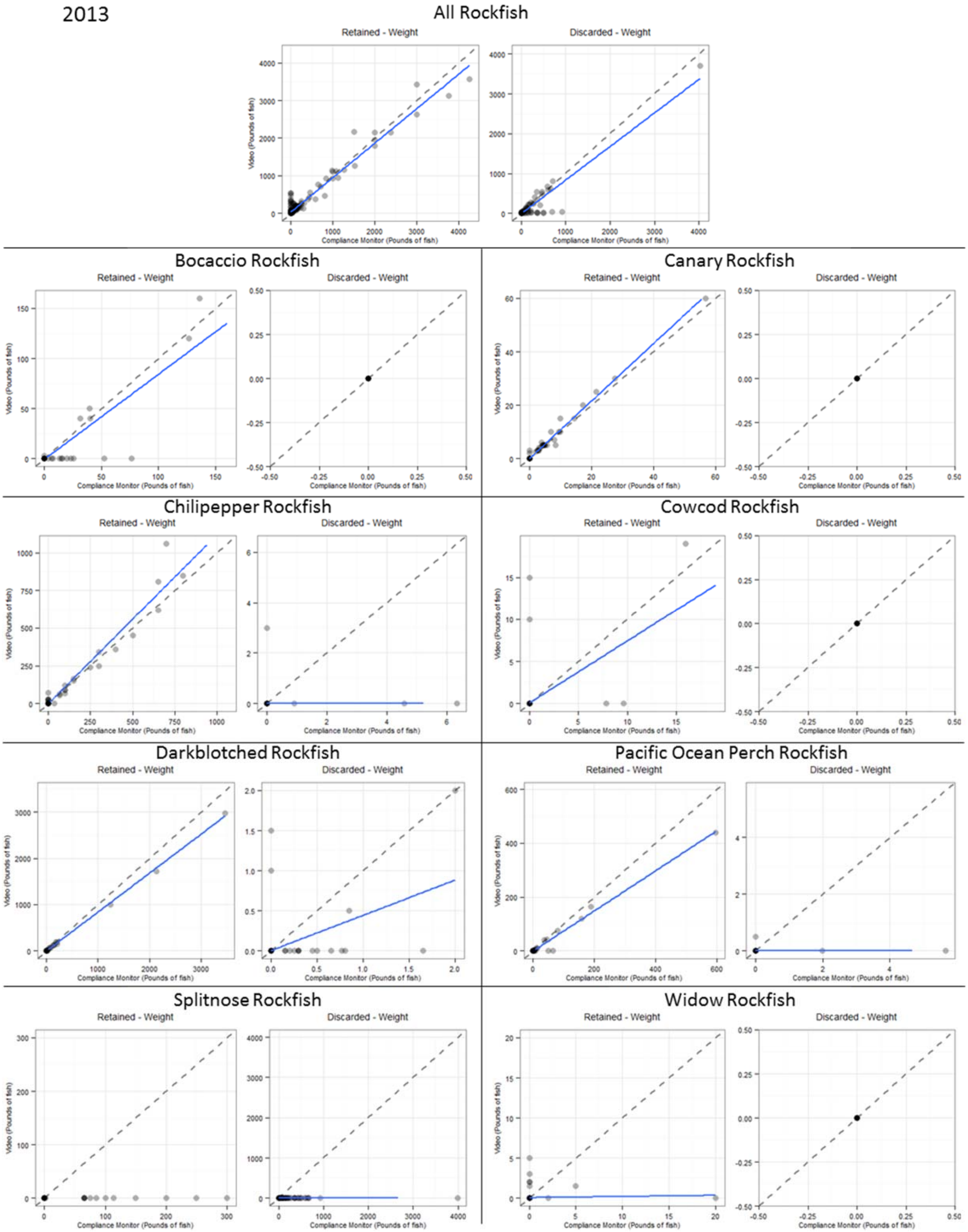

Figure 16a. Bottom Trawl. Rockfish. 2013. Comparison of compliance monitor and video retained and discarded catch weights of Rockfish aggregated to the group and individual component IFQ complexes at the haul level.

2013

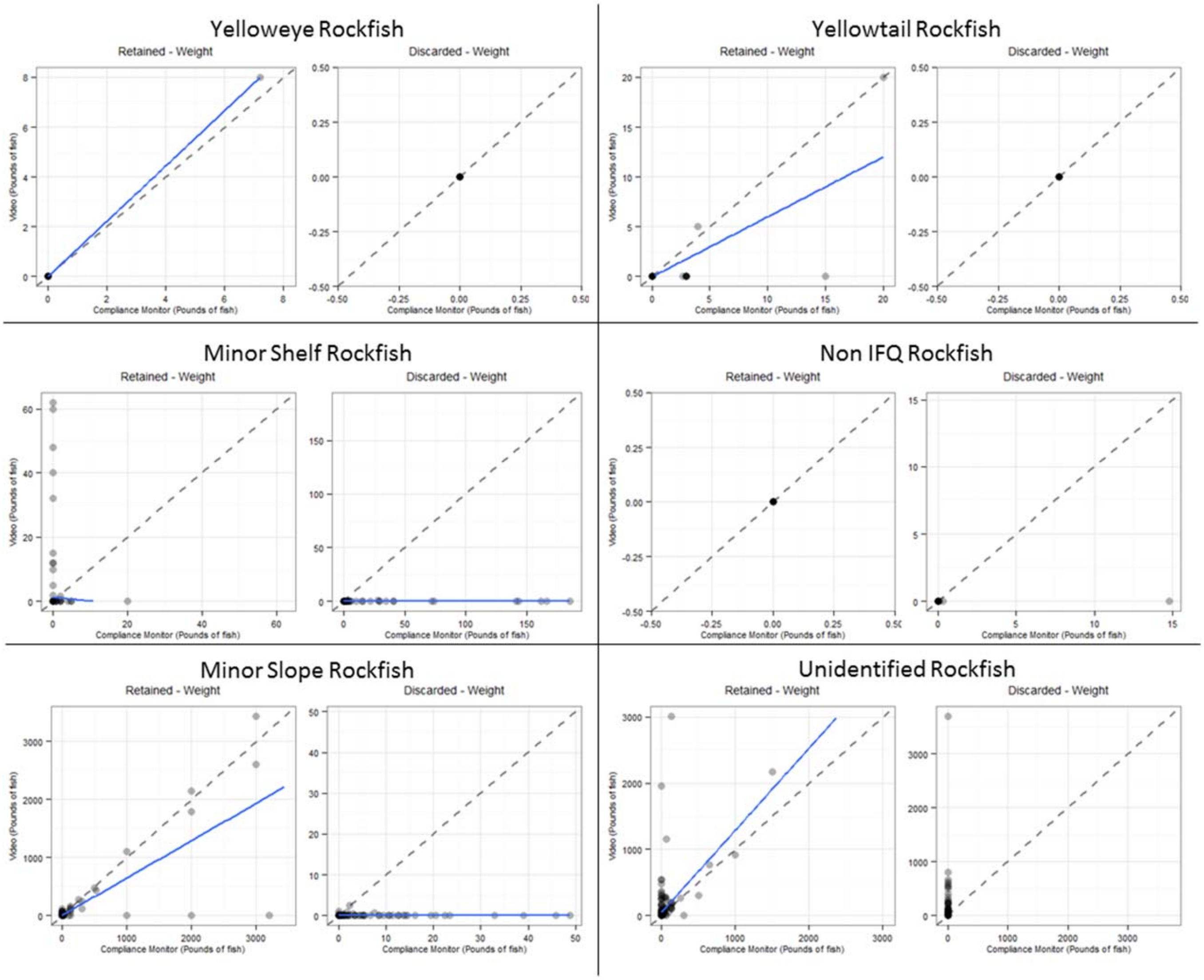

Figure 16b. Bottom Trawl. Rockfish. 2013. Continued.

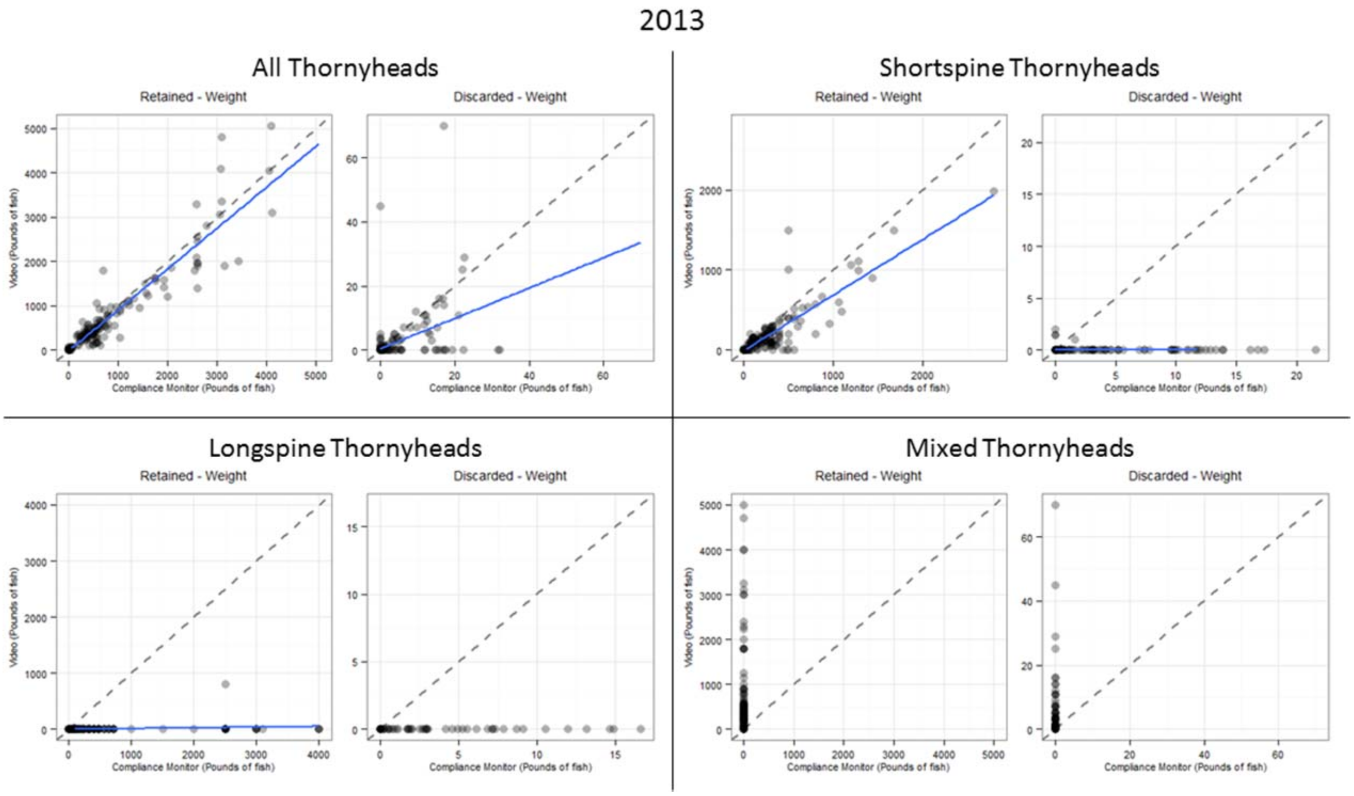

Figure 17. Bottom Trawl. Thornyheads. 2013. Comparison of compliance monitor and video retained and discarded catch weights of Thornyheads aggregated to the group and the individual component IFQ complexes at the haul level.

ENFORCEMENT CONSULTANTS REPORT ON ELECTRONIC MONITORING REGULATORY PROCESS

The Enforcement Consultants (EC) has reviewed the documents associated with Agenda Item F.2. In general, the EC had difficulty making recommendations for refining or adopting numerous Preliminary Preferred Alternatives. Primarily because we feel there is a need for additional information, information we hope to obtain through the electronic monitoring (EM) Exempted Fishing Permit (EFP) process, which the Council will take up later this week. The EC has been consistent in its position that EFPs will better inform all parties for making decisions regarding the use of EM in lieu of, or in conjunction with observers in the Trawl Rationalization Fishery. Our review of this agenda item has done nothing to change our opinion in that regard. With that understanding, the EC makes the following comments pertaining to the alternatives listed under Chapter 2 of the document *Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program*. As an alternative to listing our recommendation as a summary at the end of our analysis, we offer our recommendations/endorsements as presented in bold text throughout the document.

2.2 Compliance Monitoring Basic Provisions

2.2.1 We **endorse the draft analysis position,** that it is the individual vessel's option to use cameras in lieu of human observers and that 100% of all individual fishing quota (IFQ) trips must either have an observer or camera.

2.2.2 Video Reading Protocols: At this point in the process, the EC has no position on this option and awaits additional information gleaned through the EFP process and/or analysis from the Northwest Fisheries Science Center (NWFSC), Scientific and Statistical Committee (SSC), and Pacific States Marine Fisheries Commission (PSMFC).

2.3 Discard Accounting: The EC believes individual catch accounting should be maximized, which is one of the hallmark objectives of the Trawl Rationalization Program and which is achieved in the current program using 100% observer coverage. **We endorse Option A in that it appears to be the best "fit" for maintaining this management objective.**

2.4 Definitions for Total Catch Accounting: **The EC endorses these definitions as presented**. These definitions are consistent with the definitions used by the WCGOP in evaluating discards reported by observers and therefore seem appropriate.

2.5 Discard Requirements: Regarding Option A: Maximize Retention and Option B: Optimize Retention Retain Catch Share Species with Limited Discard Options, both Options A and B have been proposed for testing in the EFP applications currently under Council consideration. As with the Video Reading Protocols, the EC prefers to wait for additional information gleaned through the EFP process and/or analysis from the NWFSC, SSC, and PSMFC prior to endorsing or recommending either or both Options A and B.

Option B provides flexibility regarding discard proposals as well as requiring purposeful definition of the discard. Option C appears to be unduly broad, especially in light of the fact that speciation through camera technology has proven, thus far, to have limited application. For these reasons, **the EC recommends Option C: Discard at Will, be rejected from further consideration.**

2.6 Halibut Retention/Discard with Fishery Specific Options: The EC has no position other than to note any option adopted must be compliant with International Pacific Halibut Commission rules and regulations.

2.7 Discard Species List Adjustments: The EC has no position on this matter.

2.8 Vessel Operations Provisions

- 2.8.1 Observer Exemption Process
- 2.8.2 Eligibility for Camera Use:
  - 2.8.2.1 Initial eligibility criteria
  - 2.8.2.2 Continued eligibility
  - 2.8.2.3 Self-Governing Plan Elements

- 2.8.3 Application Approval and Required Information

- 2.8.4 EM Vessel Operational Plan – Individual Vessel Monitoring Plans (IVMP)
  - 2.8.4.1 IVMP requirements

With respect to Sections 2.8.1-2.8.4, the EC endorses these options as presented but also notes that if EM EFPs are approved by the Council later this week, that the information gleaned from those EFPs may alter, change, and/or enhance these options as currently presented.

2.8.5 EM Vessel Operational Plan – IVMP Expiration: **The EC endorses Option B Annual Expiration or if modifications are made.** This option is consistent with general West Coast federal or state permitting processes. Although not a permit, the IVMP supports a request for a regulatory exemption. As such the exemption should be viewed as a privilege. We believe the status of that privilege, at least initially, should expire, be reviewed, and potentially renewed on an annual basis. Our position demonstrates a conservative approach to the initial implementation of the EM Program. As the program matures and all participating effected parties become familiar with the program components and requirement, we believe this annual requirement may become a candidate for modification. This has been our experience in the First Receiver Site License Program which has similar elements.

2.8.6 Declaration of EM Use

At present, the EC is not prepared to recommend or endorse any of the options and awaits additional information regarding industry needs, such as, what is considered feasible by observer providers, and analysis from the NWFSC, SSC, and PSMFC.

2.9 Equipment and Protocol Provisions

The EC is not prepared to make a recommendation on this issue, but notes that currently, there are only two EM systems available for deployment in the trawl fishery, either by EFP or regulation.

2.9.1 EM Equipment Requirements

2.9.1.1 Data formats

2.9.1.2 Video Hardware

2.9.1.3 Logbook Data Source

2.9.1.4 On vessel Data Storage

2.9.1.5 Onboard operations

With respect to Section 2.9.1, the EC has no objection to these options as presented but notes these options, as listed, are incomplete in their detail and application description since the details will be developed during implementation. As with other operational components, we anticipate our understanding of needed equipment requirements will improve through the EFP process if EM EFPs are approved by the Council later this week.

2.9.2 Data Transfer Process

The EC is actively engaged in this issue. Chain of custody is a topic that is often raised in this discussion. The EC is confident that chain of custody requirements can be developed that create reasonable requirements on industry participants while meeting the evidentiary requirements of enforcement.

Regarding the personnel options listed for transfer of the data from the vessels to the reviewer, the EC believes all listed options are viable as long as proper training and accountability elements are in place.

Speaking specifically to the "crew" option, while a crew member may in fact, be the person who does the change out of the hard drive, the EC believes the ultimate responsibility for ensuring the transfer of the data from the vessel to the reviewer is completed, lies with the vessel operator/captain.

The EC recommends the shoreside catch monitor option as the option with the lowest probability of compromise of the data in the transfer process.

2.9.3 Data Confidentiality/Accessibility Ownership

2.9.4.1 Video Review Process

2.9.4.2 Video reviewers

The EC concurs with the options as stated with a caveat and an exception.

Video Reviewers, Option C: EM Provider. The EC is concerned there may be a conflict of interest with an EM provider reviewing their own data or some other EM provider's data. EM providers want to promote the capabilities and reliability of their product as a basic element of their business plan, which may influence their review of the data generated by their systems, i.e. their analysis may be biased because of their interest in demonstrating the advertised capability or reliability of their system, which in turn may be exaggerated or overstated. Conversely, this bias may manifest doubt on the capabilities or reliability of their competition's system.

The EC is also concerned about the consistence of the data analysis fleet wide. Even with one reviewing entity doing all data analysis coast wide, there will be some level of subjectivity in that analysis. The inconsistency of that subjectivity could expand exponentially if, for example, there are three or four system providers all doing their own data analysis, or possibly even more so if there is an additional third party analysis option.

The EC believes strongly that taking a conservative approach in the initial implementation phases of this program is a prudent course of action. One such step is to have one provider doing the data analysis for the entire coast, at least in the beginning of this program.

We also believe that it is reasonable to assume the video review will be deemed an inherently government function. **The EC recommends NMFS or its agent assume the video analysis responsibility, with one reviewer doing the data analysis for the entire coast.**

2.10 WCGOP Scientific Observations

The EC defers to the WCGOP for this entire section.

2.11 NMFS Processes

The EC has no deletions or changes to offer at this time, but as with other options, we await additional information gleaned through the EFP process and/or analysis from the NWFSC, SSC, and PSMFC.

2.12 Spatial Variation for High Bycatch Areas

The EC supports the GEMPAC recommendation to remove Options B and C for spatial management options. We agree the spatial management will add complexity to the management of the IFQ fishery and will require identifying additional management areas which in turn will be more difficult and more costly to manage.

2.13 Adaptive or Phased Implementation

The EC looks forward to agenda item F.5, later this week, where the merits of the four EM EFPs will be discussed and evaluated.

PFMC
06/20/14

Agenda Item F.2.b
Supplemental GAP Report
June 2014

GROUNDFISH ADVISORY SUBPANEL REPORT ON THE ELECTRONIC MONITORING REGULATORY PROCESS

The Groundfish Advisory Subpanel (GAP) was briefed by Mr. Brett Wiedoff on the Electronic Monitoring (EM) regulatory process, draft analysis, and Groundfish Electronic Monitoring Policy Advisory Committee (GEMPAC) report. The GAP would like to thank Mr. Wiedoff and Mr. Seger for their work on the analytical document, as well as the GEMPAC for its report.

Overall, the GAP would like to see regulations for EM move forward as expeditiously as possible. The rationale for moving forward quickly is described in detail in previous GAP statements and is encapsulated on page 15 of the Draft Analysis of an Electronic Monitoring Program for the Pacific Coast Limited Entry Trawl Groundfish Fishery Catch Shares Program (Agenda Item F.2.b, Attachment 1, June 2014). High costs, measured both in direct payments to observer providers as well as in lost opportunity when observers are not available, a heavier burden for small boats and more remote ports with less activity, and the indication that observer companies may pull out of "unprofitable" ports are some of the primary reasons for needing to implement an EM system. Additionally, many in the fleet feel that having an observer is intrusive, takes up critical space on vessels, and limits operational flexibility.

The GAP endorses the entire GEMPAC report, but does not offer any recommendations on specific preliminary preferred alternatives (PPA) at this time other than those contained in the report. The GAP hasn't yet seen the necessary cost analysis and believes that more analysis is needed before selecting PPAs for many items. The GAP firmly believes the Council should take final action in September, and we expect the necessary analysis will be complete in time for us to take final action at that time.

The GAP offers the following specific comments on the documents.

First, the GAP agrees with the GEMPAC recommendation to strike the "Spatial Variation for High Bycatch Areas" option from the draft analytical document. The GAP believes that it would add unnecessary complexity, and would likely constrain opportunities for use of EM when no such constraint is required in a program that holds each individual accountable.

Second, the GAP believes that while potential impacts to observer provider companies should be given consideration, primary consideration in the decision to move forward or refrain from moving forward with EM should be focused on the fleet. Furthermore, if observer providers are so tenuous that transition to EM for a portion of the fleet may seriously threaten their business models, then that illustrates that alternatives to human compliance monitors are indeed desperately needed. Finally, there was some discussion about whether the removal of human compliance monitors from vessels would disrupt the shoreside catch monitor component of the program. The GAP believes that there are a variety of alternatives that could serve this purpose if the removal of human compliance monitors did in fact require changes to the current structure of the shoreside catch monitor system.

PFMC
06/20/14

GROUNDFISH MANAGEMENT TEAM REPORT ON THE ELECTRONIC MONITORING REGULATORY PROCESS

The Groundfish Management Team (GMT) held a publicly noticed webinar to discuss Electronic Monitoring (EM) Program regulatory issues (on Tuesday, June 10, 2014). Council staff and the committees have done a considerable amount of work in a relatively short amount of time. However, we do not see how the Council could choose preliminary preferred alternatives at this point, at least for the core program design elements like those in Section 2.2. At the same time, preparing for this last meeting of the 2015-16 harvest specifications and management measures cycle has involved a lot of work for members of the GMT. We therefore may be behind the Council and other advisory bodies as to comfort and understanding of how EM might work.

We begin with some general thoughts on how the team has reviewed or would continue reviewing the EM alternatives and options. In following the team's analytical role, we attempt to focus on the risks and incentives that affect catch accounting. The overall thrust of our statement involves suggestions on where the analysis might focus next. If we had more time for writing and discussion, we would have had more detailed comments including on specific alternatives. And with more time over the coming months, we believe we could provide valuable input on the design of the EM programs.

Purpose of Observers and Electronic Monitoring

We have noted some confusion in discussions at this meeting and before about the purposes observers and EM serve. Discussions around EM often make a distinction between "science" and "compliance" with the point being made that EM is mainly for compliance and not for science. We understand "science" to refer to measurements like taking the lengths and sex of fish as part of stock assessments (i.e., biological data collection). Yet the GMT finds this distinction to be of limited helpfulness. EM may be designed mainly around compliance yet that compliance is meant to serve accurate catch accounting. Likewise, the core purpose of the West Coast Groundfish Observer Program (WCGOP) observers has been to account for discards and to take other measurements that cannot be made onshore (e.g., collecting sablefish otoliths). In other words, their main role has been to perform total catch accounting.

Our point here is that it would be helpful to list the specific observations/measurements/tasks that observers conduct and to consider, one by one, how they can or cannot be made under EM in conjunction with state port sampling programs, etc. There are likely to be trade-offs and information lost (e.g., of interest to the GMT is that we might lose tow by tow catch information under EM), yet it may be that many observations can still be made onshore under EM programs where most fish are retained. Furthermore, it is possible that EM might improve some types of observations.

We would recommend that the Council consider these issues in the full context of sampling design, the accuracy and precision of estimates made from sampling, and the various purposes for which fishery-dependent observations are made (i.e., catch accounting, stock assessment, protected species management, etc.) We understand that WCGOP may be working on such an analysis but it will not be ready until later this year or next year. The specifics of such an analysis would be very helpful for understanding how EM and observers would fit together.

The Different Levels of Catch Accounting

Again, we see the primary purpose of EM as accounting for catch. In our discussions, we found it useful to keep in mind that there are two different levels of catch accounting involved: (1) estimates of total annual catch, and (2) accounting to create individual accountability in the individual fishing quota (IFQ) and co-op fisheries. Individual accountability requires a higher level of monitoring, but ultimately it is meant to keep total annual catch to the Council's preferred sector allocations and annual catch limits. There is some concern about how EM might reduce individual accountability. However, for some species we would argue that individual accountability may not be needed to adequately control catch. When considering risk, we attempt to be specific about whether we are referring to individual accountability or to the more general matter of accounting for total fishery removals.

Of note, Pacific halibut presents another layer to individual accountability. The halibut Individual Bycatch Quota (IBQ) system is meant to improve the survivability of the fish by giving fishery participants individualized estimates of discard mortality.

Thinking About Risks and Incentives Generally

Some GMT members were able to attend the National EM Workshop this past January in Seattle. Many of the discussions were very informative. One that stood out was a talk given by Rick Stanley on his experience with the design of EM systems in British Columbia.[1] He indicated that they spent considerable time, including holding meetings over several years (perhaps before and after EM had already been implemented), considering how people might "game the system" and figuring out how to plug the holes that were identified. He referred to it as "means, motives, and opportunity" for evading the EM system. He also emphasized the importance of having these conversations with the fishery participants because they best know which behaviors to be realistically concerned about.

We would recommend conducting a similar exercise here to best understand and compare and contrast the risks of optional program designs. The "means, motives, and opportunities" would be different by vessel type and sector and even species and possibly area. We would like to emphasize that the GMT does not mean to take an overly cynical view of how fishery participants would behave under an EM system. Most participants would likely act responsibly. Nonetheless, knowing how a system might realistically be exploited is valuable to understanding risks. We believe that there is widespread interest in ensuring the integrity and fairness of the monitoring system.

Retention Definitions

As a small matter, some on the team question the use of the term "optimum." The plain and technical meanings of that word are different than what is meant by the proposal. The proposal is

[1] The talk may be viewed here: http://www.eminformation.com/presentation/plenary-session-3. The remarks referred to can be heard at approximately the 7:20 mark on the video.

in essence to simply allow more species to be discarded. We think the focus would best be turned toward the factors that make discards acceptable or not, which is a species by species determination based on some of the risks we lay out here (e.g., the precision and accuracy of discard estimates, the effect on individual accountability, and at the higher level, how the error in discard estimates affect the risk of exceeding an Annual Catch Limit (ACL) and ability to estimate stock status with assessments). As discussed below, this would involve species by species consideration along the lines of the "Discard Species List" option.

Coverage Levels

The EM alternatives are focused on retention-based programs where discards are limited. These programs basically work by either: (1) disallowing discard with compliance measures focused on detecting illegal discards, (2) incentivizing accurate reporting, or (3) some combination of these. In short, there are various ways of designing programs but the problem of proof is focused on the question of how well fish tickets will reflect what was caught in total.

We had some confusion about matters of coverage level and video review. In other words, what would a 10 percent coverage or review level be a percentage of? We have heard coverage spoken about in terms of the number of tows or sets made on a trip. We can see how that would be appropriate in a system where it is possible to see which fish came aboard and then confirm with reasonable confidence that it was recorded on a fish ticket or in a logbook. The sampling logic would be that the accuracy of logbooks or fish tickets could be incentivized by the prospects of getting caught intentionally or unintentionally making inaccurate entries. Such systems depend on being able to determine how accurately logbooks or fish tickets record total catch.

When discards are of concern, the sampling problem becomes a bit different. Using the concepts of sampling theory, the ideal is to use a "sampling frame" that when sampled from, gives every unit in the total "population/universe" of possible events an equal chance of being sampled. If EM is meant to ensure compliance with retention requirements, then the "universe" of possible events to sample from is the total time in which there are means and opportunity to discard, or from the time the fish is caught to the time the catch is confirmed reported on a fish ticket.

The main point we emphasize here is that we are unsure how to think about risks and coverage levels without more specifics on how the EM programs would function.

Comparative Risks of Observers and EM

We have heard arguments, both within team discussions and elsewhere, that EM should not be held to a higher standard than observers. Observers can certainly be fooled, may make errors in their estimates, be forced to basket sample and provide expanded estimates, or may not be able to sample all hauls during a trip. We would recommend giving attention to the holes in monitoring, whatever the program design, in a risk-based manner. No program will be perfect, but it would be preferable to be aware of what the holes in the monitoring might be, and how they might affect the accuracy of catch estimates, individual accountability, etc.

We do not mean to prompt discussion of whether observers or EM are superior to one another. There are trade-offs involved with each. However, the comparison is being made in the analysis given the standard protocol of comparing action alternatives against status quo/no action. Where comparisons are made, we would again point to the concepts of sampling theory. For instance, an observer might be thought of as a mobile “sampling frame”, that while not looking all the time, may be looking when not expected. In other words, 100 percent observer coverage does not mean the observer will detect every event of interest. A camera based system may be more fixed, but again, it depends on the design. Likewise, observers have protocols for knowing when fish come onboard that make it more likely the fish would be missed if discarded surreptitiously. These are just examples of what the analysis might look to when comparing and contrasting alternatives.

Lastly, we would like to express concern about statements that there are consistent ways of fooling observers. These statements are usually made, again, to argue that EM should not be expected to be perfect either, and we have not seen direct evidence of consistent cheating in the IFQ and co-op programs. Nonetheless, those of us that are concerned are concerned enough to recommend that the Council also look at observer protocols and how they may or may not be changed so as to reduce the chances of bias in catch accounting and holes in individual accountability.

The fish “in the water” problem - Controllability

A lot of attention seems focused on the problem of estimating the species and weight of fish that are caught but not seen onboard, for instance, when fish are “bled” from the net intentionally or come loose unintentionally when bringing gear aboard. Arguments are made about how significant the amount of fish might be, and in many cases, it seems that the amounts are relatively low. Yet taking a risk-based view, we would recommend focusing on how controllable certain behaviors are, or in other words, focus on the means and opportunity for “gaming the system.” If the activity is not controllable, then it is unlikely to affect the incentives of individual accountability. If individual accountability might be affected, then the Council may wish to address them with the program design.

Species and Areas

The level of precision and accuracy needed for catch accounting and compliance may depend on the species, who the interested end-user of the information is (i.e., fisherman, stock assessor, manager, or enforcement), and by the question that we are trying to answer (see above). Questions regarding the necessary level of precision/accuracy may be considered by fishermen for their individual catch accounting needs, by management for ensuring individual accountability and catch remains below the ACL, and by stock assessors for their assessments. If discarding certain species is of importance to a sector (e.g., undersized English sole), then the risk of using EM to estimate those discards would ideally be evaluated by each end-user group of the information.

One question we discussed was along the lines of “how significant would the impact be if the discard estimate provided by EM was wrong (i.e., different from the “true” value)?” For example, the impact of being wrong, whether for compliance or for discard weight estimates, may be much lower for species that are typically caught in quantities far below the trawl allocation and the ACL (e.g., English sole) and are easily identified and discernible from all other species. On the other hand, there are species for which attainment is high, annual fishing mortality is near the ACL, and/or identification may be difficult (e.g., rougheye rockfish, petrale sole, and overfished species). For these types of species, fishermen, management, stock assessors, and enforcement may require a much higher level of precision and accuracy, because the impacts of being wrong may be much greater than for species such as English sole.

The risks and incentives at play with EM are likely to be by area as well. Using the extreme example of yelloweye rockfish, some areas will have higher probability of encountering yelloweye than others. These matters could be looked at with existing observer data. We understand that WCGOP is preparing analysis that would help understand these probabilities better.

An example of individual accountability and ACL management

We provide the following example for perspective on team discussions about EM and concerns of individual accountability. Evaluating the risk of potential impacts of allowing discard can be made on a species-by-species basis. The example uses English sole because one EFP proposes allowing two bottom trawl vessels to discard English sole (Agenda Item F.5.a, Attachment 2, June 2014).

The 2015 ACL for English sole is 11,040 mt; (see Agenda Item F.7.a, Attachment 2). The 2014 IFQ allocation is approximately 5,260.9 mt. The average attainment of English sole for the IFQ fishery 2011-2013 was 2 percent of the IFQ fishery allocation (see Agenda Item F.4.b, Supplemental NMFS Report, June 2014). If the assumption is made that 10 trawl vessels may participate in EM, then approximately 15 percent of the trawl IFQ fleet would be monitored using EM whereas the remaining portion of the fleet (85 percent) would opt for status quo observations (i.e., 68 vessels fished IFQ trawl during 2013; see Agenda Item F.4.b, Supplemental NMFS Report, June 2014). In this case, we might project that the "true" discard of English sole by vessels using EM may be approximately: (5,261 mt trawl allocation) x (2 percent attainment) x (17.8 percent discard) x (15 percent of vessels) = 2.8 mt, or 0.28 mt per vessel. The "true" discard of English sole in this example would represent 0.025 percent of the ACL (= 2.8 mt / 11,040 mt). If for some reason, estimated discard from EM was one-half the true value, then the error would be 0.0125 percent of the ACL, or 1.4 mt for the 10 vessels combined (= 0.14 mt per vessel).

These types of calculations could be helpful for considering the potential cost of being wrong if EM is not as precise or accurate as human observers.

Economic Connections Between Observers and EM

We have heard about the concerns an EM program might have for the economics of observer providers, catch monitors in small ports, and more. We see these as very important questions that should be looked at in as much detail as possible to avoid unintended consequences to fishing communities and to the monitoring capabilities across all sectors.

PFMC
06/20/14

Archipelago Marine Research Ltd.
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Agenda Item F.2.c
Supplemental Public Comment (Full Version Electronic Only)
June 2014

June 12, 2014

Dr. Don McIsaac
Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384
(Delivered by email)

Dear Dr. McIsaac,

Re: Report on the 2004 to 2010 US Shore-based Whiting EM Program

The attached paper summarizes the results from 2004 to 2010 EM program carried out with the US shore-based whiting fishery. While the results were previously reported in the individual annual reports, the purpose of this paper was to compile the results of the seven-year EM program in order to review the operation of the monitoring program and how it evolved over time. The paper was also intended to document the operational aspects to demonstrate that effective EM programs are a lot more than the underlying technology. As well, the intent of the paper was also to summarize what we learned, with the aim of evaluating the merits of the program and providing insights that would assist in other fisheries where EM is being considered.

The EM program evolved over time with operational efficiencies and improvements in technology. EM data collection success across these years exceeded 98% sensor data for all but one year, image data over 95% for five of seven years, and sensor and image data 99% for the last two program years. The EM program provided increased transparency which was a contributing factor to the marked decline in at sea discards over the seven year period. In particular, vessel specific information showed that the majority of the discard problem could be attributed to a small minority of the fleet, and that many vessels could successfully participate in the fishery with little or no discards. In 2005, nearly all vessels discarded, with most discarding 1.5% or more of their catch. Over time, the discard levels declined with increasing numbers of vessels showing very low levels of discard. By 2010, a third of the fleet had no observed discards, and among those vessels with discards, all but three discarded less than 0.6% of their total catch.

The program was co-funded by industry and NMFS, and the 2007-2010 average annual cost was $6.03 per mT, $254 per sea day, or 3.6% of the landed catch value. The EM cost per sea day was about 30% less than the rate for an at-sea observer, yet the latter does not reflect the total cost of the observer program. The cost comparison between EM and observers from an industry perspective would likely center on the portions of the program they would fund, rather than the total program cost. Cost effectiveness of EM as compared to observers comes down to an assessment of the resource risk associated with potentially less granularity of EM data versus more detailed observer data at greater cost. Given that EM was lower in cost and that the incidence of discarding was reduced to a low level, EM is considered to be the most cost-effective monitoring solution for this fishery.

The report summarized a number of lessons learned that would be applicable to the application of EM in any fishery:

- EM based monitoring should not be considered a "plug-and-play" alternative to observer programs as each has their own opportunities and challenges.
- The utility of EM for collecting fisheries data relies on a careful design process that integrates the EM technology, the vessel specifications, and specific on board catch handling and EM system duty of care requirements.
- EM programs are much more than the underlying technology. The majority of cost is with the service components and thus, a structured program design approach is needed.
- Successful use of EM often depends upon integration with other data collection processes and information sources. Data integration opportunities should be considered in the design process.
- Stakeholder engagement is an essential ingredient to EM program success. This should occur at a variety of levels in order to improve the program, optimize operations, and effect change.
- A key risk to EM is the hidden bias that can result from strategic intentional data loss (i.e., turning the system off to avoid recording). While some data loss is to be expected in any monitoring program, effective measures are needed to control, monitor and manage the level of missing data.
- EM technology will change over time and the program design needs to be flexible to include change, where appropriate.
- Effective EM programs require control measures through governance, regulations, incentives or disincentives. Instruments such as an EFP are particularly effective as they can be easily modified during the early stages of program implementation.
- EM programs take time to implement and a multi-year time horizon is needed to establish operations and infrastructure, and offset start up costs. Uncertainty of program tenure will slow the process and reduce cost efficiencies that can be achieved with EM approaches.

The EM program for the shore-based fishery was discontinued in 2010 with the onset of the 100% at-sea monitoring and the IFQ program. I believe this was more the result of an effort to bring the entire west coast groundfish fishery under a single monitoring framework than from a shortcoming of the EM program.

As the potential for EM is being considered by the Pacific Fishery Management Council it is hoped that this paper will aid in these discussions. Please feel free to distribute this report. I would be happy to address any comments or questions at the email address provided below.

Sincerely,

Howard McElderry, M. Sc.,
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ARCHIPELAGO MARINE RESEARCH

The 2004 to 2010 US Shore-based Whiting EM Program: What Did We Learn?

June 12, 2014

Prepared by: **Howard McElderry, Martina Beck and Jessica Schrader**

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Acknowledgements

This report summarizes the results of 2004 to 2010 Shore-based Whiting EM program carried out for the National Fisheries Marine Service of NOAA, funded jointly by NMFS and the shore-based whiting fishery participants. Funding for this report was provided by the Pacific States Marine Fisheries Commission and Archipelago Marine Research Ltd. We would like to thank the authors of the original reports, in particular Janet Cowan, Andrea Crumpacker, Morgan Dyas, and Dale McCullough. Several individuals within NMFS contributed to the project design included: Jonathan Cusick, Becky Renko, Janell Majewski, and Elizabeth Clark. Steve Parker, of the Oregon Department of Fish and Game, provided helpful advice during early phases of the program design. The authors would also like to thank the following reviewers for their useful advice on the manuscript: Dave Colpo, Mark Holliday, George Lapointe, Dayna Matthews and Michelle McClure. Lastly, and importantly, we would like to thank the shore-based whiting fishery participants for their support and ongoing advice during the seven year program.

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Contents

List of Figures

List of Tables

Summary

This paper provides an overview of a seven-year program involving the use of electronic monitoring (EM) on the US shore-based Pacific whiting (*Merluccius productus*) midwater trawl fishery. The paper describes the fishery and the EM program, and how these have changed over this time period. We also examine the operational aspects of the EM program to better inform an assessment of cost effectiveness of this monitoring method.

The whiting fishery is a high volume spring/summer fishery operating off the coasts of Washington, Oregon and northern California, consisting of ~35 vessels making day fishing trips. Total removals are estimated from landed catch and no discards are permitted. Full retention regulations were monitored from 2004 to 2010 using EM, whereby each vessel was equipped with closed circuit television cameras, GPS, winch and hydraulic sensors, operating continuously while the vessel was at sea.

Over the seven-year monitoring program, the fishery ranged from 24 to 180 days duration, 500 to 1,300 vessel sea days, and 40,294 mT to 972,677 mT total catch. EM data collection success across these years exceeded 98% sensor data for all but one year, image data over 95% for five of seven years, and sensor and image data 99% for the last two program years. Early monitoring results yielded a clearer understanding of fishing practices, providing a framework for more practical regulations on permissible levels of ‘operational discarding’. The EM program provided increased transparency which was a contributing factor to the marked decline in at sea discards over the seven year period. In particular, vessel specific information showed that the majority of the discard problem could be attributed to a small minority of the fleet, and that many vessels could successfully participate in the fishery with little or no discards. In 2005, nearly all vessels discarded, with most discarding 1.5% or more of their catch. Over time, the discard levels declined with increasing numbers of vessels showing very low levels of discard. By 2010, a third of the fleet had no observed discards, and among those vessels with discards, all but three discarded less than 0.6% of their total catch.

EM data reviewers estimated discard quantities using volume-density estimation methods. A small study comparing EM estimates with direct weights from a research vessel suggested EM estimates were correlated but highly variable. We believe estimation methods improved over time; however, the 90% decline in discard quantity over the seven-year period reduced discards to a level where the lower precision of the EM estimate became less important.

EM results were compared closely with vessel log data. Estimates of discard quantity were correlated but highly variable and it was not possible to attribute error as both were estimates. Most challenging to estimate were events where

discarding occurs directly from the net without coming aboard. The level of alignment between EM and vessel logs with respect to recorded discard events improved over time and we suggest using EM to audit vessel logs as a possible future program design.

EM data loss was closely monitored, particularly after a 2007 incident involving large discard quantity of widow rockfish. Data loss occurring during catch stowage operations was a particular concern because of the potential opportunity to discard unwanted sensitive species. In 2010, data loss during these critical periods was estimated at 0.5% of the total fishing events for the year. We examined monitored landings data to estimate the potential missed catch from EM data loss and determined the level to be less than 1% of the Annual Catch Limit for all sensitive species except widow rockfish and POP (5% and 3%, respectively). Hence, the data loss occurring in most program years would not pose a resource risk caused by unaccounted for catch but the results underscore the need to ensure that EM data loss is monitored and actively managed.

The program was co-funded by industry and NMFS, and the 2007-2010 average annual cost was $6.03 per mT, $254 per sea day, or 3.6% of the landed catch value. These figures reflect the total cost of the monitoring program, including program planning, field data collection and all the steps required to produce a finished data set. The costs are also reflective of a mature program where startup costs such as data-base development, program design, and infrastructure development have already taken place. EM equipment provision and field service were the largest cost component, over twice the data analysis and reporting component. The uncertain tenure led to higher EM equipment costs as most participants chose to lease rather than purchase.

The EM cost per sea day was about 30% less than the rate for an at-sea observer, yet the latter does not reflect the total cost of the observer program. The cost comparison between EM and observers from an industry perspective would likely center on the portions of the program they would fund, rather than the total program cost. Cost effectiveness of EM as compared to observers comes down to an assessment of the resource risk associated with potentially less granularity of EM data versus more detailed observer data at considerably greater cost. Given that EM was lower in cost and that the incidence of discarding was reduced to a low level, EM was considered a more cost-effective method for this fishery.

Although the EM program likely drove the significant improvement in the full retention compliance and the quality of catch data, it was discontinued in 2011 when the groundfish trawl fleet implemented a catch share quota system with 100% observer coverage, funded by NMFS.

1.0 Introduction

The non-tribal commercial Pacific whiting (also known as Pacific hake) (*Merluccius productus*) fishery is a seasonally intense spring/summer fishery that operates off the coasts of Washington, Oregon and northern California. This fishery consists of an at-sea processor fleet and a shore-based fleet. The shore-based fleet consists of approximately 30 vessels that make day fishing trips and deliver their catch to six ports. During the fishery, most of the vessels operate out of three Oregon ports: Charleston (Coos Bay), Newport and Astoria. The remaining four to six vessels deliver their catch to Westport (WA), Eureka, (CA) and Crescent City, (CA). The dates for the shore-based hake season coincide with the movement of hake along the coast: an early season in northern California, a main season fishery, usually opening mid-June off the Oregon and Washington coasts, and a late season fishery starting in the fall in the same areas.

At-sea information for the shore-based whiting fishery is important because of several factors unique to this fishery. During the fishery, vessels transit for several hours from the fishing grounds to deliver their catch to shore-based processing plants. Unsorted catch must be rapidly transferred from the net to refrigerated seawater holds to retard a parasitic degradation process common to this whiting population (Alderstein and Francis 1991). The immediate transfer of catch to preserve product freshness makes it impractical to sort the catch at sea. Therefore, by-catch monitoring takes place at dockside when the unsorted catch is delivered to the processing plants. In support of this shore-based method of catch monitoring all fishing vessels participating in the fishery are required to maximize retention of catch. At sea monitoring has been a requirement since 2004 to ensure compliance with maximized retention.

Traditionally, trained fisheries observers are used to provide onboard monitoring of fishing vessels. This past approach may not be practical or cost effective in certain circumstances, particularly when the scientific data collection needs are low. A variety of studies have shown that some types of monitoring can be more effectively carried out using electronic monitoring (EM) technologies (MRAG 2004, Ames et al. 2005, Sommerville 2004, McElderry 2008, Stanley et al. 2009, Stanley et al. 2011). In 2002, a pilot study was carried out with a single shore-based whiting fishing vessel (McElderry et al. 2002), and on the basis of these successful results, EM-based at-sea monitoring was extended to the entire shore-based component of the fishery from 2004 to 2010. The EM program for this fishery was established under an annual exempted fishing permit (EFP), which was renewed each year until 2011 when the fishery transitioned to an IFQ program, and 100% monitoring by at-sea observers became compulsory.

The transition from EM to observers in the shore-based whiting fishery in 2011 came about more as a desire to establish a consistent monitoring program for the entire groundfish fishery rather than any documented shortcomings with the EM program. Prior to 2011, the EM program for the shore-based whiting fishery was mostly industry funded (about 70%), whereas the 2011 observer program was mostly funded by the National Marine Fisheries Service (NMFS). The federal funding of at-sea monitoring was planned as a transition measure with monitoring costs being increasingly borne by the fishing industry over time. With monitoring costs rising for industry, there is increased interest in exploring a technology-based monitoring alternative, which could be more cost effective. While an EM program was carried out over a seven-year period prior to 2011 when it was replaced with human observers there has been no formal assessment of the EM program and its efficacy in addressing the monitoring requirements for this fishery.

The EM program for the shore-based whiting fishery was carried out under an annual contract by Archipelago Marine Research Ltd. (Archipelago) with NMFS. The program was delivered in a generally consistent fashion across all program years, beginning as a program under the science branch, then transitioning to a compliance program in 2007. Over the seven years, the program evolved with improved technology and minor changes to methodology. The results from each program year were summarized in technical reports for NMFS, as referenced in Table 1-1.

The purpose of this paper is to compile the results of the seven-year EM program in order to review the operation of the monitoring program and how it evolved over time, as well as, to describe how the fishery changed over this period as a result of the monitoring program. We also examine the operational aspects of the EM program to better inform an assessment of the cost effectiveness of this monitoring method.

Table 1-1. Citations for annual technical reports for 2004 to 2010 shore-based whiting EM program.

Program Year	Report Reference
2002 (Pilot)	McElderry et al. 2002
2004	McElderry et al. 2004
2005	McElderry et al. 2005
2006	McElderry et al. 2006
2007	Schrader and McElderry 2008
2008	Schrader and McElderry 2009
2009	Cowan et al. 2010
2010	Archipelago Marine Research 2011

2.0 Materials and Methods

2.1 EM Technology

EM System Specifications

The EM systems used for this project were manufactured by Archipelago in Victoria, BC, Canada and are designed for the automated collection of sensor and image data which can be used to produce fisheries information. While different equipment models were used over the seven-year period, the basic configuration was the same, as schematically shown in Figure 2-1. This equipment has been used on a variety of fishing gear types and boats around the world, and have been in use as a key source of fishery data in the British Columbia Groundfish Fishery since 2006 (McElderry 2008, Stanley et al. 2011). The EM system is comprised of a system control centre, up to four closed circuit television cameras, a GPS receiver, a hydraulic pressure sensor, and a winch rotation sensor. The sensor configuration was the same for the entire program period, as were the analog CCTV cameras. The control central computer software manages the collection and storage of high-frequency sensor data and CCTV image data at specified settings throughout the fishing trip. Image and sensor data are stored digitally on a removable hard drive that can be exchanged at intervals during the fishery.

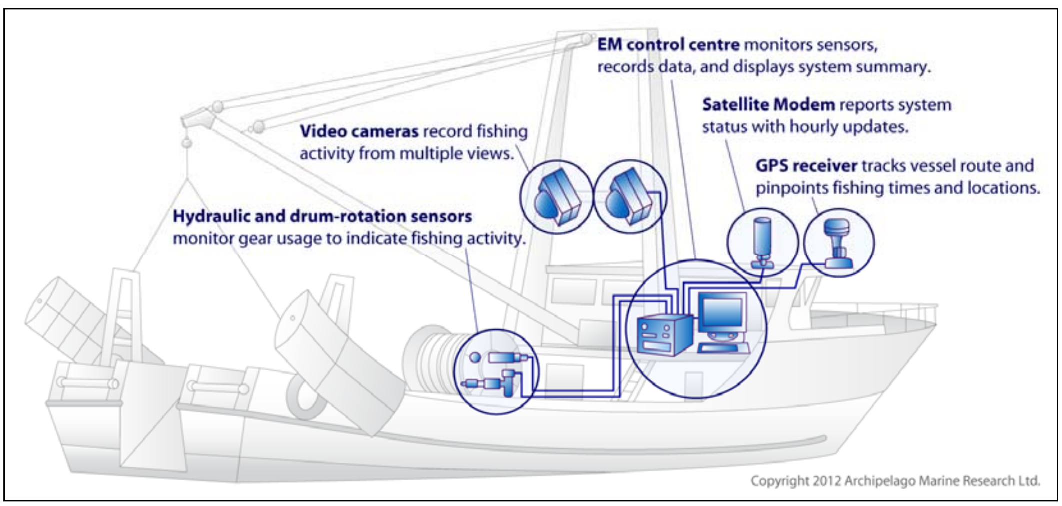

Figure 2-1. Schematic diagram of the electronic monitoring system used for 2004 to 2010 program years.

The control centre software was set to collect and store sensor data (GPS, hydraulic pressure and drum rotation) every ten seconds. This recording frequency delivered an accurate account of vessel activity that could be used to develop a distinctive digital "signature" of vessel activities including transit, gear setting, net towing, net retrieval, and catch stowage. Image data was generally recorded at a rate of one frame per second and the control centre was set up to record imagery from all cameras when the first fishing activities occurred on the trip, and continue image recording until the vessel returned to port. Detection of fishing activity was evidenced by either or both hydraulic pressure and winch sensors. A geo-fence of port locations and vessel GPS data was used to determine vessel location in relation to port.

EM Technology Evolution

Over the seven-year EM monitoring program period, EM systems evolved with improvements in technology. Table 2-1 provides a summary of the key improvements to the EM equipment over the duration of the program. From 2004 to 2006, a V3.0 control centre was used. This system consisted of a small industrial computer, paired with a CCTV system, commercially available from the security industry. The industrial computer managed the sensor data while the CCTV system managed and recorded the image data. Starting in 2007, a V4.0 platform was introduced, which consisted of a single computer platform that recorded sensor and image data in a more integrated fashion. This newer equipment was fully adopted for 2008 to 2010 program years.

Table 2-1. EM system components used for the 2004 to 2010 program years.

Components	2004	2005	2006	2007	2008	2009	2010
EM Hardware	V3.0	V3.0	V3.0	V3.0 & V4.0	V4.2	V4.2	V4.2
EM Software	VDL 1.0	VDL 1.0	VDL 1.0	VDL 1.0	VS 2.0	VS 2.0	VS 2.0
Image Data Player	Proprietary player	Proprietary player	Proprietary player	WMP	WMP	Video Analyzer	Video Analyzer

The earlier V3.0 system recorded image data in a proprietary non-PC format, which limited the ability to view and manage image data files. The later V4.0 system recorded in the standard PC file formats (MP3 and WMP) which provided greater flexibility for viewing, storing and managing image files. A standardized sensor data format occurred throughout the program but starting in 2008, the method of sensor polling changed to improve the ability to detect gaps in the data set. Prior to 2008, a sensor record could be delayed if the GPS signal was poor, whereas afterwards this was forced to provide precise 10 second recording intervals. Thus, time intervals greater than 10 seconds between adjacent records represented a ‘data gap’ which could easily be detected for investigation.

There were also changes with the software tools used to process EM data sets. As mentioned, the image data format of the V3.0 system was proprietary and could only be viewed using the CCTV platform provided by the vendor. The change to the more common MP3 and WMP formats provided more options for handling image data, starting with simple commercially available viewing software (e.g., Window Media Player), then moving a custom built viewing software that allowed for viewing of multiple camera images simultaneously. The sensor data was initially displayed in graphical format, but later was integrated with the viewing software to enable direct referencing between sensor signatures and image data. Interpretations from raw EM data sets such as set time and location, catch events, etc. were initially recorded in a separate spreadsheet. Later, these data entry functions were integrated using the custom viewing software, providing a single platform for loading a raw EM data set, navigating through different parts of a fishing trip to review pertinent monitoring activities, then directly record observations into a database (Figure 2-2). This evolution to a single analysis platform greatly improved the quality and reliability of EM data, as well as significantly improved the efficiency of data processing activities.

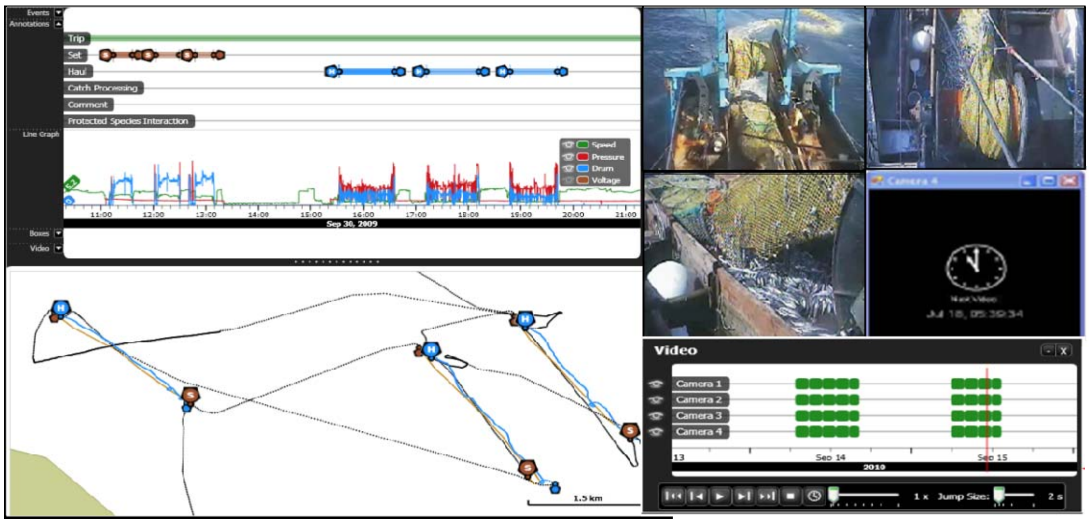

Figure 2-2. EM analysis software display of whiting fishing trip. Upper left shows time series graph of vessel speed, hydraulic pressure, winch (drum) and voltage. Lower left shows vessel cruise track and right panels show CCTV camera imagery.

2.2 EM Program Operations

An EM program is more than the underlying technology itself and includes a variety of service elements, as summarized in Figure 2-3. The diagram outlines the service elements associated with a typical seasonal cycle for the shore-based whiting fishery. The EM program service elements occurred before, during and after the fishery took place and related to the effort needed to: ensure that the technology was in place to achieve its stated objective; ensure that there was the appropriate level of feedback and coordination between all the program participants (e.g., industry, agency, service provider); and to ensure there was appropriate and timely effort to interpret and report on fishery data derived from the EM data set. Each of the operational program elements are described in the following sections.

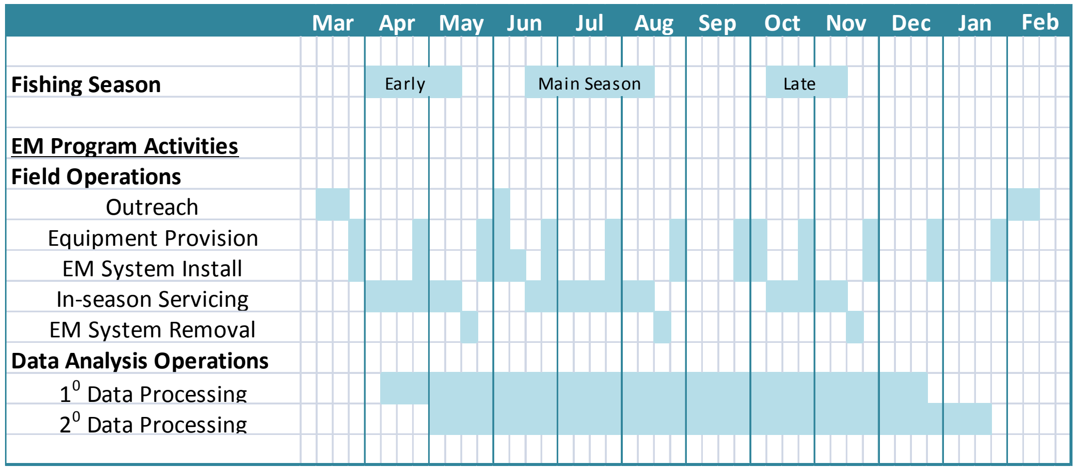

Figure 2-3. Schematic timeline of key program operational components for the 2004 to 2010 program years.

2.2.1 Field Operations

Outreach

The EM program was integrated with NMFS staff and industry through several outreach processes. Program planning took place between Archipelago and NMFS in advance of scheduled outreach meetings with industry, and usually in conjunction with finalization of the EFP and operational planning for the season. In later years of the program, there was a higher level of interaction with NMFS Office of Law Enforcement (OLE) staff that included training with the operation of EM systems and analysis software.

The main instrument for launching the program and creating alignment among the different program participants were outreach meetings scheduled in advance of the early and main season fishery. The meetings involved representatives from the active fishing vessels, agency staff and service delivery staff and served to provide information about the program for the coming season, provide an overview of the EFP, provide summary information from previous program years and gather specific input to improve program coordination. Participation in the outreach meetings was a mandatory condition of the EFP. In addition to the pre season meetings, program staff also conducted outreach by phone and during regular service visits to the vessel. Upon completion of the fishery in 2004 and 2005, a questionnaire was administered to participating vessels in order to solicit feedback on the EM program and issues in the fishery.

EM Equipment Provision

The EM systems were provided by Archipelago (described in Section 2.1), available on a sale or lease basis. The year-to-year tenure of the EM program for the fishery resulted in most participants choosing to lease EM equipment. In advance of each season program staff prepared and tested all the EM systems expected for the upcoming season. This equipment was transported to the various ports for deployment on participating vessels. EM system provision included ensuring an inventory of spare parts was available to ensure continuous operation of EM systems during the fishery.

Installation and Removal of EM Systems

Each year of the program usually involved a significant field effort to install equipment prior to the start of the fishery. The mobilization efforts included deploying a mobile crew of service technicians traveling with EM systems to the ports, working under tight timelines of vessel availability prior to the start of the fishery. The process was repeated at the conclusion of the fishery, or when vessels exited the fishery. The 2008 and 2010 fishing season length was extended (148 and 180 days, respectively) with closure periods to avoid by-catch. In these cases, EM systems were often left in place until the vessel completed fishing for the season. As mentioned, there were a few vessels with purchased EM systems, but numbers were not significant to alleviate the hectic pre-season equipment mobilization effort.

The installation procedure on each fishing vessel began with consultations with vessel personnel regarding the layout of the vessel, fishing deck configuration, onboard electrical system, hydraulic systems and wire access routes. Vessels were typically fitted with two to three CCTV cameras. The GPS sensor was mounted at a high point away from other electronics, with a clear sky view. Hydraulic pressure sensors were usually mounted on a winch hydraulic supply line or in the engine room. Winch rotation sensors were mounted on either a warp winch or the stern net drum. Beginning in 2005, the EM system was fitted with an uninterrupted power supply unit (UPS), which was intended to stabilize power interruptions and reduce data loss caused by brief power interruptions. Upon completion of installation and testing, technicians briefed vessel personnel on the operation of the EM system and their duty of care responsibilities (see Section 2.2.4). Installation crews also photographed and measured fish holding areas on the deck (e.g., trawl alley, fish checkers) to enable density-volume catch estimations by image analysis staff.

Shortly after the close of the fishery, service technicians removed EM systems from the vessels. Often, participating vessels departed the area for other fisheries, causing an intense busy period to demobilize many vessels over a short time period. EM sensor and camera wiring was often left in place (with permission by vessel operators) to simplify future installations of EM equipment.

In-season Servicing

During the first week of the fishery, technical staff attempted to visit each vessel to confirm the functionality of the EM system. Thereafter, service visits occurred every two to four weeks as either a scheduled visit, or if the technician was in port for another vessel they would try to service as many available vessels as possible. EM service events were typically done while the boat was offloading or while the vessel was waiting to offload. EM servicing involved removing sensor and image data from the EM system and refreshing data storage capacity by installing a new hard drive. Servicing also involved an evaluation of system performance to ensure that all systems were functioning correctly. This included an examination of recorded data and a visual inspection of all components for wear and damage. Technicians also obtained photograph copies of the vessel logs during the service trips.

The program goal was to ensure vessels participating in the fishery had EM systems operational for 100% of their fishing operations. Vessel operators had several 'duty of care' responsibilities toward the EM system, which included:

- Keeping the system continuously powered while the vessel was at sea;
- Regularly cleaning camera dome surfaces to ensure sharp image resolution;
- Conducting periodic inspections of system components and conducting regular system checks to ensure the EM system was performing properly;
- Ensuring that camera view areas were adequately lit during night operations;
- Immediately contacting program staff and NMFS if the EM system stopped operating; and
- Maintaining regular contact with service provider for data retrieval and service scheduling.

Program staff was available to address service issues during the fishery. As well, information from EM data analysis alerted staff of any changes to the EM configuration or special duty of care needs aboard the vessel. This information was directed to vessel personnel and technical service staff in order to improve data quality.

2.2.2 Data Analysis Operations

The volume of data for a four week period of active fishing was approximately 120 GB from a typical vessel, large image data files accounting for most. This resulted in data from the fishery being stored on several hard drives, each drive representing a period of fishing operations for a single vessel.

Figure 2-4 illustrates the data processing operations that are described in the following sections. EM program data were assembled and managed in a relational database, linking operational elements of the program with specific service, trip and fishing event level data. Data summaries were designed to examine operational performance issues, as well as to examine compliance with the specific fishery monitoring objectives.

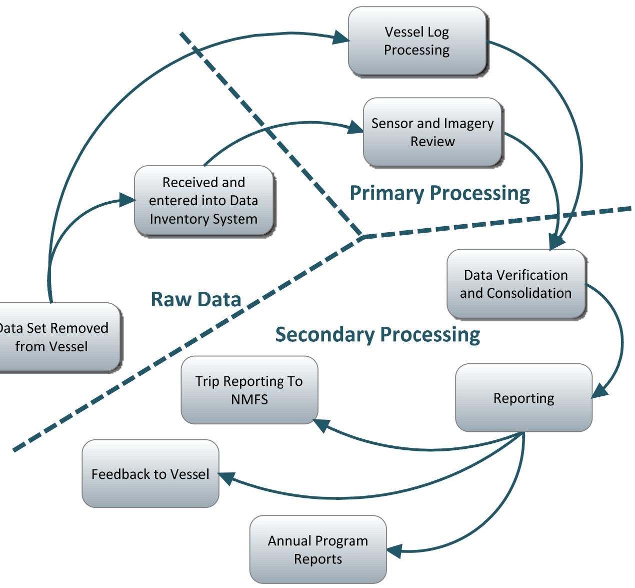

Figure 2-4. Schematic of data flow from the vessel retrieval to data reporting for the EM program.

EM data processing consisted of examining all the data products collected from a service event and compiling summary reports. The analysis objectives were as follows:

- Sensor data:
  - Evaluating data set completeness,
  - Identifying fishing events, and
  - Compile detailed fishing tow tracks.
- Image data:
  - Confirm fishing events,
  - Examine catch stowage operations to assess compliance with maximized retention requirements, and
  - Document the characteristics of discard events.
- Vessel logs:
  - Verify that trips and fishing events aligned with that recorded from the sensor data, and
  - Compare skipper records of discard information as compared with EM data.

Service Coordination

Data service coordination ensured that hard drives and data sets created by active fishing vessels were tracked throughout the operational cycle. Hard drive management involved the use of an inventory management system to track hard drives throughout their use cycle. During 2004, hard drives were deleted once analyzed and returned for use in the fishery. From 2005 to 2010, hard drives were kept for the entire duration of the fishery, enabling archiving of compliance events, and re-analysis as needed. From 2007 to 2010, hard drives were kept for a year following the fishery, and drives showing compliance could be kept longer, if desired by OLE. During these years, the entire hard drive was delivered to OLE when compliance events were identified. Other drives were kept in the project office and turned over to OLE at the end of the fishing season.

Data tracking was also carried out to monitor data set progress through the processing cycle. This included tracking the transit of the hard drive from the vessel to the office, through sensor and data processing, data consolidation and data reporting.

2.2.2.1 Primary Data Processing

Sensor Data

A preliminary analysis of sensor data occurred during each vessel servicing event to verify quality and identify possible service needs. Later, the data set was examined in greater detail to further examine data quality and identify vessel activities. Sensor data (GPS, hydraulic, winch rotation) for fishing episodes were simplified to one-minute intervals (versus 10-second intervals) to enable compilation of fishing event spatial data. Fishing trips were defined as the time from when a vessel left port until the time the vessel returned to port. Port location and vessel speed were used to define trip start and end. The start and end of fishing events was discernible from sensor data although fish stowage also required referencing the image data.

Image Data

Technicians reviewed all recorded image data (i.e., from the first set of a trip until the vessel returned to port). The following definitions were used to describe fishing operations:

- ***Set Interval*** **-** the period from when the trawl doors entered the water until they were returned and stowed.
- ***Catch Stowage Interval*** **-** the period from when the codend was winched on deck until when the all fish were stowed in the hold, or (rarely) when the vessel holds were full and the remaining catch stowed as a deck load.

EM Data Completeness

Data collection performance of EM systems was assessed in several ways. On a trip by trip basis, the quantity of sensor data expected (i.e., the duration between beginning and end) was compared with what was actually recorded by the EM system. EM data sets from each fishing trip were categorized as follows:

- ***Complete*** – Complete data record for the entire trip;
- ***Incomplete*** – Data record for trip has intermittent breaks;
- ***No data*** – No data recorded from the trip; and
- ***Post-collection data loss*** – Data was recorded successfully by the EM system but could not be accessed later. This problem was specific to the V3.0 CCTV system used until 2007.

EM data sets from each fishing trip were also assessed for sensor performance. The GPS, hydraulic and winch sensor data were examined and performance for a trip was considered complete if all data were present with intelligible (uncorrupted) results. CCTV camera image data quality was assessed as an average for the entire trip, using the following scale:

- ***High*** – the imagery was properly focused, the viewing area was clearly visible and net retrieval and catch stowage operations were easily assessed;
- ***Medium*** - there was a loss of image clarity, poor camera positioning or minor obstructions, but the analyst was able to confidently assess net retrieval and catch stowage operations;
- ***Low*** – there was low image quality due to reduced light, water droplets, poor focus or major obstruction of view and fishing operations were difficult to monitor; and
- ***No Data*** – image data were missing or when the quality was obstructed or insufficient to reliably assess fishing operations.

The data sets for each fishing trip were also evaluated for data gaps, or breaks in the data record. The data gap threshold was one minute, allowing consistency across all program years. Data gaps, often related to power interruptions, provided a measure of overall data success rate. Starting in 2008, time gaps were further categorized according risk as follows:

- ***Minor*** - Time gap occurred during the trip, but fishing activity had not yet begun;
- ***Moderate*** - At least one set had been completed when the time gap occurred, but the gap did not overlap with catch stowage operations;
- ***Critical*** - Time gaps occurred while catch stowage operations were underway; and
- ***Major System Failure*** - Any time gaps lasting more than half the duration of a fishing trip.

Discard Estimation

All catch stowage operations were examined to assess vessel compliance with the maximized retention requirements. It is normal that some fish will be discarded on nearly all catch stowage operations, owing to the high catch volumes and some fish being damaged or gilled in the net. A threshold of 0.045 mT (100 lbs) was used as a standard to distinguish normal operations from discarding events. In 2004, confidence in discard quantification was uncertain and hence discard quantities were categorized only by relative magnitude (<0.045 mT, 0.045-0.45 mT, 0.45-4.5 mT, and >4.5 mT). In 2005, discard quantities were estimated and recorded using finer intervals (<0.045, 0.045-0.450 mT, 0.450-2.2 mT, then ~2.0 mT intervals to 18.1 mT, >18.1 mT), and from 2008-2010, discards were recorded as the estimated quantity, rather than as interval data.

Two methods were used for estimating discard quantities. The preferred and most common method was using a standard volume-density approach, based on deck measurements, codend straps, or other references. Both trawl alley and codend volumes were estimated directly from image data, based on deck dimensions obtained by technicians at the start of the season. Height estimates were determined based on the height of comparable objects, such as bin boards or people. The volume-density formula (0.7854 x length x width x height) was applied to fish holding areas on deck and a standard ellipsoidal cylinder density volume formula (0.7854 x π x diameter (min) x diameter (max) x length / 4) was applied for net codends. In some cases, such as for incidents of bleeding, the only estimation method possible was visual, estimating the change in net volume before and after discarding using net dimensions and codend straps for reference.

The following terminology was used in 2004 to describe the catch retention activities:

- ***Maximized Retention*** – All catch was brought aboard and transferred to the fish holds. Any discards were less than a 0.045 mT threshold;
- ***Discarding*** – Some (or all) of the catch was released back into the sea in one of the following ways:
  - ***High Grading*** – species that were selectively discarded from the entire catch on deck. Criteria for selectively discarding fish were size, quality and species.
  - ***Bleeding*** –catch that was non-selectively discarded from the net via a "zipper" that the crew opened to release excess fish before the net was brought aboard (bleeding is also referred to as slipping).
  - ***Dumping*** –catch that was non-selectively discarded from the deck after the net was brought aboard. Dumping occurred in two ways: from the deck, or by towing the codend to flush fish from a full or partially full net.

From 2005 to 2010 discarding was categorized as follows:

- ***Selective*** – As above.
- ***Non-Selective*** – Non-selective discarding occurred when fish were discarded and no selection was apparent, usually connected with a vessel being full to capacity and excess fish are released. Four non-selective discarding categories were used:

- ***Bleeding*** – catch that was non-selectively discarded from the net via a "zipper" that the crew opened to release excess fish before the net was brought aboard. * Bleeding is also referred to as slipping.
- ***Codend flushing*** –when a partially filled codend is opened, lowered into the water and flushed by the forward motion of the vessel.
- ***Deck disposal*** –when catch is discarded directly from the deck, usually by using a water hose to flush fish overboard.
- ***Net Cleaning*** –discards of fish that were entangled in the net. Crew would usually pick the net to removed fish gilled in the mesh.

Vessel Log Data

Data processing also included processing vessel logbook data. Trips recorded in vessel logs were assigned a unique identifier and entered into an MS Access database. Data entry included trip and set information, as well as catch and discard quantities. Discard events were not always recorded at the set level, cases where discards were only recorded at the trip level were flagged as such and discards assigned to the last set. Vessel log data were primarily used to compare with fishery data as determined from information analysis of the EM data set.

2.2.2.2 Secondary Data Processing

Secondary data processing involved a series of steps to produce finished data sets from the interpreted EM data. Data consolidation involved making comparisons of data from EM sources with vessel logs to verify completeness of the EM data set and assess quality of self-reported data. Inconsistencies identified from this comparison could result in further review of original EM data. These comparisons could then be used for program feedback.

2.2.2.3 Reporting

Reporting evolved over the seven program years. In-season reporting was intended to provide timely analysis information to assist with in-season management of the fishery. From 2004 to 2006, in-season reporting occurred weekly (or bi-weekly in 2004) and consisted of a summary of vessel discarding activity for processed data sets, delivered to NMFS. No in-season reporting occurred in 2007 as efforts were focused toward development of a more standardized post season report which included more comprehensive vessel specific information. From 2008 onwards in-season reports followed each batch of completed data analysis, and a post season report was delivered to NMFS. Vessel specific in-season reports were delivered to participating vessels. In addition to data reports, NMFS received copies of EM data and summary data, provided in database format.

In addition to structured reporting, feedback among program participants often resulted from analysis of a data set in order to improve the quality and effectiveness of the EM deployment on the fishing vessel. Common feedback would be adjustments to system settings, changes to camera positions, advice to vessel personnel on duty of care responsibilities, or catch handling practices.

2.2.2.4 Discard Accuracy Study

In an effort to assess the accuracy of estimating discard quantities, comparisons between EM volumetric estimates and vessel weight estimates were conducted. An EM system was installed aboard NOAA's R/V Miller Freeman and the scientific crew weighed and sorted all whiting catch during the 2005 research cruise. This made it possible to compare direct weights with density volume estimates determined from EM image data. EM and vessel comparisons were made only for sets with catch large enough to fill the 1.8 m by 2.6 m sorting table, allowing the viewer to estimate only one parameter of volumetric estimation: height.

3.0 Results

3.1 Fishery Overview

The following three sections provide an overview of the 2004 to 2010 fishery in terms of key characteristics, the spatial footprint of the fishery and the management regime. This information provides an overall context to the monitoring program.

Key Characteristics

Key elements of the shore-based whiting fishery from 2004 to 2010 are presented in Table 3-1. Except for the first two years, fishery participation included about 35 vessels and fleet activity (days at sea, fishing trips and fishing events) was generally aligned with the total catch allocation, with the total catch ranging from 40,294 mT to over 972,677 mT. The season length varied by program year; partially in relation to catch allocation but also bycatch avoidance. In particular, the season in 2008 and 2010 was extended to over 140 days with voluntary closures in order to reduce the risk of exceeding bycatch limits. This was in contrast to season lengths of 24 to 60 days for other years.

As mentioned previously, the fishery typically consists of an early, main and late season component; the former involving 5-8 vessels fishing off the northern California coast, taking about 5% of the catch allocation. The EM program captured all phases of the shore-based fishery except for 2004 and 2005 where program initiation was delayed and the early season was missed.

Table 3-1. Summary of the shore-based whiting fishery during the 2004 to 2010 program years. Fishery characteristics were derived from program data except that denoted as '*' (source PFMC, 2011). Sea days are calendar days vessels are at sea as per Northern Economics (2011).

Fishery Characteristics	2004	2005	2006	2007	2008	2009	2010
Seasons Monitored	M	M	E/M	E/M/L	E/M/L	E/M	E/M
Vessels Participating	24	28	35	36	36	33	35
Season Length (days)	60	60	48	41	148	24	180
Sea Days	1,489	1,834	1,513	1,449	1,281	887	1,984
Total Trips	1,019	1,105	1,113	902	609	478	728
Total Sets	1,762	2,013	2,197	1,968	1,248	940	1,843
Whiting Catch (mT)*	89,251	97,378	972,677	73,277	50,760	40,294	62,655
Catch Value ($000's)*	n/a	n/a	13,617	12,078	11,914	5,536	10,038

Spatial Footprint

The spatial footprint of the fishery is shown in Figure 3-1, showing fishery location based on EM tow track data. Fishing locations ranged from Northern California to Northern Washington, with the bulk of the activity occurring off the coast of Oregon. During 2004 to 2007, vessel-fishing tracks were located closer to shore as compared with 2008 to 2010 where vessels were required to fish further offshore. Fishing activity inshore also appeared to be more dispersed as compared to years prior to 2008. In 2010 fishing activity was the furthest offshore and most dispersed as compared to previous years.

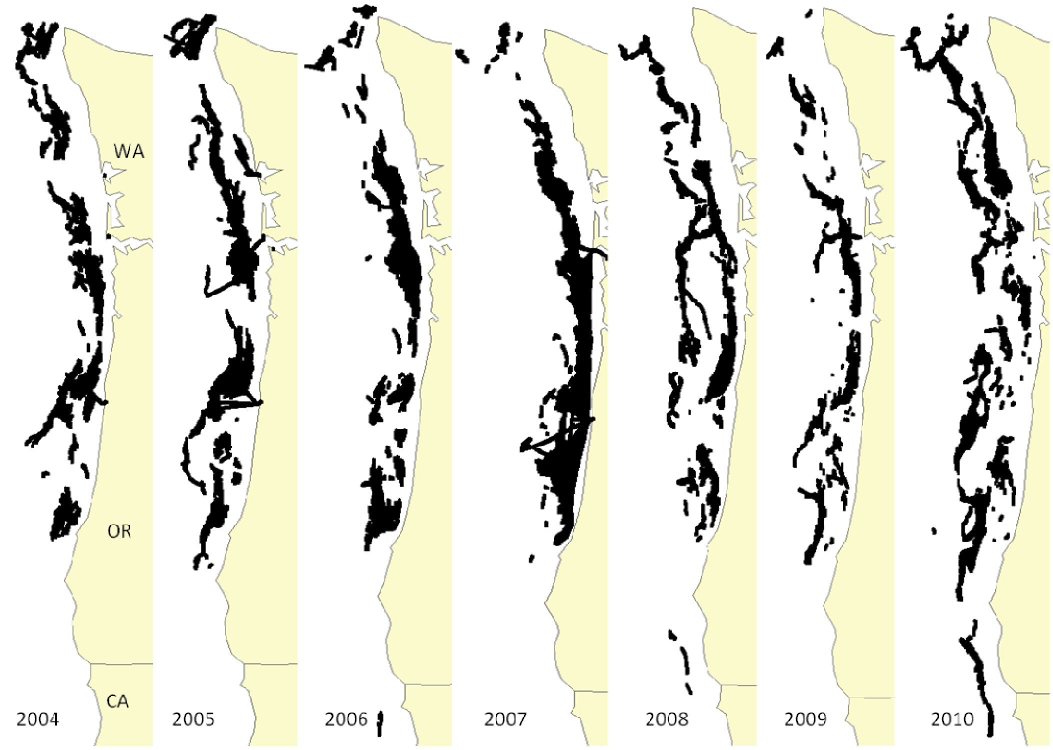

Figure 3-1. Spatial plots showing fishing locations during the main season for the shore-based whiting fishery for each of the program years (2004-2010). Fishing location data were taken from EM data when fishing gear was deployed.

Management Regime

As mentioned earlier, the fishery was managed under recurring Exempted Fishing Permits (EFP) for the 2004 to 2010 seasons. This annual permit process is generally used for experimental research or special cases that fall outside the normal regulatory process. The EFP process was not intended for ongoing fishery management and was instituted primarily to exempt vessels from the on-board catch sorting required under regulation. The EFP was a convenient tool for implementing EM-specific requirements because of the ease in which EFP wording could be updated to accommodate program specific needs. Over the 2004 to 2010 period, the specific language in the EFP changed in response to a growing understanding of the fishery and building more specific regulations aimed at addressing key fishery issues.

Changes in the EFP wording over time included more specific language concerning EM program requirements. Mostly, this related to increasing vessel responsibility toward monitoring the functionality of the EM system. Vessel operators were required to ensure the EM system was functioning properly, following specific 'duty of care' requirements (see Section 2.2.1), and immediately contact a service technician and OLE if problems were identified.

Most EFP changes related to catch and discard issues. In 2004, the requirements were to retain and land all catch caught during fishing operations. Discards due to emergency or safety situations were the only exceptions permitted. In 2005, the language changed to “maximized retention”. Discarded amounts for each species and reason for discarding were to be recorded in the logbook as required by the State of landing. In 2006, the language describing discards remained the same, but cumulative limits were listed for Pacific cod, lingcod and various rockfish.

In 2007 area restrictions were put in place limiting retention of more than 4.5 mT (10,000 lbs) of Pacific whiting per trip shoreward of the 100-fathom contour in the Eureka area (43°00' N. lat. - 40°30' N. lat.). Increased emphasis toward compliance resulted in the following revisions concerning discard events.

- ***Large marine organisms (2008–2010) -*** Large individual marine organisms, such as marine mammals or fish species longer than 6 ft (1.8 m) in length, may be discarded. If a large marine organism is discarded, the species and the reason for discarding must be recorded and labeled as “discard” in the required logbook.
- ***Avoidable discards (added in 2006, removed in 2008)*** - Discards that resulted from malfunctioning net sensors and catching more than the vessel hold capacity were considered avoidable and must be minimized to the extent practicable. Vessels were encouraged to modify gear and fishing practices to limit occurrences of avoidable discards.
- ***Unavoidable discard (2004-2007)*** - Discard events that resulted from hazardous weather conditions, unusual codend condition (i.e., over full codend), school density, and net cleaning, must be minimized to the extent practicable. If unavoidable discarding occurred, the discard event must be clearly recorded in the vessel logbook, detailing total discard amount by species, location and reason for discarding.
- ***Unavoidable discards (2008-2010)*** - Same as above, plus: Immediately following an unavoidable discard event, the vessel must stop fishing and immediately return to port, with notification to NMFS, OLE being made prior to arrival in port.
- ***Operational discards (added in 2008)*** - Pacific whiting removed from the deck and fishing gear during cleaning may be discarded, provided that the total operational discards must not exceed one basket from any single haul, with the maximum dimensions of the basket being 24 inches by 16 inches by 16 inches. If net cleaning resulted in a greater amount, all catch in excess of the one basket must be placed into the fish hold. Discarding operational discards of more than one basket of Pacific whiting per haul is prohibited. Discarding any quantity of groundfish species other than Pacific whiting is prohibited.

3.2 EM Data Collection Success

It is useful to evaluate overall data collection success prior to examining monitoring results, as gaps and poor quality source data can potentially bias the results. As mentioned previously, the goal of the program for each year was to monitor 100% of all participating vessels for the entire time they were at sea. Data collection success is summarized in two tables (Table 3-2 and Table 3-3), for sensor and image data collection, respectively.

The total expected sensor data for most program years exceeded 20,000 hours (Table 3-2). Based on EM data, the annual totals for fishing time (time gear in the water) was over 5,000 hours for most years, while catch stowage time was usually greater than 1,500 hours per season. This equates to approximately 20% and 6%, respectively, of the total vessel time at sea (the balance of time spent in transit and searching).

The sensor data success rate (i.e., percentage of hours recorded versus the total fishery hours) exceeded 98% for all but one year. The sensor data collection success rate was lowest in 2006 at 94.6%, or 1,347 hours of missing sensor data from a total expected of 25,030 hours. The causes were primarily (57%) source power related (interruptions to power, UPS compatibility issues), with the balance mostly attributed to a removable hard drive seating problem (poor electrical connection). While UPS devices were present on many vessels, compatibility issues with generated AC electrical power resulted in them not being effective on certain vessels.

Sensor component performance was evaluated differently, as the percentage of fishing trips in which the specific sensor was fully functioning. The GPS receiver showed the highest performance level, ranging from 91% to 100% across program years. The winch sensor had the most variable performance level, ranging from 82% to 100%. The winch sensor was usually located on the fish deck and more easily fouled, making it more prone to failure than other sensors.

Table 3-2. Summary of EM sensor data collection performance across the 2004 to 2010 program years. Sensor performance includes both complete and incomplete trips.

	2004	2005	2006	2007	2008	2009	2010
Total Trips	1,019	1,105	1,113	902	609	478	728
Complete Trips (%)	98.4%	99.0%	88.5%	87.5%	91.6%	93.3%	93.3%
Incomplete Trips (%)	0.7%	1.0%	7.0%	11.6%	7.9%	6.7%	6.7%
Trips No Data (%)	0.9%	0.0%	4.5%	0.9%	0.5%	0.0%	0.0%
Sensor Performance (by % of total trips)							
GPS	98.0%	100.0%	91.0%	99.0%	99.0%	97.0%	98.0%
Hydraulics	81.0%	100.0%	89.0%	98.0%	96.0%	100.0%	98.0%
Winch	97.0%	100.0%	82.0%	87.0%	94.0%	98.0%	89.0%
Sensor Data Success (by % of total hours)							
Total Hrs Expected	19,755	23,576	25,030	24,578	17,900	11,665	30,193
Total Hrs Recorded	19,377	23,524	23,683	24,182	17,645	11,593	29,974
Fishing Time (hrs)	4,499	5,241	5,564	7,534	3,562	2,115	6,563
Catch Stowage (hrs)	1,547	1,591	1,953	1,858	1,319	1,146	1,838
Success Rate (%)	98.1%	99.8%	94.6%	98.4%	98.6%	99.4%	99.3%

The success rate of recorded image data, expressed as hours recorded versus hours expected, exceeded 95% for five of the seven program years (range 87.1% to 99.0%,Table 3-3). As with sensor data, image data recording success rates were lowest in 2006 at 87.1%, or 2,752 hours of missing data. The lower image recording success for 2006 was due to power loss (10%), drive seating failure (41%), 'post collection data loss' (12%) and technician error (15%). The V3.0 equipment was phased out in 2007, which resulted in marked improvements to sensor and image success rates in the latter years of the program. A single incident in 2008 represented over half the total annual data loss. With this removed, the rate was over 98%. Success rates (as hours recorded versus hours expected) were highest in the final two years of the program at 99.0% and 99.6%.

In terms of the proportion of the fishing trips with complete data, the values for 2008 to 2010 were 93% to 96%, while years prior were 83% to 91%. In terms of image quality, over 80% of the total trips were rated as either high or medium for five of the seven program years. The higher rate of medium quality image data in 2007 was likely associated with differences between EM reviewers in making quality assessments. Across all seven years of the program low quality image data made up 10% or less of the total trips.

Table 3-3. Summary of image data collection performance across the 2004 to 2010 program years.

	2004	2005	2006	2007	2008	2009	2010
Total Trips	1,019	1,105	1,113	902	609	478	728
Complete Trips (%)	87.9%	91.1%	82.6%	84.0%	92.9%	95.8%	94.8%
Incomplete Trips (%)	2.5%	1.1%	2.6%	7.2%	5.1%	4.2%	5.2%
Trips No Data (%)	9.6%	2.5%	10.6%	8.8%	2.0%	0.0%	0.0%
Post Collection Loss (%)	0.0%	5.2%	4.2%	0.0%	0.0%	0.0%	0.0%
Image Data Quality (by % of total trips)							
High	82.6%	87.7%	69.1%	44.6%	94.6%	87.4%	82.4%
Medium	7.8%	4.2%	14.1%	37.5%	2.5%	11.5%	8.1%
Low	0.0%	0.4%	2.0%	9.2%	0.3%	1.0%	2.7%
Not rated/No Data	10.0%	8.0%	15.0%	9.0%	2.0%	0.0%	0.0%
Image Data Success (by % of total hours)							
Total Hrs Expected	12,896	20,471	21,250	21,578	15,577	9,734	26,763
Total Hrs Recorded	12,347	19,967	18,498	19,463	15,026	9,633	26,643
Success Rate (%)	95.7%	97.5%	87.0%	90.2%	96.5%	99.0%	99.6%

EM sensor and image data gaps are further summarized in Table 3-4, showing missing data by both hours and events by program year. In the most common instance where the entire EM system was down, there were gaps in the sensor data record and, if image recording was activated, gaps in the image data set as well. Sensor data gap events were nearly twice as common as image data gaps, reflecting time breaks at the start of fishing trips where image recording had not yet been triggered. In some cases, as in 2009, there were more gaps in the image data set because the EM system was operating but image recording had failed to activate, as would occur with a faulty hydraulic sensor. The very high amount of image data loss in 2006 and 2007 related to post collection data loss, mentioned previously. The lowest levels of missing sensor and image data, in terms of both number of events and hours, were in 2009 and 2010. Data gaps were not a fleet-wide phenomenon, but concentrated to a portion of the fleet. For example, during 2008 to 2010 program years, about 60% of the fleet showed 100% sensor data capture success and the five vessels with the most sensor data loss accounted for over 80% of the total.

Table 3-4. Summary of sensor and image data gap events across 2004 to 2010 program years.

	2004	2005	2006	2007	2008	2009	2010
Total Events	1,762	2,013	2,197	1,968	1,248	940	1,843
Total Sensor Hours Recorded	19,377	23,524	23,683	24,182	17,645	11,593	29,974
Total Video Hours Recorded	12,347	19,967	18,498	19,463	15,026	9,633	26,643
Sensor Data Gaps							
Total Hours	386	52	1,347	396	231	72	219
Total Events	565	368	250	239	146	59	83
Image Data Gaps							
Total Hours	549	504	2,752	2,115	551	100	119
Total Events	N/A	N/A	243	113	89	37	71

Table 3-5 provides a risk-based view of missing image data from the 2008 to 2010 program years, in terms of hours, number of events and vessels involved. In 2008 and 2009, over three-quarters of the image data loss was from 'major system failure' events and these represented less than 14% of the total events and a small number of vessels (4 and 2, respectively). In 2010, about half the missing time was classified as critical, most of which (80%) was from two events by one vessel on a single trip. There were five events by four vessels, ranging in length from six minutes to six hours, and a further seven events by five vessels, ranging from 1 to 3 minutes in length. The latter events correspond to the reboot cycle time of the EM control center, caused by a brief power interruption or the error detection (watchdog) software. In our view, it is unlikely that unreported discarding could occur with these events.

Table 3-5. Summary of image data gaps for the 2008 to 2010 program years by hours, events and vessels involved. See text for risk category definitions.

	2008	2009	2010
Total Image Hours Recorded	15,026	9,633	26,643
Critical	60	17.9	58.5
Moderate	54.2	6.5	23.2
Minor	18.9	0	37.6
Major System Failure	418	75.6	0
Total Missing Hours	**550.8**	**100**	**119**
Total Number of Events	1,248	940	1,843
Critical	11	11	13
Moderate	36	22	21
Minor	30	0	37
Major System Failure	12	4	0
Total Events Missing	**89**	**37**	**71**
Number of Participating Vessels	36	33	35
Critical	4	5	7
Moderate	9	8	11
Minor	15	0	12
Major System Failure	4	2	0
Total Vessels With Data Gaps	**32**	**15**	**30**

3.3 Maximized Retention Compliance

The primary monitoring goal of the EM program was to monitor vessel compliance with the requirement to retain all catch aboard during the fishing trip. Recognizing that there are periodic needs for operational discards, the program goal was not only to detect discard events but also to characterize these in terms of estimated quantity and discard type. Finally, the program goal was to ensure that instances of discarding were properly recorded in the vessel logbooks. In the following sections, these issues are examined collectively for the fleet across program years, then in terms of individual vessel performance across program years.

Fleet-wide Performance

In terms of absolute quantities of fish, discards of fish declined markedly across the seven program years, starting at an estimated 1,400 mT in 2004 to under 180 mT in 2010 (Figure 3-2). The decline in discard quantity was most pronounced after 2007 when the EM program became more compliance focused. In 2009 there was a two-fold increase in discarding activity from the 2008 levels (288 mT versus 125 mT) and the percentage of sets with discards rose to 15%, as compared with 4% in 2008. This was mostly due to an increase in high volume discards (>4.5 mT) which accounted for 84% of the total discard volume in 2009. It should be noted that discarding accounted for a very low overall percentage of the total catch in all program years, declining over time from 1.7% to below 0.3%, the most marked decline occurring in 2008.

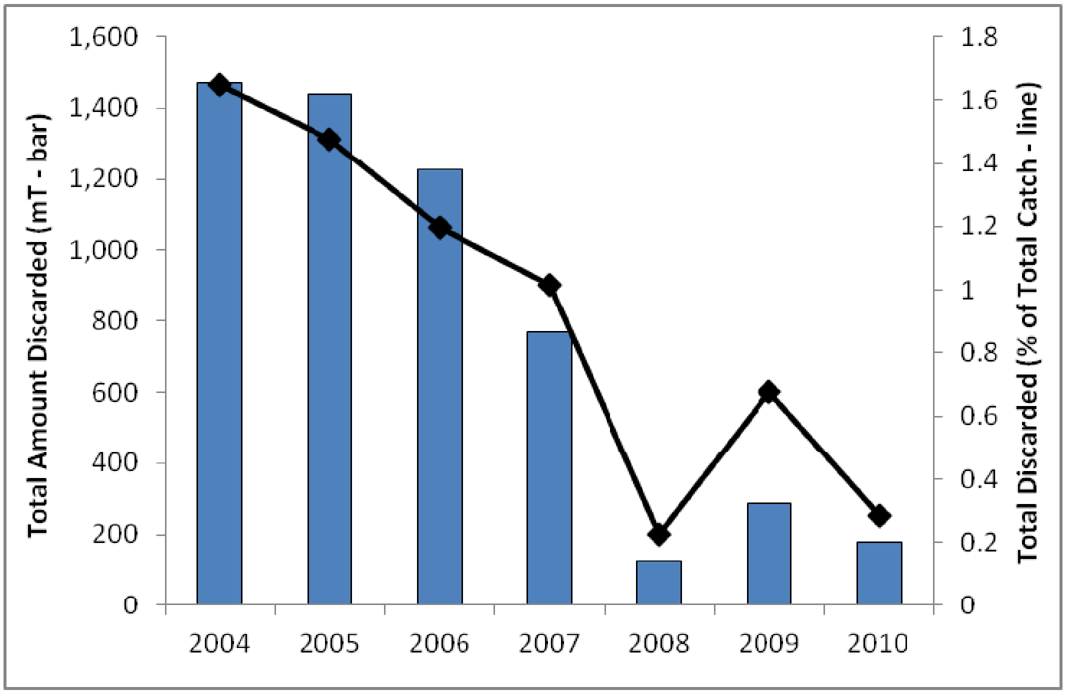

Figure 3-2. Summary by total amount (mT) discarded (primary y-axis) and the total amount discarded as a percent of the total catch (secondary y-axis) for the fishery by year across the entire duration of the program (2004-2010). *The total volume discarded for 2004 is only a general estimate following ranked quantities (see Section 2.2.2).

In a pattern similar to discard quantities, there was also a decline in the number of discard events: 250 to 350 events per annum between 2004 and 2007 versus 50-125 events per annum for 2008 to 2010 (Figure 3-3). In 2004 and 2005, discard events were almost exclusively on the last fishing event of the trip, indicative of the vessel being full to capacity and excess fish being discarded. Discarding during fishing events other than the last event of the trip became increasingly common in later years, indicative of unavoidable discard situations.

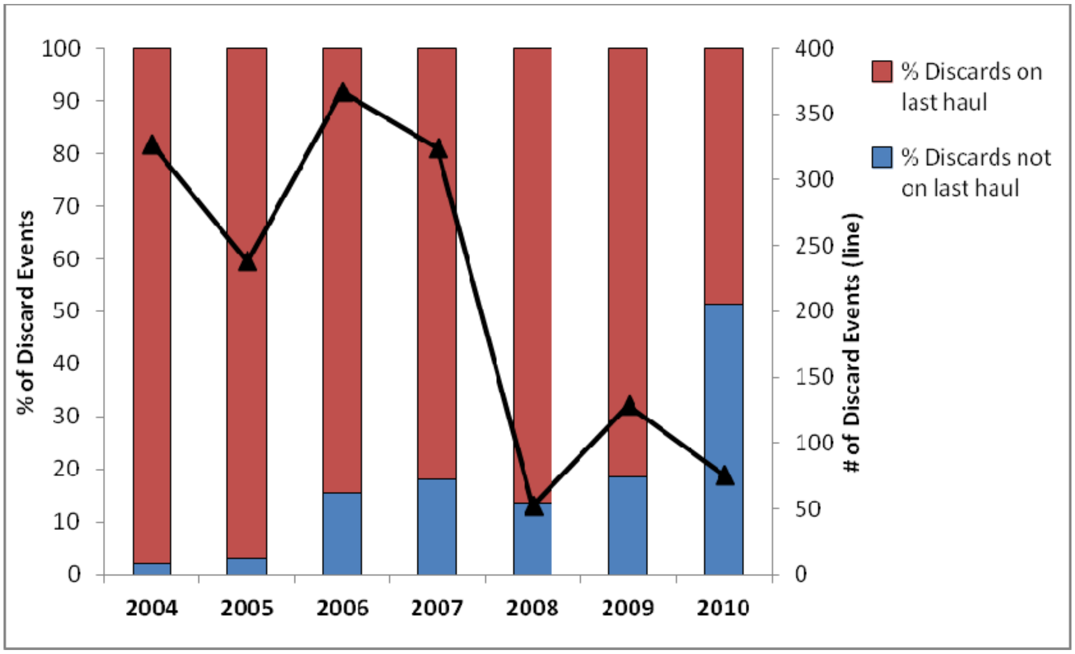

Figure 3-3. Summary of the percent of discard events (primary y-axis) not occurring on the last haul, and the total number of discard events (secondary y-axis) across the entire duration of the program (2004-2010).

In terms of the quantity of fish discarded per event, there was a marked change across program years (Figure 3-4). In 2005 and 2007, over a third of the total discard events were more than 4.5 mT, whereas these events were much less common after 2007. Discard events less than 0.45 mT varied by year in no obvious trend, however these events made up almost two thirds of the total discard events in 2010, much higher than any other year. The pattern is likely due to variability in viewers between years, more structured vessel catch accounting in later years (using a fish basket) and annual differences in whiting size, affecting amounts gilled in the net. Looking only at discard events greater than 0.45 mT, the decline in discard events across program years becomes much more marked, declining by nearly an order of magnitude between 2005 and 2010. One notable change in discarding activity in 2009 was the increase in discards greater than 4.5 mT. However, over 50% of the total discard volume in that year came from four vessels, indicating this was a localized issue.

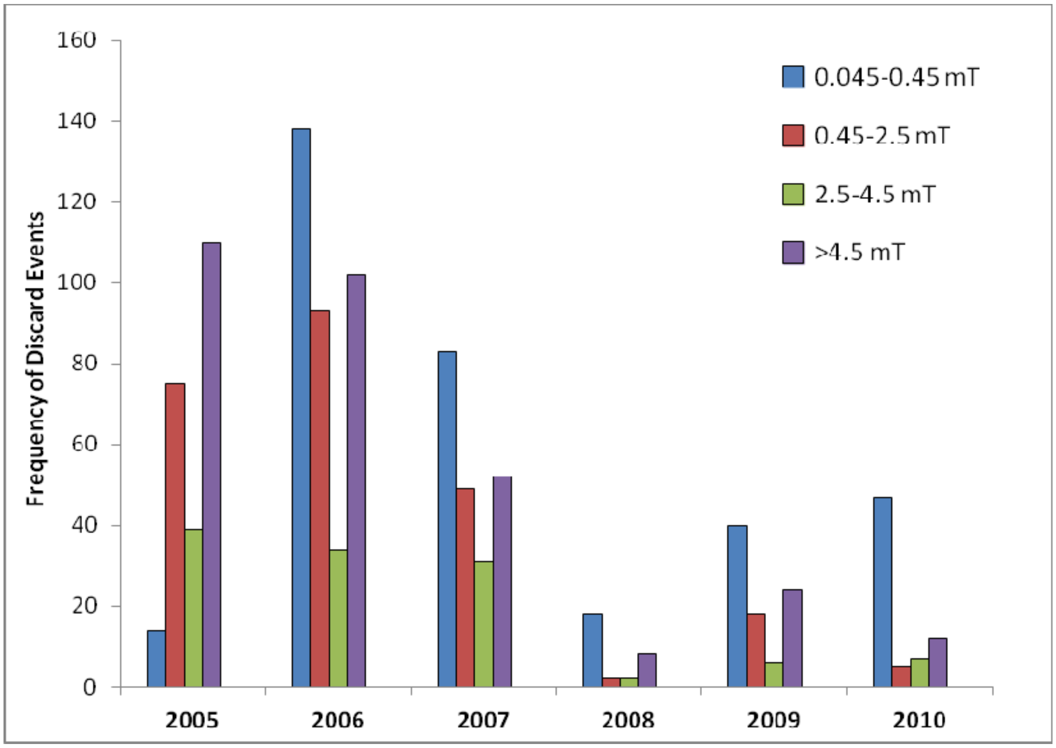

Figure 3-4. Frequency of the various size categories (mT) of discarding events for 2005 to 2010. * Data was not available for 2004, as discard amounts were not estimated for that year.

The frequency and type of discard events are shown by program year in Figure 3-5. Selective discarding consistently made up less than 1 % of the total discards from 2005-2010. Likewise, discards resulting from net cleaning made a small contribution to the total discard quantity. Net flushing, bleeding, and deck discards were the main discard methods, all three of which declined between 2005 and 2010. Deck discarding declined most markedly of the three (475 mT to 1.1 mT), followed by net flushing. Discard quantities from net bleeding were higher before 2008, as compared with after, and the proportion of discards from net bleeding increased from 10% to 60% as a consequence of declines in the other methods.

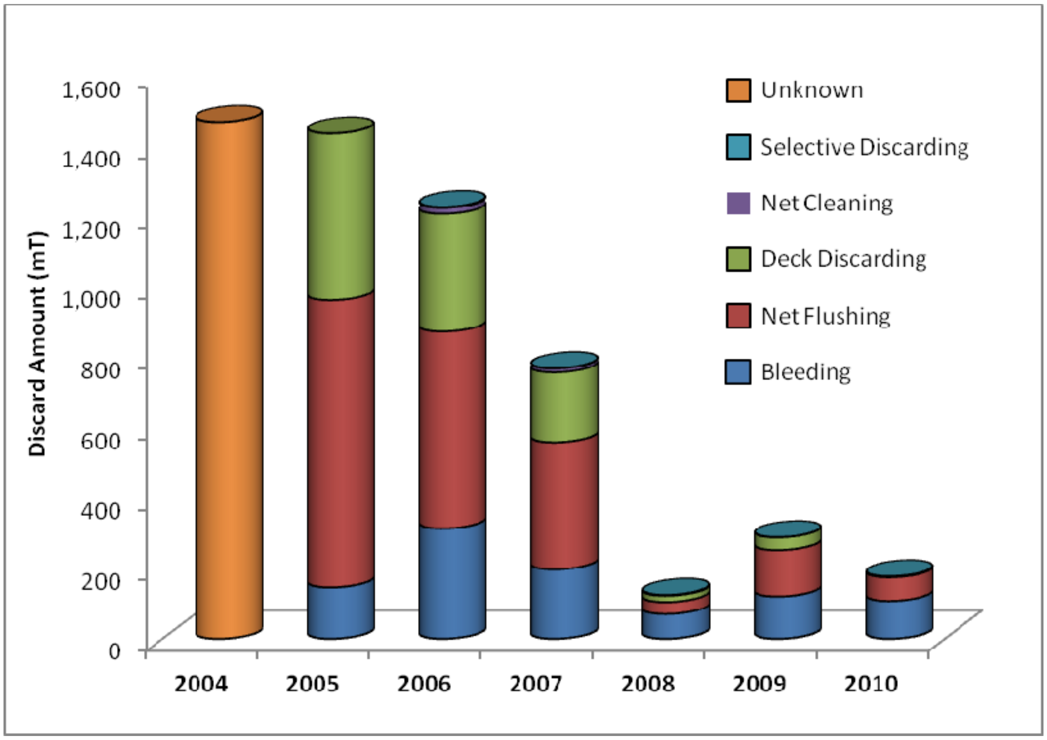

Figure 3-5. Summary of the total discard amount (mT) by discard type for the entire duration of the program (2004-2010). Data for 2004 were not available by discard type.

Vessel Specific Performance

Compliance with the maximized retention requirement by individual vessels was examined in a few different ways. Quantities discarded by individual vessels are shown in Figure 3-6 and Figure 3-7. Interestingly, across program years there was a marked decline in both the number of vessels discarding catch and in the proportion of catch discarded. In 2005, nearly all vessels discarded and most discarded 1.5% or more of their catch (Figure 3-6a). In 2010, a third of the fleet had no observed discards, and all but three vessels discarded less than 0.6% of their total catch (Figure 3-6f). Vessel reference numbers were unchanged between program years and vessels showed no consistent discard patterns. Vessels high in discards in one year were more often low in others. This is possibly the result of different skippers on the same vessel over time, but more likely the common challenge by all skippers of avoiding occasional instances of high catch. As was evident with the fleet-wide results, there was a marked difference in vessel discard patterns for the years prior to 2008 as compared to the three years from 2008 to 2010.

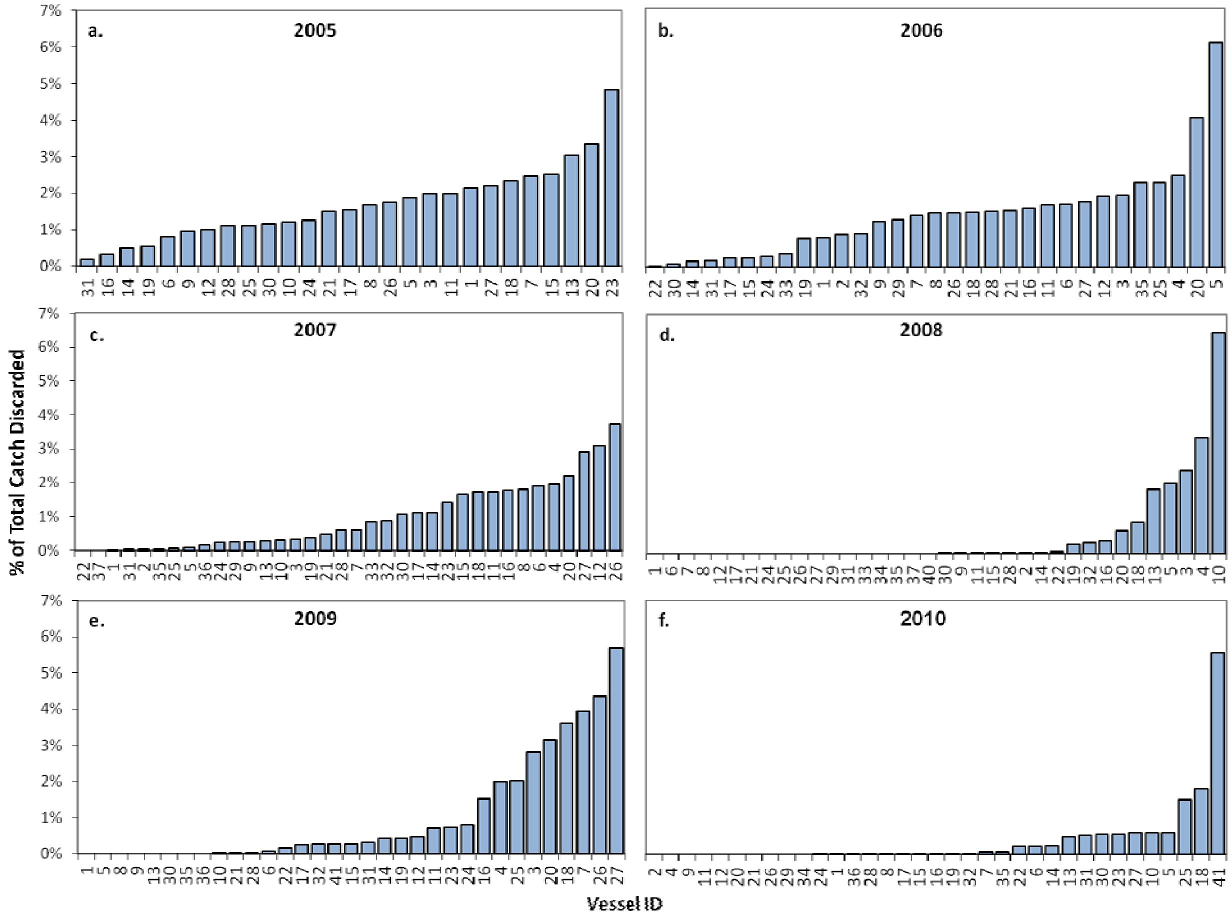

Figure 3-6. Quantities discarded as a percentage of total landed weight by vessel ID across six years of the program (2005-2010), with the vessels ordered (identified by ID numbers) from lowest to highest discard rates.

Table 3-7 examines the relationship between discard quantity (total for season and average for fishing events) and the level of vessel activity. The plots suggest that discard quantity was unrelated to the level of fishing activity for all program years. For example, in 2005 Vessel 8 that fished for ~ 60 trips discarded around the same percent of total catch (~2%) as Vessel 5 that fished for ~ 5 trips (Figure 3-7a). The plots also show that the average discard quantity per set (bubble size) did not vary with total catch or level of activity. As observed in Figure 3.6 there were no consistent vessel specific patterns; vessels showing high discard levels observed in one year were often lower in other years.

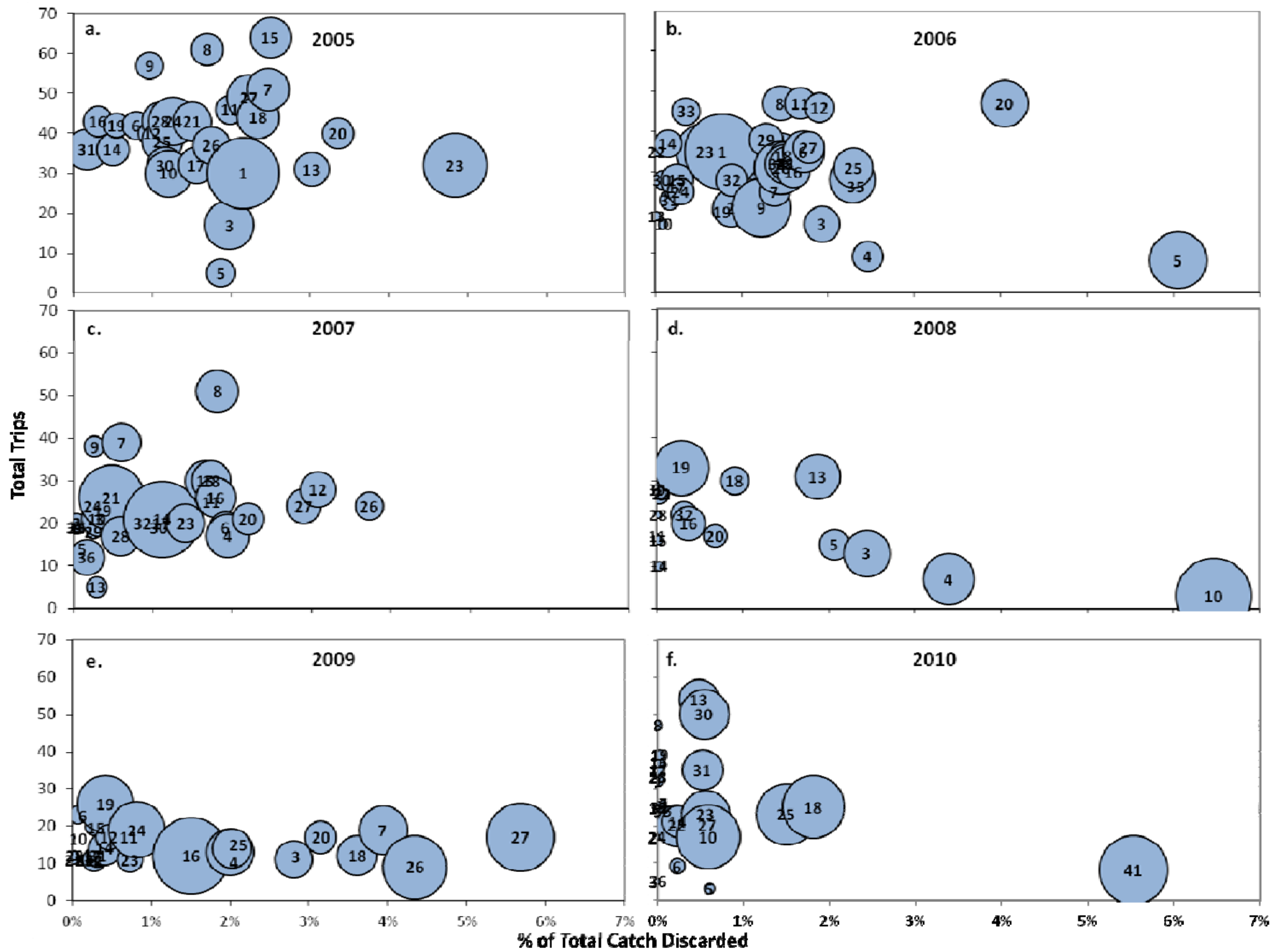

Figure 3-7. Vessel discard patterns expressed as the average discard quantity per set (bubble size) in relation to total quantity landed and the total number of trips by vessel across 2005 to 2010 program years. Reference numbers identify specific vessels.

Discard Estimation Accuracy

During the 2005 Miller Freeman research cruise, crewmembers weighed and sorted all catch, making it possible to directly compare estimates of volume as determined from EM imagery to actual weights from the Miller Freeman. Among the 65 hauls taken, most were either too small or too large, leaving 10 hauls where the quantity was suited to volumetric estimation on the sorting table (Table 3-6). On average, volumetric estimation by EM resulted in a 8.5% lower amount than the actual weight taken aboard the vessel. The average catch estimates did not differ significantly between EM and the Miller Freeman (paired one-way t-test P=0.238). However, variability on individual hauls was considerable (range 1.2% to 62.6%), with only 4 of 10 estimates within 5%. The largest difference was unrelated to the volume estimation but came from the EM viewer not detecting that the sorting table was filled twice instead of the usual practice of filling once. The comparison showed that the EM estimate made from these tests was not very precise, but unbiased in estimating the vessel catch volume across the full data set.

Table 3-6. Summary of EM weight estimates by volumetric method and Miller Freeman actual weight (kg). A negative difference indicated that the EM estimate was greater than the actual weight, and vice versa.

Haul #	EM Weight Estimate (kg)	Actual Weight (kg) (Miller Freeman)	Difference (kg)	Difference %
13	1,012	1,199	187	15.6%
14	1,012	972	-40	-4.1%
22	1,012	1,103	91	8.3%
23	1,380	1,183	-197	-16.7%
24	1,503	1,358	-145	-10.7%
25	767	737	-30	-4.1%
32	1,135	1,167	32	2.7%
47	1,012	623	-389	-62.4%
58	1,135	1,121	-14	-1.2%
63	1,258	1,115	-143	-12.8%
Total	**11,226**	**10,578**	**-648**	**-**
Average	**-**	**-**	**-65**	**-8.5%**

3.4 EM and Vessel Logbook Data Comparison

Starting in 2005, vessel log data were compared with the EM data for discarding activity (Table 3-7). The proportion of comparable events (i.e., where the data sets could be aligned) varied across the program years from 73% to 94%, showing a clear improvement over time. The data sets were considered in agreement if both EM and log data recorded a discard event (EM+Log+) or if neither recorded a discard event (EM-Log-). The level of agreement (% match) ranged from 86% to 96%, the majority (74% to 95%) of which were from fishing events that did not involve discarding. Cases where both EM and vessel logs recorded discards (EM+Log+) ranged between 1% and 15%, while the percentage of discard events that did not match (EM-Log+ or EM+Log-) varied between 1% and 8%. Discard events that were recorded in the vessel log and not by EM (EM-Log+) in 2006 and 2007 likely related to small volume discards (<450 kg) such as net cleaning that were more commonly reported in the vessel logs than by EM reviewers.

Table 3-7. Comparison of Vessel logbook (Log) and EM data (EM) sets across the 2005 to 2010 program years. The proportion of matched and unmatched sets is from comparable sets. See text for description of EM/Log detection categories.

Year	Total Sets	% Comparable Sets*	% Match	EM- Log-	EM+Log+	% Not Matched	EM-Log+	EM+Log-
2005	2,013	89%	96%	85%	11%	4%	3%	1%
2006	2,197	73%	89%	74%	15%	11%	7%	4%
2007	1,968	89%	86%	77%	9%	14%	8%	6%
2008	1,248	83%	96%	95%	1%	4%	2%	2%
2009	940	93%	89%	86%	3%	11%	3%	8%
2010	1,843	94%	95%	93%	2%	5%	2%	3%

**The percent of comparable sets are sets where either one or both of EM and vessel log record a discard event*

In order to further examine discard events missed by the EM viewer (EM-Log+), events logged by vessels with discards >0.45 mT were re-examined. For the 2010 data set, this resulted in five events where EM did not record a discard (EM-Log+) out of a total of 34 events with discards >0.45mT. In three instances, no discarding was observed but the reviewer noted image quality issues (sun glare, poor image, and poor lighting conditions). In one instance the image quality was very good and no discarding was evident, likely a vessel log recording error, while in another discarding was evident, indicating a viewer error.

The reverse situation where events missed by the vessel log were also re-examined (EM+Log-), taking events logged by EM viewer with discards >0.45 mT. This resulted in a total of eight events of 53 in the 2010 data set. In four instances, the vessel log notes that discarding occurred but no quantity was recorded. Among the remaining four events, three recorded catch but no discards and one recorded the event but no catch or discard quantity.

Table 3-8 provides a summary of regression tests between EM and vessel log estimates of discard events, according to different discard types. The data used for this comparison was drawn from 2005 to 2010 program years, from cases where discards were recorded by both EM and vessel logs. While the correlation was significant (Pearson's Correlation test, $p<0.05$) for all three discard types, the correlation coefficients were low ($R^2<0.43$) in all cases, indicating there is a high level of variability between the two data sources. Interestingly, the deck discard estimates showed the strongest correlation, yet the EM estimate was 33% below the vessel log estimate. Keeping in mind that both EM and vessel logs are estimates, the results do not attribute error to one source over the other.

Table 3-8. Summary statistics for comparisons between EM and vessel log discard estimates by type of discard. * Denotes a statistically significant Pearson Correlation value (P<0.05).

Discard Type	Sample Size (n)	EM Discards (mT)	Log Discards (mT)	% Difference (EM:Log)	R^2	Y-Int.	Slope	Pearson's Correlation
Deck Discards	270	531.2	797.1	-33.4%	0.43	1.15	0.92	0.657*
Bleeding	71	361.1	374.1	-3.4%	0.32	1.94	0.66	0.568*
Net Flushing	108	698.9	566.6	18.9%	0.35	1.11	0.64	0.593*
Total	**449**	**1,591.2**	**1,737.8**	**-8.4%**	**0.35**	**1.22**	**0.64**	**0.65**

3.5 EM Program Operational Considerations

In addition to the fishery specific program results, there was a progression in the operational aspects of the program, which affected the quality of data, operational efficiencies and program cost. The salient aspects of this program evolution are summarized in the following sections.

Industry Outreach

Results from the 2004 and 2005 questionnaire surveys to industry demonstrated support for the EM program and its effectiveness as a monitoring tool. Among the responses received (about half the fleet), there was consensus that EM was an effective monitoring tool (86% and 100% for the two years, respectively), the majority supported the use of EM (73% and 75%) and the majority did not experience technical difficulties with EM technology (80% and 75%). Interestingly, the majority of respondents also felt that EM did not cause changes to their fishing practices (73% and 58%), but it is suspected that this result would be very different during the period from 2008 to 2010.

Industry outreach was also useful in communicating program specific results. At the annual pre-season meeting, skippers received copies of prior year fleet performance graphs (Figure 3-6). The vessel names associated with reference numbers were confidential, except on an individual basis. Vessel owners or skippers were provided with the reference number of their vessel in order to determine their performance in relation to the rest of the fleet. This information served to create an understanding of general discard patterns in the fishery and helped fishery participants compare their vessel performance in relation to the rest of the fleet. The feedback focused discussion on problem areas and helped shape opinions of acceptable discard practices in the fishery. Starting in 2008, participating vessels received in-season reports showing EM analysis results including EM data collection success, compliance with maximized retention, vessel logbook recording practices, and comments regarding corrections needed. This feedback process was considered useful but not very timely, given the time delays in collecting EM data sets and completing data processing. Other feedback, showing vessel specific bycatch information was published on shore-based fishery website, hosted by the Oregon Department of Fish and Game. This information, while not part of the EM program, served to keep attention focussed on bycatch issues and compliance with full retention requirements.

Field Services

A consistent issue across the program years was the large mobilization and demobilization effort required to deploy EM systems. Timelines were short because access to the whole fleet was usually limited to a narrow time window at the start and end of the fishery. This component of field services required a large service staff, and was logistically complex and costly. In-season field service efforts were also challenging because the fleet activity was distributed across several ports and access to vessels was often limited to the brief time when they were in port to offload. With offloads scheduled to provide a steady supply of fish to plants, only a portion of the fleet was accessible at any point in time during a port service visits. There was no single best way to cover the fleet; technicians could either stay in a single port waiting for vessels to land, or travel from port to port, meeting vessels opportunistically. Vessels requiring technical support were usually given service priority and collection of hard drives was opportunistic, based on vessel accessibility. This resulted in a variable supply of hard drives for data analysis.

The seasonal nature of the fishery, the fact that no single location had sufficient activity to justify establishing dedicated port-based services, and the challenge to provide responsive field services with qualified technicians across a broad geographic area created ongoing logistical challenges across the seven program years. From 2004 to 2006, technicians were based in Newport, Oregon, which is more central to many of the active ports. This staffing effort satisfied in-season field service requirements but was insufficient at the start and end of the fishery when a larger number of technicians were needed. This Newport-based approach was abandoned in 2007 in recognition that gains in efficiency did not justify the expense and complexity of establishing a program-dedicated EM technician for the short fishery duration. Field services were then based from Archipelago's head office in Victoria, BC, where there was a larger pool of qualified EM technicians who could more easily be tasked to the fishery as required.

EM Data Processing

EM data processing followed the same general method but there were differences across program years. The most significant change came from the evolution of the EM technology, mentioned previously, that affected both operational efficiency and accuracy. The integrated data analysis software (used from 2008 to 2010) enabled technicians to easily work through EM data sets, distinguishing trips and sets, viewing multiple camera images simultaneously, and recording their observations into a database directly from the analysis software. These efficiencies significantly improved the data analysis processes.

Data processing efficiency is often expressed with analysis ratios, defined as the amount of time required to review imagery divided by actual time of the event. Analysis ratios from the 2010 project year (Table 3-9) showed an average ratio for catch stowage time of 0.249 (i.e., one hour of catch stowage operation takes 15 minutes to review). The analysis ratio for transit and fishing was much lower at 0.048, reflecting the higher speed that imagery can be reviewed when no fish handling activities are occurring. The higher rate for catch stowage operations related to the more careful examination required from different cameras to monitor for discard events. When discarding was evident, more time was needed to examine the event and data enter observations, hence the wide range in analysis ratios.

Sensor data processing time on average took 15 minutes per trip, and was not affected by the duration of the trip. In contrast image data review time was dependant on the duration of the trip, number of cameras, image quality, complexity of deck operations, and other factors. The data review time for a fishing trip varied considerably but in general, less than an hour was required to process an average trip of 41 hours in duration.

Table 3-9. Summary of analysis ratios (viewing time/actual elapsed time) for imagery review during catch stowage operations versus transit and fishing time for the 2010 project year.

	Catch Stowage (fish on deck)	Transit and Fishing (no fish on deck)
Total Events Reviewed (n)	128	73
Average	0.249	0.048
Min	0.001	0.013
Max	0.643	0.087

While improvements in analysis tools streamlined the data services components of the program, it was difficult to provide timely monitoring results throughout the seven program years. In 2005, there was approximately a five-week delay from initial data collection to finished results which, given bi-weekly hard drive collection, translated to a delay of as much as seven weeks from when an event occurred. In 2010 the delay averaged 3.5 weeks (range of 0.5 to 7.4 weeks) following collection, or about 5.5 weeks from when an event occurred. With usually less than 60 day fishery duration and 30 or more active vessels, there are significant challenges with the field and data services operational components if the goal were to produce EM monitoring results for in-season management.

Program Cost Analysis

The EM program was co-funded by industry and NMFS throughout the 2004 to 2010 period and, owing to a number of circumstances, the proportional contribution varied from year to year. A cost summary for the 2007 to 2010 program years is presented in Table 3-10, showing total program cost, the contribution by industry, and program cost in relation to catch and vessel days. The program costs represent the total fees paid to the contractor for the delivery of the EM program and represent the true total cost of an ongoing EM program. It should be noted however, that program start up costs are not included and these would vary considerably depending upon program design and the service delivery approach used. Table 3-10 shows that program costs varied from year to year, the fluctuation driven by season length, catch quantity, the number of participating vessels and the number of vessel days at sea. Season length was the most significant cost driver: 2008 and 2010 program years were over 140 days, while 2009 and 2007 were 24 and 40 days, respectively. The four year average program cost was $6.03 per mT, or $254 per sea day. The number of sea days per season is equivalent to the total number of calendar days that fishing vessels are at sea (i.e., partial days count as a full day), in line with how the term is generally defined by observer programs.

Table 3-10. Summary of total EM program costs for the 2007 to 2010 program years. See text for definition of sea days.

Year	Total Program Cost (000's)	% Industry Funded	Cost per mT	% Catch Value	Cost per Sea Day
2007	$346.3	64.0%	$4.58	2.9%	$239.0
2008	$434.8	76.0%	$7.87	3.6%	$339.0
2009	$228.4	66.0%	$5.37	4.1%	$258.0
2010	$412.2	79.0%	$6.61	4.1%	$208.0
4yr Average	**$355.4**	**72.0%**	**$6.03**	**3.6%**	**$254.0**

Figure 3-8 provides a breakout of program costs for 2009 and 2010, according to the program components defined in Section 2.2. The largest single cost factor (40-42%) was the service effort relating to installation, in-season servicing and post season removal of EM equipment for the fishery. In 2010, EM system provision cost was the second largest cost factor (36%), where as this was only 15% in 2009, owing to season length differences. As mentioned previously, most vessels leased EM systems as opposed to purchasing them. Had purchased systems been used, savings would occur with both EM system provision and mobilization and demobilisation costs, resulting in about a 15% program cost savings. Analysis and reporting was proportionately higher in 2009, as a significant portion of the fishery analysis and reporting effort was independent of season length.

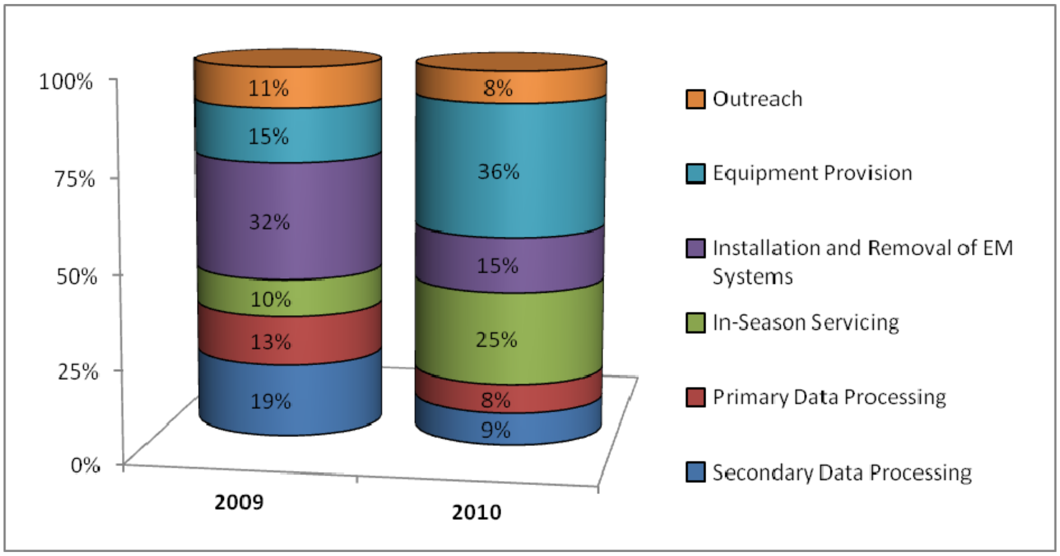

Figure 3-8. Distribution of 2009 and 2010 EM program costs by component.

4.0 Discussion

The purpose of this paper was to compile the results of the seven-year EM program in order to review the operation of the monitoring program and how it evolved over time. The paper was also intended to document the operational aspects to demonstrate that effective EM programs are a lot more than the underlying technology. As well, the intent of the paper was also to summarize what we learned, with the aim of evaluating the merits of the program and providing insights that would assist in other fisheries where EM is being considered. The following key questions are relevant for this purpose:

- Was EM effective?
- Was EM cost-effective?
- What were the ingredients to success?
- What are the lessons learned?

4.1 Was EM Effective?

One of the challenges when evaluating the role of EM in contributing to the change in fleet-wide discarding activity is the lack of other monitoring methods that can be directly compared to EM, or understanding the discarding practices occurring in the fishery when no monitoring was in place. As well, the EM program was just one of a few initiatives that increased the level of attention toward discarding practices and the relative role of EM would be difficult to isolate. Clearly, EM had a role in building a level of awareness and other factors such as stakeholder engagement, feedback, more stringent EFP regulations and OLE involvement all played a role in creating change in the fishery.

4.1.1 EM Data Collection Success

The effectiveness of EM as a fishery monitoring tool can be evaluated from both a fishery management and operational perspective. The seven-year program consistently demonstrated that it was possible to cover nearly all, of the fishery using EM technology, without any significant loss of fleet monitoring coverage. Over the seven-year program period, technology and program efficiencies improved to a level where over 99% of the fishery was monitored, creating confidence that results from the EM program were a true reflection of the fishery. The technology was well suited for this application and, for the most part, provided consistently high reliability. The sensor data success rate exceeded 98% for all but one year and the success rate for image data exceeded 95% for five of the seven program years. EM sensor data provided a very precise time and area footprint of the fishery.

Some data loss occurred in all program years which raises the question of the risk posed by missing key events in the fishery. While missing data is a component of any monitoring program, EM should probably be held to a different standard than observers because of the potential hidden bias with potentially purposeful data gaps. Put another way, fishery participants can alter the fishery results by 'accidentally' shutting the system off when undesirable events occur. In July 2007, an enforcement incident, reported by Matthews (Pers. Comm.), highlighted the potential harm of minor breaks in the data record. A large quantity of groundfish, consisting of whiting and widow rockfish (*Sebastes entomelas*), was reported washed ashore in Southern Washington. Using VMS data, OLE officials were able to narrow the potential suspects to a vessel whose skipper admitted to turning the EM system off in order to discard approximately 17 mT of fish, including about 3 mT of widow rockfish. The EM data record for this incident showed a data gap thereby preventing the discarding incident from being detected. In a fishery with limited bycatch allowances, a capture event such as this could put the fishery at risk and would therefore motivate participants to conceal the event. This potential area of resource risk became even more relevant with the 2011 implementation of the groundfish IFQ program, where bycatch was individualized to single quota holders or groups of quota holders.

The above incident prompted a change in EM data analysis methodology where greater attention was given to data record gaps. In 2008, changes to wording in the EFP, greater emphasis by OLE, and more detailed analysis of data gaps resulted in a sharp decline in missing data. In the 2008 to 2010 program years, success rates were greater than 99% and the vast majority of data gaps were attributed to moderate or low risk events (i.e., data gaps were not during fish stowage operations), where an event such as described above could not have taken place. In 2010, 13 data gap events occurred during fish stowage operations and eight were considered as potential candidates for unrecorded discarding. As there were over 1,800 fishing events in 2010, the EM program was effective at reducing the likelihood of such discard events to less than 0.5% of the total.

Despite these low levels of EM data loss, the question remains of the potential risk to sensitive species. In order to assess this risk, we examined landings data from the 2011-2013 whiting fishery (Colpo, Pers. Comm.) to construct a worst case scenario of the amount of unrecorded catch that would be associated with various levels of missing EM data. The 2011-2013 years correspond to a period of 100% catch accounting using 100% at-sea observers and 100% shore-based landings monitoring. We examined catch quantities of sensitive species from the landings data to identify the highest bycatch incidents and selected the year of highest bycatch for each sensitive species. We then estimated a 'worst case' catch quantity associated with EM data loss rates of 0.5% by summing 0.5% of the highest catch events from the highest of the three years for each sensitive species. This was repeated for EM data loss rates of 1% and 5% and the results are shown in Table 4-1. Other than widow rockfish, bycatch levels of most sensitive species is low, both in terms of the percentage of fishing when present (percent occurrence) and catch quantity. Taking the highest catch rates from the three years and using a 0.5% EM data loss rate, the worst case amount of missing catch would be less than 1% of the ACL for all species but widow rockfish and POP. The missing catch for these species would still be below 2% of the ACL with a 5% EM data loss. As compared with other species widow rockfish has a much higher occurrence rate and therefore, missing EM data is more critical for this species. As much as 5% of the ACL could be missed at a 0.5% EM data loss and 14% at a 5% EM data loss. POP, with much lower fishery occurrence pattern and lower ACL, would have as much as 3% of the ACL missing at a 0.5% EM data loss. This analysis was a 'worst case' assessment where missing catch data would result if only the highest bycatch events were excluded from the EM data record. Also, the species results are mutually exclusive; that is, selecting the worst case for one species would not likely result in the worst case catch rates for other species. In our view, these results suggest that, at the data loss rates experienced for most program years, the hidden bias from missing EM data is more likely to impact management of individual IFQ holdings than pose a risk to the resource caused by large amounts of unaccounted catch. However, these results underscore the need to ensure that EM data loss is monitored and actively managed in an EM program.

Table 4-1. Risk assessment of worst cast missing catch data for sensitive species associated with different levels of EM data loss based on 2011 to 2013 landings data (Colpo, Pers. Comm.).

Sensitive Species	2012 ACL (mt)	Highest Catch Year	Percent Occurrence (%)	Max Catch Event (mT)	0.5% Data Loss		1% Data Loss		5% Data Loss	
					Missed Catch (mT)	Percent of ACL	Missed Catch (mT)	Percent of ACL	Missed Catch (mT)	Percent of ACL
Widow	600	2012	75.0%	14.04	28.23	4.7%	39.19	6.5%	86.96	14.5%
Darkblotched	296	2012	28.5%	0.78	1.44	0.5%	1.95	0.7%	4.41	1.5%
POP	183	2012	25.8%	3.28	5.76	3.1%	7.71	4.2%	12.58	6.9%
Canary	107	2013	13.7%	0.12	0.34	0.3%	0.52	0.5%	1.754	1.6%
Bocaccio	274	2011	0.9%	0.03	0.03	0.0%	0.05	0.0%	0.1679	0.1%
Petrale	1,160	2013	0.1%	0.00	0.00	0.0%	0.00	0.0%	0.0009	0.0%
Pacific Halibut	-	2013	5.8%	0.07	0.28	-	0.45	-	1.5854	-
Chinook	-	2012	37.4%	0.77	1.93	-	2.93	-	7.173	-
Coho	-	2011	2.7%	0.09	0.16	-	0.21	-	0.4201	-
Pink	-	2011	7.1%	3.34	7.23	-	8.71	-	11.3871	-
Chum	-	2011	1.0%	0.03	0.03	-	0.05	-	0.2083	-
Sockeye	-	2011	0.1%	0.00	0.00	-	0.00	-	0.0032	-

4.1.2 Maximized Retention Compliance

Importantly, the EM program provided individualized results of vessel compliance with maximized retention. In 2005, nearly all vessels discarded and most discarded 1.5% or more of their catch. Over time, the discard levels declined with increasing numbers of vessels showing very low levels of discards. By 2010, a third of the fleet had no observed discards, and among those vessels with discards, all but three discarded less than 0.6% of their total catch. Vessel-specific discard information showed that the majority of the discarding activity was caused by a minority of the fleet, and that many vessels could successfully participate in the fishery with little or no discards. In our view, the data rich vessel-specific information system provided by the EM program was instrumental in helping drive this change in the fishery.

While not contributing directly to catch data, the EM program strengthened the veracity of the offload monitoring data collection system. Without at-sea monitoring, the landings data only report offloaded catch, leaving uncertainty for what was discarded at sea. The EM program provided estimates of discarded catch, and also corroborated information provided in vessel log data. Events of selective discarding were of particular concern, given the potential to bias overall species composition from landed catch. Very few selective discarding incidents were observed and the vast majority (>99%) were considered non-selective discarding events. These two categories were distinguishable more by crew behavior than by species recognition. Selective discarding could be damaged whiting, sharks or sensitive species and likewise, non-selective discarding could be mixed species or all whiting. Given the decline in large volume discard events and the shift to predominantly net bleeding and flushing methods over the seven year period, discarding seemed to be more related to an over-full or the vessel being full to capacity rather than discarding for species avoidance purposes. Hence, the level of at-sea discarding in this fishery (<0.03% in 2010) would likely contribute very little bias to the species composition obtained from landings data.

The results from the EM program identified the difficulties in quantifying discarded catch. The CCTV cameras provided an overall view of the fishing deck from various angles in order to monitor fish stowage operations and estimate discard quantities volumetrically. Using a similar set up on the R/V Miller Freeman, we observed no significant difference between weighed catch and estimates from EM imagery. However, these results must be interpreted with caution given the very small sample size (n=10 hauls) and different quantities between the fishery (.045 mT to >15.0 mT) and research vessel (~1 mT). As well, the discard accuracy study was conducted in the second year of the program and would not be representative of the seven-year program, particularly as technology and methods improved.

4.1.3 EM and Vessel Logbook Data Comparison

The comparisons of estimated discards by EM and vessel logs showed significant correlation across three discard types (deck discards, net flushing and bleeding), yet there was a high level of variability between the two data sets (R^2 <0.4). As both are estimates, it was not possible to attribute the error to vessel logs or EM estimation method but it is reasonable to conclude that density volume estimates from EM imagery were imprecise. Quantification of net bleeding events (no catch comes aboard) is difficult for EM reviewers, but also for observers and skippers. Without bringing fish aboard, it would be difficult to improve on estimates of fish discarded by net bleeding. The majority of catch was discarded in this manner in 2010. Discard events from the fishing deck were more easily estimated from referencing dimensions of deck features (e.g., checkers, trawl alley, etc.), yet this was still an imprecise process for skippers, observers and EM reviewers without more careful controls. Estimates of discard quantities could be improved with the use of more structured on board catch handling methods to facilitate more accurate volume estimation. This would entail placing fish intended to be discarded in containers such as baskets, totes or designated checker areas, the size being appropriate to the quantity desired. Other approaches including weigh scales, stereoscopic volume estimation (Ruff et al. 1995), and piece to weight conversion (Pria et al. 2012) should be considered in respect to cost benefit. Given the discard quantities declined to below 0.3% of total catch in this fishery (the majority by net bleeding), it is questionable whether more sophisticated catch quantification techniques would be justified. The importance of more precision is probably less important than ensuring that the species composition of discarded is unbiased.

One of the limitations of the EM system was with providing suitable imagery to identify individual species. The camera technology used in this program was analog, providing lower resolution (smaller file size) images that provide little detail when enlarged from the full deck perspective. Generally, fish that were distinctively different from whiting (i.e., different size, shape or color) could be distinguished but often could not be specifically identified. Close up cameras were not used in this study as was done by Bonney and McGauley (2008), which would have enabled species identification at a discard control point. This does limit the ability to use EM data for species specific enforcement and to collect biological data at the species level (i.e., species distribution information). However, species identification was not one of the monitoring objectives, instead, monitoring efforts were primarily directed at monitoring crew activities during catch stowage operations. Incidents of selective discarding could easily be detected, but were rarely observed. Generally, activities were non-selective with quantities of fish being transferred *en masse* from the net to the hold. More problematic were incidents where catch was discarded directly from the net to the water either as a bleeding event, or net flushing event. We examined such cases carefully, reasoning that such events occurring when the vessel was not full to capacity were considered suspect for having a higher bycatch composition than those of the last fishing event on a trip where the vessel was full to capacity. The EFP regulation in 2008 requiring vessels to end their trip and come to port if discarding occurred was intended to address this potential risk.

Program improvements to enable species identification would be beneficial. Recent technology provides much higher resolution digital imagery and much larger data storage devices, enabling much higher image quality than was previously possible. This would allow much greater image resolution during catch stowage operations. Designated discard control points and measures to control the rate of fish flow would still be necessary to distinguish among discards of predominantly whiting. The best application for EM for this high volume fishery would be to verify maximized retention, and if limited discarding were permissible (e.g., halibut, large sharks, etc), they be released singly through a discard chute.

4.1.4 EM Program Operational Considerations

An ongoing challenge for the EM program related to the timeliness of data reporting. These processes were improved over the program years, but with a fleet size of ~35 vessels, seasonally intense fishing effort, sporadic access to vessels for data collection, and a short season, it was very difficult to provide data reports within 4-5 weeks of the fishery activity. We recognized that timelier reporting of EM data would result in better overall program coordination, improved compliance, and greater responsiveness, yet this was countered by managing program costs and logistics. More timely collection of hard drives is possible but the analysis bottleneck still presents a challenge given the high but seasonal data volume. Options for timely data collection and reporting could be explored to determine if the additional cost and complexity could be justified.

In terms of meeting the fisheries management objectives of the EM program, there are a number of aspects to consider. The EM program contributed to the improvement of the fishery in several ways. The EM program addressed a critical need to measure compliance with full retention; the estimates of discard event frequency and quantity improved over time and showed significant declines. The EM program reported discard events by type and apparent reason, providing a better understanding of situations where discards occur. Program results showed the estimated quantity of discards declined by nearly an order of magnitude and there was a shift away from 'top off' discarding to less frequent, apparently unavoidable overfull net circumstances when a portion of catch needs to be discarded prior to bringing the codend aboard.

4.2 Was EM Cost-Effective?

4.2.1 EM Program Costs

An evaluation of EM cost effectiveness must take into consideration the value for expenditure in relation to other available alternatives, which in this case is an observer program. Based on the results of this study, we have a clear understanding of the total cost of an EM program. Financial information presented for the 2007 to 2010 program years showed the average EM program costs to be about $6.00 per mT or 3.6% of the landed value of the catch. These figures reflect the total cost of the monitoring program, including program planning, field data collection and all the steps required to produce a finished data set. The costs are also reflective of a mature program where startup costs such as data base development, program design, and infrastructure development have already taken place. As mentioned previously, the lease choice over the purchase of EM caused by the lack of program tenure resulted in program costs being elevated by as much as 20%. Including this, costs of an EM program could have been below $5 per mT, or less than 3% of the catch value.

4.2.2 EM vs. Observer Program Costs

It is very difficult to develop a like-for-like comparison with an observer program for cost comparison purposes. The sea day rate used in the 2011 groundfish IFQ observer program was $365, however the rate was not reflective of the true cost of observer deployments but derived by examining the average costs across several US observer programs (Colpo, Pers. Comm.). Furthermore, the sea day rate only includes the field portion of an observer program, not the overhead elements such as observer training, deployment management, briefing/debriefing, and data processing and reporting. We know from experience delivering the at sea observer program for the BC groundfish trawl fishery from 1995 to 2014 that overhead costs can easily contribute 30% or more of the total program cost. While this component can vary widely from one program and another, there is no reason to believe it to be less for the groundfish IFQ observer program. While the EM cost per sea day was about 30% less than the $365 rate, taking these other factors into consideration, we believe the cost of an EM program to be less than half the cost of an observer program.

In the case of the whiting fishery, it is reasonable to conclude that the cost of an EM program would be much less than an observer program, but was it more cost effective? The data available from an observer program is potentially much more comprehensive and likely more timely than that of an EM program, but is this level of detail necessary? Unlike an observer program, the EM program reduces the overall monitoring opportunity to a single purpose: monitoring compliance with full retention. Results from the seven-year program suggest that EM was very effective at monitoring full retention compliance and contributed to a significant decline in the level of discarding. Yet discarding still occurs in the fishery and EM will likely never capture 100% of all discard events. The data granularity provided by observers for these limited discard events is likely to be richer than what EM can provide and the choice of monitoring method comes down to a decision of whether the additional cost of an observer program is justified for the additional data collection opportunity. In our view, EM had a significant role reducing discarding to a level where the lower precision of the EM-based estimate becomes unimportant.

4.2.3 Future EM Program Cost

The issue of program cost effectiveness must also be considered in the context of other pertinent issues. We drew a comparison between the estimated total costs between EM and observer programs, yet there is no indication that the observer program overhead costs, currently funded by NMFS, would transfer to industry. As well, the EM program was co-funded by NMFS and industry and it is not known if future EM programs would also be partially funded by NMFS. Hence, the cost comparison between EM and observers from an industry perspective would center on the portions of the program they would fund, rather than the total program cost.

Also factoring into future cost consideration with EM is the issue of the service delivery model. Service delivery refers to how the EM monitoring services within a program are organized and delivered, including options such as segregated roles for field and data services as well as single versus multiple service providers. The 2004-2010 EM programs were delivered as a single integrated program with all participants using the same technology and all service functions being carried out by a single service provider. Changes to the service delivery model will affect program efficiencies and resulting costs. The EM program costs shown for the 2007 to 2010 program period reflected a mature program, three years after implementation. A new program can expect to have implementation inefficiencies with higher costs during the start up years. With both EM and observer methods, there are ancillary issues that affect the total cost. For example, observer program costs also need to consider insurance, food, and logistical considerations associated with carrying an additional person aboard. EM programs need to consider additional power and other needs to host EM equipment, additional duty of care responsibilities, and changes to fish stowage operations if special catch handling methods are required.

One of the key factors that affected the overall equipment costs was that the majority of the fleet leased EM systems instead of purchasing. This decision resulted in increased mobilization and demobilization costs as the leased EM systems required installation and removal after each fishing season (and in some cases within the season during extended periods of non-fishing). It is important to consider how infrastructure costs would change under a long-term purchase amortization schedule in an operational program. Vessels are more likely to purchase EM systems in a long-term operational program, which leads to decreased servicing and equipment costs. In addition, as long-term programs mature, the local infrastructure develops to support the day-to-day program management needs, and subsequently further reduces the overall program costs. In long-term programs, it is also important to factor in the costs associated with replacing EM systems and parts over longer periods of time.

In conclusion, the results from this program showed that EM was lower in cost than an observer program, and given that monitoring reduced the incidence of discarding to a low level, EM was a more cost-effective method for this fishery. Future considerations of cost-effectiveness by EM will need to also consider the service delivery framework, the timeline to achieve results, and the ancillary impacts of the EM approach.

4.3 What Were the Ingredients to Success?

The 2004 to 2010 shore-side whiting EM program was essentially a fully implemented operational EM program. As opposed to the more than 30 EM pilot studies conducted on various US fisheries over the past decade the program was an integral part of the management of the fishery. The program was in place to ensure compliance with full retention and to provide comprehensive information for better understanding of the fishery. Other than the seven-year program tenure as compared with the short duration pilot studies, there were many features of the program design that ensured its success.

4.3.1 EM Technology Evolution

Firstly, the technology itself was appropriately suited to the working environment and the monitoring objectives of the fishery. As mentioned, the EM technology became more effective and reliable over the program period, yet was consistently able to provide the level of data collection required to address monitoring issues in the fishery. There were no significant technology issues that compromised the monitoring objectives. Moreover, fishery participants were satisfied with the technology and felt that it was effective in achieving its purpose. Their confidence made it easier for the program to achieve industry acceptance. As shown by the questionnaire results, industry participants did not necessarily want EM-based monitoring but they felt it was effective.

4.3.2 Management Regime

Secondly, the EM program was a mandatory requirement for participation in the fishery. This requirement was enforced through the EFP and vessel operators risked expulsion from the fishery, future access, or fines if they failed to comply with the EFP. As a result, industry participants were directly compelled to cooperate, as compared to the voluntary nature of most pilot programs. Furthermore, the annual term of the EFP provided flexibility in wording, such that the program requirements could evolve. This resulted in improvements to the EM program over time, becoming more directly focused on the information needs in the fishery. From 2008 onward, the level of involvement by OLE and State Fisheries Officers increased, and staff received more training on the use of the EM system and became more directly involved in potential compliance events. The increased enforcement involvement in the program resulted in the most dramatic declines in discarding over the seven-year period.

As mentioned, the EFP provided annual flexibility and allowed for modifications to enforcement as the program evolved, which was integral to the success of the EM program. However, the EFP was not the only element of the program that evolved over the years. Improvements to the EM technology led to very high data collection success rates and consistent discard monitoring over the program years that was independent of the EFP. The increased flexibility was a very important aspect of the EFP which allowed for the evolution and success of the EM program. However, for fisheries that are not managed under an EFP, the key aspect of flexibility can be achieved by implementing a long-term EM program using a scaled approach. This can be achieved by starting the EM program on a small number of vessels in order to identify the primary monitoring objectives and the appropriate EM system configurations and data analysis procedures.

Once the program elements have been identified during the field trials then it can then be scaled up to a full operational program. Alternatively, EM operational programs can be implemented right away however the fishery will likely go through an initial learning curve that will require some modifications to EM system configurations and data analysis procedures.

4.3.3 Industry Outreach

Also important to the success was the level of information sharing established between agency, industry and the service provider. Information from the monitoring program provided for dialog on a variety of issues. Incorporation of vessel log data into the EM program was adopted early, recognizing that this information expedited EM data analysis as well as providing a way to audit vessel logs and potentially further streamline the monitoring process. Feedback to skippers on comparisons between EM and vessel log data resulted in improvements to data quality. In our view, vessel log data, corroborated by EM, could provide the most cost-effective, data rich information system for this fishery, as opposed to 'mining' the EM data set for the same information. Outreach processes also a high level of operational communication among the groups, providing responsive service for technical issues, providing feedback on monitoring information, leading to corrective action, and, to the extent possible by analysis timelines, directing OLE officials to potential problem areas in the fishery.

4.4 What Were the Lessons Learned?

With the aim of providing advice to those considering the use of EM in other fisheries, the following are a number of salient lessons with broad applicability:

- EM based monitoring should not be considered a "plug-and-play" alternative to observer programs as each has their own opportunities and challenges.
- The utility of EM for collecting fisheries data relies on a careful design process that integrates the EM technology, the vessel specifications, and specific on board catch handling and EM system duty of care requirements.
- EM programs are much more than the underlying technology. The majority of cost is with the service components and thus, a structured program design approach is needed.
- Successful use of EM often depends upon integration with other data collection processes and information sources. Data integration opportunities should be considered in the design process.
- Stakeholder engagement is an essential ingredient to EM program success. This should occur at a variety of levels in order to improve the program, optimize operations, and effect change.

- A key risk to EM is the hidden bias that can result from strategic intentional data loss (i.e., turning the system off to avoid recording). While some data loss is to be expected in any monitoring program, effective measures are needed to control, monitor and manage the level of missing data.
- EM technology will change over time and the program design needs to be flexible to include change, where appropriate.
- Effective EM programs require control measures through governance, regulations, incentives or disincentives. Instruments such as an EFP are particularly effective as they can be easily modified during the early stages of program implementation.
- EM programs take time to implement and a multi-year time horizon is needed to establish operations and infrastructure, and offset start up costs. Uncertainty of program tenure will slow the process and reduce cost efficiencies that can be achieved with EM approaches.

4.5 Conclusions

In our view, the EM program was successful for the shore-based whiting fishery. Comparing discard patterns in 2004 with those in 2010, they appear as though there were two different fisheries. EM contributed to change the fishery by providing vessel specific information on discarding practices, and showing that many vessels could successfully participate in the fishery with little or no discards. The cost of the EM program was lower than an observer alternative and in consideration of the monitoring objectives, EM is considered to be the most cost effective approach for this fishery.

In consideration of the applicability for other fisheries, it is important to recognize that EM based monitoring is more than the capabilities of the technology. A holistic perspective is needed, linking the fishery characteristics and monitoring needs with technology capabilities, monitoring options, regulatory framework, incentive systems, and program operational requirements (i.e., field service infrastructure, data analysis specifications, and other program components) to ensure the program is efficient, effective, cost effective, and integrated with management needs. Often overlooked is the importance of incentive systems to appropriately distribute responsibility toward the monitoring program within industry participants. This is reinforced through individualized vessel-specific performance reporting, feedback and engagement with industry. As well, missing data in an EM program requires active management to minimize hidden bias in the program results. Finally, timelines are important for success of an EM program as, compared to an observer program, it will take longer to achieve performance objectives and cost efficiencies as a result of the increased complexity of this type of fishery monitoring.

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OMNIBUS REGULATION CHANGES PART 1

Under this agenda item, the Council is slated to

- make a final recommendation on continuation of the trawl rationalization adaptive management program (AMP) pass-through,
- address any other issues identified by National Marine Fisheries Service (NMFS) with respect to development of rules to implement the Council's past recommendations on trawl trailing actions, and
- begin to develop a list of potential new groundfish management measures to be considered outside the biennial process, including trawl rationalization trailing actions and limited entry fixed gear-related actions.

Adaptive Management Program

At this meeting, the Council is scheduled to finalize a recommendation on continuation of the AMP pass-through. Ten percent of the annual distributions of the quota pounds (QP) issued for nonwhiting quota shares (QS) and halibut individual bycatch quota (IBQ) are reserved for the AMP. Currently the QP issued for the AMP QS/IBQ are distributed annually to QS/IBQ holders, in proportion to their QS/IBQ holdings, i.e. "passed through" based on QS/IBQ percentages. This "pass-through" has been in place as a temporary measure because the Council has yet to develop alternative criteria for their distribution (criteria that would address the objectives for the AMP program (see Agenda Item F.3.a, Attachment 1). The "pass-through" regulations are scheduled to sunset prior to the distribution for the 2015 fishing year and some Council action is required to provide direction on how the QP will be distributed for 2015. At its March 2014 meeting, the Council adopted the following alternatives for consideration:

- No Action Alternative: Beginning in 2015, the QP associated with the QS set-aside for AMP purposes will be distributed in accordance with procedures developed under the AMP provisions adopted under Amendment 20.
- Action Alternative 1: The AMP QP allocation procedures will be considered as part of the five-year review and the pass-through procedure used since 2011 will be continued
  - Suboption A: through 2017.
  - Suboption B: until the implementation of regulations resulting from the five-year review.
- Action Alternative 2. The pass-through procedures used since 2011 will be continued until procedures are developed as specified in the AMP provisions of Amendment 20.

If no action is taken, since other procedures have not been developed and the pass-through would sunset, the AMP QP would go undistributed. In these alternatives, all references to QS include halibut IBQ QS and all references to QP include the related halibut IBQ QP. A discussion of these alternatives is provided in Agenda Item F.3.a, Attachment 1.

New Rule Clarifications for Trawl Trailing Actions

At this time there are a number of issues on which the Council has taken action for which implementation is in progress. For two of these, the chafing gear rule and the observer/catch monitoring rule, proposed rules have been published and the comment periods completed, but the final rules had not been published as of the briefing book deadline. For two others, fixed gear trawl permit stacking (joint registration) and shorebased whiting season date changes, the proposed rules have yet to publish. This agenda item provides the Council an opportunity to respond to implementation questions which NMFS might identify, if any.

New Groundfish Management Measures

In March 2013, the Council adopted a process whereby only adjustments to routine management measures[1] would be considered during the process to establish biennial harvest specifications and management measures (see http://tinyurl.com/nh9soch, Motion 11, Item 4). New management measures[2] would be considered outside of the biennial process, and specifically, a call for new management measure proposals would be conducted at the June Council meeting in even-numbered years (e.g., 2014). At that June meeting, the Council would adopt a draft calendar and a prioritized list of new management measures to be analyzed outside of the harvest specifications and management measures process. The recommendation for narrowing the types of management measures considered during the biennial process, along with the development of default harvest control rules under Amendment 24 and the long-term impact analysis, was intended to reduce workload during the biennial process and increase the probability that harvest specifications would be implemented January 1. Also, at the March 2014 meeting, the Council aggregated consideration and prioritization of trawl trailing actions, delayed from last September to this June's Council meeting, to allow for a more holistic evaluation of groundfish priorities and workload.

In April 2014, the Council decided to postpone the adoption of a draft calendar and a prioritized list of new management measures to be analyzed outside of the harvest specifications and management measures process until the September 2014 Council meeting, given the anticipated workload and Council floor time necessary to accomplish the biennial specifications agenda items. However, the Council wanted to establish a list of candidate new management measures at the June Council meeting. To meet this objective, an initial unprioritized list of potential management measure topics, ordered by category and sector, has been provided in Agenda Item F.3.a, Attachment 2, derived from previous Council discussions. In order to assist in comprehensive workload planning, this attachment also includes a list of other groundfish-related matters with workload implications for Council, state, and Federal staff. Under Agenda Item F.3, the Council is scheduled to establish a tentative list of topics and, under Agenda Item F.9, the Council is scheduled to add to the list any additional candidates that may have arisen during the week.

Over the summer, staff will develop some preliminary background material on each issue of interest to the Council. In order to optimize the information available for the September prioritization, the Council may wish to identify those issues which should receive the most focus

[1] Routine management measures are defined in regulation and a range of alternatives have been previously analyzed.
[2] New management measures are those for which the environmental impacts have not been previously analyzed and/or have not been previously implemented in regulations.

between the June and September Council meetings under Agenda Item F.9, such as identifing three levels of background detail expected for the September Council meeting (e.g., high, medium, or low). Staff will distribute their available time among the topics based on these rankings. Since the Council removed prioritization from the June Council meeting task, the level of detail requested by the Council in June should not necessarily reflect the priorities assigned at the September Council meeting.

In September, the Council is scheduled to prioritize the list it develops at this meeting, determine the groups in which issues will be packaged for moving through the Council process, and identify a calendar for those packages. At that time, it is expected that a workload analysis of West Coast Region staff capabilities will be available for alignment with Council staff and Advisory Bodies, workload capabilities. For actions to be implemented by the start of 2016, alternatives for analysis will have to be finalized at the November Council meeting and final action taken by April 2015. Some of the criteria the Council may want to have in mind are provided as Agenda Item F.3.a, Attachment 3, which includes the Groundfish Strategic Plan executive summary, groundfish Fishery Management Plan goals and objectives, and a list of National Standards.

Council Task:

1. **Adopt final preferred alternative for Adaptive Management Pass-through.**
2. **Consider new rule clarifications, if any.**
3. **Identify initial list of candidate new management measures for further consideration under Agenda Item F.9.**

Reference Materials:

1. Agenda Item F.3.a, Attachment 1: Trawl Rationalization Issue: Adaptive Management Program QP Pass-Through, Council Decision Document.
2. Agenda Item F.3.a, Attachment 2: Initial Compilation of Possible Groundfish Management Measures for Council Consideration.
3. Agenda Item F.3.a, Attachment 3: Considerations for Prioritizing the List of Groundfish Management Measures.
4. Agenda Item F.3.c, Public Comment.

Agenda Order:

a. Agenda Item Overview — Jim Seger and Kelly Ames
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Adopt Final Preferred Alternative for Adaptive Management Program Pass-Through; Consider New Rule Clarifications, if Any; and Identify Initial List of Candidate Management Measures Including Trawl Catch Share Trailing Actions and Off-cycle Groundfish Management Measures, for Further Consideration Under Agenda Item F.9

PFMC
05/30/14

Agenda Item F.3.a
Attachment 1
June 2014

TRAWL RATIONALIZATION

ISSUE: ADAPTIVE MANAGEMENT PROGRAM QP PASS-THROUGH

Council Decision Document

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Table of Contents

CHAPTER 1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

This document provides background information and analyses for

> a provision that would extend the current method for annual distribution of quota pounds (QP)—a pass-through to quota share (QS) holders in proportion to their QS holdings—issued for the QS set aside for the Adaptive Management Program (AMP)—10% of the nonwhiting QS.[1]

The AMP was adopted by the Council as part of its trawl rationalization program, Amendment 20 to the Pacific Coast Groundfish Fishery Management Plan (FMP). The proposed actions would require an amendment to the regulations implementing the groundfish FMP. If the regulatory amendments are implemented, the description of the trawl rationalization program contained in Appendix E to the groundfish FMP would automatically be revised to reflect the regulatory modification. The proposed action must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore.

1.2 Description of the Proposed Action

The proposed action is to amend the regulations implementing the groundfish FMP to change provisions related to the distribution of QP issued for the QS set aside for the AMP.

1.3 Purpose and Need for the Proposed Action

Under the Amendment 20 trawl rationalization program, an IFQ system was adopted for the shoreside trawl fishery. That catch share system includes a set aside of 10 percent of the nonwhiting QS for an AMP. The AMP QP, issued each year for those QS, are to be distributed to address the following objectives.

- Community stability
- Processor stability
- Conservation
- Unintended/Unforeseen consequences of IFQ management.
- Facilitating new entrants.

For the first four years of the program, the annually issued AMP QP have been passed through to the QS holders in proportion to their holdings of QS. The catch share program originally specified that the Council would develop alternative criteria for distribution of the AMP QP beginning in year 3 of the program. In 2011, the Council recommended an extension of the pass-through until the end of 2014 due to concern that given the other high priority trailing actions that the Council was working on alternative criteria might not be developed and implemented by 2013, in which case there would be no procedure in place for distribution of the AMP QP. Subsequent to that time, the Council has not prioritized the development of a pass-through formula due to the absence of an adequately pressing need. With the pass-through due to expire at the end of this year and no alternative criteria yet developed, the Council

[1] In this document, all references to QS include halibut individual bycatch quota (IBQ) quota shares and all references to QP include the related halibut IBQ quota pounds.

is once again considering options to extend the pro rata pass-through so that the fish authorized for harvest through the biennial specifications process will be continue to available to benefit the fishing industry, dependent communities, and consumers.

CHAPTER 2 DESCRIPTION OF THE ALTERNATIVES AND COUNCIL ACTION

2.1 Alternatives

At its March 2014 meeting, the Council adopted a range of alternatives for final consideration at its June 2014 meeting.

No Action Alternative: Beginning in 2015, the QP associated with the QS set-aside for AMP purposes will be distributed in accordance with procedures developed under the AMP provisions adopted under Amendment 20.

Action Alternative 1: The AMP QP allocation procedures will be considered as part of the five year review and the pass-through procedure used since 2011 will be continued

Suboption A: through 2017.

Suboption B: until the implementation of regulations resulting from the 5-year review.

Action Alternative 2. The pass-through procedures used since 2011 will be continued until procedures are developed as specified in the AMP provisions of Amendment 20.

2.2 Rationale for Council Final Action

To be developed.

CHAPTER 3 IMPACTS

3.1 Direct and Indirect Impacts to the Physical and Biological Environment

Under the No Action Alternative, there may be a reduction of trawl IFQ sector impacts starting in 2015, if no alternative means are developed for distribution of the AMP QP and assuming that resolution of the situation would not qualify for emergency action. Under the action alternatives, there would be no impacts relative to a 2013-2014 baseline and the trawl allocation authorized under the 2015-2016 groundfish specifications. The alternatives provide the trawlers an opportunity to fully harvest the allocations authorized and analyzed under other fishery management actions. The action alternatives would allow full harvest of the authorized allocations; and there would be no difference among any of the action alternatives with respect to impacts on the physical and biological environments. Under any of the alternatives, at any time the Council would be free to recommend either another extension of the pass-through or an earlier than specified end to the pass-through. All alternatives leave the adaptive management program in place in its current form.

3.2 Direct and Indirect Impacts to the Socioeconomic Environment

The main socio-economic impacts of the No Action Alternative are the possibility of a 10 percent reduction in the shoreside nonwhiting trawl harvest starting in 2015 and the attendant adverse social and economic impacts that would be experienced by the fishing industry, fishing communities, and consumers.

Under any of the action alternatives, at any time the Council would be free to recommend either another extension of the pass-through or an earlier than specified end to the pass-through. Therefore, the primary impacts of action alternatives relate to administrative burden of making changes to the pass-through provisions and QS holder expectations regarding whether the pass-through will be continued.

A regulatory amendment would be required for all action alternatives; and to implement alternative criteria all action alternatives would require a future regulatory amendment; but the action alternatives vary with respect to the time at which, or whether, the Council would either have to recommend alternative criteria or recommend another extension. Under Alternative 1, Suboption A, which continues the pass-through through 2017, another Council final action would be required sometime in 2016 or no later than June of 2017. The deadline for action would depend on the complexity of the criteria to be implemented (including the possibility that there would be another continuation of the pass-through). Alternative 1, Suboption B terminates the pass-through as of the date of regulatory actions coming out of the five year review of the trawl rationalization program, and presumes that review will be conducted in 2016, after data from year five of the program is available. It also presumes that the review would lead to some additional regulatory modifications. For Suboption B, it is not clear whether the end of the pass-through would be triggered if the review process did not generate any regulatory actions. Depending on the time required for the review and the time required to generate and act on alternatives in response to information developed during the review, the continuation of the pass-through would likely be to a date comparable to or later than what would occur under Supoption A. Suboption B would continue the pass-through to a time (after the five year review) when the Council might have more information on the utility of implementing alternative criteria for the distribution of the AMP QP. However, this is not to say that adequate information might not be available before that time. Under Alternative 2, the pass-through would be extended indefinitely but the QS set aside for the AMP would remain in place, facilitating implementation of alternative criteria at any time the Council and NMFS decided they were needed. If the ultimate outcome is that the AMP pass-through continues and alternative distribution criteria are never developed, then Alternative 2 will have been the lowest administrative cost alternative.

All of the alternatives, including No Action, entail some uncertainty, which may affect QS pricing. QS prices are likely to vary depending on whether traders anticipate a long-term continuation of the pass-through. If expectation of a long-term continuation of the pass-through is built into QS prices, this would likely generate resistance to future proposals for alternative distributions. If the Council is relatively ceratin it will eventually recommend implementation of alternative criteria for distribution of AMP QP, then a continuation of the pass-through for a specified amount of time might increase the probability that QS transactions are priced properly with respect to the reasonably expected value of the annually issued QP, relative to an open ended continuation of the pass-through.

Agenda Item F.3.a
Attachment 2
June 2014

INITIAL COMPILATION OF POSSIBLE GROUNDFISH MANAGEMENT MEASURES FOR COUNCIL CONSIDERATION

This document provides an initial unprioritized list of potential management measure topics, ordered by category and sector, derived from previous Council discussions. In order to assist in comprehensive workload planning, a list of other groundfish related matters with workload implications for Council, state and Federal staff are included. Public comment received by the deadline is included in the reference materials for Agenda Item F.9 but is not summarized here. Council actions under Agenda Item F.3 and F.9 can modify the list, based on public and advisory body comment, if desired.

The list is broken into three categories:

A. Items on Which Council Action Has Been Completed Which Still Entail Some Workload
B. Immediate and Long-Term Commitments
C. Candidate Items for Prioritization in September

Items are categorized based on their expected status as of the September 2014 Council meeting. For any action to be implemented by the start of 2016, alternatives for analysis will have to be specified by the November 2014 Council meeting and a final preferred alternative chosen by the April 2015 Council meeting.

Note that trawl trailing actions and Phase II of the limited entry fixed gear sablefish program review are not listed here as such. In September, when actions are prioritized and packaged, the Council may want to assign items to these two, as well as other, categories.

A list of the short titles is provided in the following table, followed by more detailed descriptions for some items. A blank column is provided to the right in order to allow this table to serve as a decision template.

Acronyms and abbreviations used in the following table:

COP – Council Operating Procedure
CP – Catcher Processor
IFQ – Individual Fishing Quota
LEFG – Limited Entry Fixed Gear
MS – Mothership
OA – Open Access
QP – Quota Pounds
QS – Quota Shares
Rec – Recreational
TOR – Terms of Reference
VMS – Vessel Monitoring System

Table 1. Unprioritized list of groundfish related workload items and initial candidate groundfish management measures grouped by category and sector.

	Sector	Short Title	
A. Items on Which Council Action Has Been Completed Which Still Entail Some Workload[1]			
1.	Trawl, Non-Trawl, Rec	2015-2016 Harvest Specifications and Management Measures and Amendment 24 (June 2014)	
2.	Trawl and Non-Trawl	Seabird Rule - Mandatory Streamers for vessels ≥ 55’	
3.	Trawl and Non-Trawl	Clarify Catch Accounting Rules for Amendment 21	
4.	Trawl and Non-Trawl	Fishery Declaration Enhancements	
5.	Trawl IFQ, MS, & CP	Cost Recovery Corrections	
6.	Trawl IFQ & MS	Electronic Monitoring Exempted Fishing Permits (if final in June 2014)	
7.	Trawl IFQ & MS	Pacific Dawn Lawsuit Appeal to District Court (Whiting Allocation)	
8.	Trawl IFQ & MS	Whiting Cleanup Rule, Including Maximized Retention Regulations	
9.	Trawl CP	Glacier Fish Co Lawsuit (Cost Recovery)	
10.	Trawl IFQ	Joint Registration and Prohibition of Processing IFQ Sablefish	
11.	Trawl IFQ	Move Shorebased Whiting Season Opening Dates	
12.	Trawl IFQ	Continue Adaptive Management Program Pass-Through	
13.	Trawl IFQ	Update eTicket for Web-based Submissions	
14.	Trawl IFQ	Rule for Forfeitures for Exceeding Aggregate NonWhiting Control Limit	
15.	LEFG	Revise Limited Entry Fixed Gear Permit Control Rule (If Recommended)	
16.	LEFG and OA	Require E-Tickets for Sablefish Landings (If Recommended)	
17.	LEFG and OA	Sablefish North of 36 Degrees - Allocation Correction	
18.	LEFG and OA	Logbooks for Fixed Gear	
19.	OA	Amendment 22 - Open Access License Limitation	
B. Immediate and Long-Term Commitments			
Currently on the Year at a Glance Schedule (See Agenda Item C.6.a, Attachment 1)			
20.	Trawl, Non-Trawl, Rec	Inseason Management (Sept 2014 and beyond, excluding March 2015)	
21.	Trawl, Non-Trawl, Rec	Adopt Final Stock Assessment Plan and TOR for 2015 (Sept 2014)	
22.	Trawl, Non-Trawl, Rec	Develop a COP for Groundfish Methodology Review Process (Sept and Nov 2014)	
23.	Trawl, Non-Trawl, Rec	Omnibus Regulations Changes (Sept and Nov 2014, Mar-June 2015)	
24.	Trawl, Non-Trawl, Rec	Essential Fish Habitat: Phase 3 of the 5 Year Review (Sept 2014)	
25.	Trawl, Non-Trawl, Rec	Amendment 25: Comprehensive Ecosystem-Based Amendment (Sept 2014 and Mar 2015)[2]	
26.	Trawl, Non-Trawl, Rec	2015 Pacific Halibut Catch Sharing Plan (Sept and Nov 2014)[3]	

[1] This list includes actions anticipated at the June 2014 meeting. Workload primarily involves NMFS and Council staff, however GMT and state staffs may be involved. Several items in this category are also covered under Agenda Item F.1.b, NMFS Report.
[2] Scheduled to occur under an Ecosystem agenda item but involves amending the groundfish Fishery Management Plan and groundfish staff.
[3] Scheduled to occur under a Pacific halibut agenda item but may involve groundfish considerations and/or staff that also work on groundfish.

	Sector	Short Title	
27.	Trawl, Non-Trawl, Rec	2015 Incidental Regulations for Pacific Halibut (Mar and Apr 2015)3	
28.	Trawl, Non-trawl, Rec	Stock Assessments for 2017-2018 Biennium (June 2015)	
29.	Trawl, Non-Trawl, Rec	Start of the Process to Establish 2017-2018 Specifications and Regulations (June 2015)	
30.	Trawl IFQ & MS	Electronic Monitoring Regulations (Sept 2014, June 2015)	
Items on the Horizon			
31.	Trawl IFQ, MS, & CP	Five Year Review (Starts in 2016)	
32.	Trawl IFQ	QS/QP Control Rule - Safe Harbor for Risk Pools - post 5-year review	
33.	Trawl IFQ	Resolve Long-term Whiting Surplus Carryover Provision - post 5-year review	
C. Candidate Items for Prioritization in September			
34.	Trawl, Non-Trawl, Rec	Rebuilding Revision Rules (signal vs. noise)	
35.	Trawl, Non-Trawl, Rec	Further Consideration for Reorganizing Stock Complexes	
36.	Trawl and Non-Trawl	Groundfish Conservation Areas for Rougheye Rockfish	
37.	Trawl and Non-Trawl	New Dressed to Round Conversion Factors for Sablefish	
38.	Trawl and Non-Trawl	Increase VMS Ping Rates	
39.	Trawl and Non-Trawl (LE)	Eliminate Permit Size Endorsements	
40.	Trawl and Non-Trawl	Seabird Avoidance Devices for Vessels less than 55 feet	
41.	Trawl IFQ, MS & CP	Revise Length of Time Required for the Trawl Fleet to Retain Records	
42.	Trawl IFQ (& MS &CP?)	Fishery Declaration Enhancements (With Gear Stowed and Testing Gear)	
43.	Trawl IFQ, MS & CP	Year Round Whiting Season and Other Modifications	
44.	Trawl IFQ, MS & CP	Revise Regulations on At-Sea and Shoreside Flow Scales	
45.	Trawl IFQ	Gear Use - Multiple Gears Onboard and Use	
46.	Trawl IFQ and LE Pot	Remove Certain Area-Management Restrictions	
47.	Trawl IFQ	Remove Certain Restrictions on Trawl Gear Configuration	
48.	Trawl IFQ	Resolve Long-term Non-Whiting Surplus Carryover Provision	
49.	Trawl IFQ	Carryover when Management Units Change	
50.	Trawl IFQ	Allow Trading of Previous Year Quota Pounds in Current Year	
51.	Trawl IFQ	Widow Rockfish QS Reallocation	
52.	Trawl IFQ	Discard Survival Credit for Lingcod and Sablefish	
53.	Trawl IFQ	Require Posting of First Receiver Site Licenses	
54.	Trawl IFQ	Develop Criteria for Distributing Adaptive Management Program QP	
55.	LEFG	Cost Recovery for the Permit Stacking Program	
56.	LEFG and OA	Commercial Gear Restriction for Targeting Flatfish in CA	
57.	LEFG and OA	Retain Halibut in the Sablefish Fishery (South of Pt. Chehalis)	
58.	Recreational	50 fm Depth Restriction (WA and OR)	
59.	Recreational	Mid-water Sport Fishery (OR and CA)	

Discussion

A. Items on Which Council Action Has Been Completed Which Still Entail Some Workload

1. **Trawl, Non-Trawl, and Rec – 2015-2016 Harvest Specifications and Management Measures and Amendment 24 (June 2014)**

The process to adopt the 2015-2016 harvest specifications and management measures, including non-electronic monitoring EFPs, and Amendment 24 culminates at this meeting with final action scheduled under Agenda Item F.7. Over the summer and fall, Council, NMFS, and state staffs will be responding to comments on the draft Environmental Impact Statement (EIS), preparing the final EIS, and preparing the regulations necessary to implement Council action. The anticipated rulemaking schedule is outlined in Agenda Item F.1.b, NMFS Report.

2. **Trawl and Non-Trawl - Seabird Rule - Mandatory Streamers ≥ 55'**

At the November 2013 meeting, the Council recommended that streamer lines be required during setting operations on commercial fixed gear vessels 55 feet or greater in length with a safety exception in the event of rough weather, which would be triggered by a National Weather Service forecast of a gale force wind warning. In January 2014, Council staff transmitted regulations necessary to implement the Council action. NMFS advises that rulemaking is in progress and the proposed rule is anticipated this summer (see Agenda Item F.1.b, NMFS Report).

3. **Trawl and Non-Trawl - Clarify Catch Accounting Rules for Amendment 21**

At its June 2012 meeting, as part of the preferred alternative for the 2013-2014 harvest specification and management measures, the Council recommended reinstating catch accounting language in the FMP that was inadvertently deleted when Amendment 21 was implemented. Changes to the FMP language were also recommended to further clarify the decision rules for determining the allocation against which a vessel's catch would count (i.e., whether it would count against the limited entry allocation or the open access allocation). The Council and NMFS staff has made progress on some draft FMP language; however, due to competing workload, language for Council consideration has not yet been fully developed.

4. **Trawl and Non-Trawl - Fishery Declaration Enhancements**

At its June 2013 meeting, the Council took action to require that vessels activating VMS units make a fishery declaration at the time of activation, even if they are not entering a groundfish fishery at that time. Additionally, the Council recommended that, for clarity purposes, category 24 in the current list of declarations (660.13(d)(5)(iv)) be modified from "other gear" to "other," to encompass declarations to participate in fisheries not specifically named in the declaration list and for research activities.

5. **Trawl IFQ, MS, & CP - Cost Recovery Corrections**

After cost recovery was implemented for the trawl rationalization program in January 2014, NMFS announced clarifications to the regulations through a public notice (see NMFS public notice, NMFS-SEA-14-12, March 20, 2014). The clarifications were on (1) fish buyer's use of principal from a deposit account in cases of credit card payment to Pay.gov (IFQ & MS), and (2) in the CP sector, only retained groundfish are subject to the cost recovery fee. In the future, NMFS intends to revise the associated regulatory language for these issues and, if further issues arise, may have additional cost recovery corrections or clarifications.

6. **Trawl IFQ & MS - Electronic Monitoring Exempted Fishing Permits (if final in June 2014)**

The Council is also in the middle of considering exempted fishing permits (EFPs) to allow some vessels to use electronic monitoring in lieu of at-sea compliance observers. Council action might be completed at this meeting (see Agenda Item F.5 for additional background), however, substantial ongoing effort by NMFS staff would be required to have the EFPs in place during the 2015 fishery.

7. **Trawl IFQ & MS - Pacific Dawn Lawsuit Appeal to District Court (Whiting Allocation)**

On May 13, 2014, an appeal to the Ninth Circuit Court was filed in the Pacific Dawn lawsuit challenging the allocation of whiting IFQ and mothership sector catch history allocations. Responding to this appeal will require the time of NOAA GC attorneys, as well as other NMFS staff, who are also integral to making progress on the development and implementation of groundfish actions.

8. **Trawl IFQ & MS - Whiting Cleanup Rule, Including Maximized Retention Regulations**

The proposed whiting cleanup rule would establish criteria for a whiting trip (at least 50% of the landing by weight must be whiting), re-establish regulations needed to cover the disposition of catch in the maximized retention fishery, and clarify the ability of midwater gear to be used to target all groundfish species in the RCAs north of 40°10′ north latitude after the whiting opening. This rule is expected to be finalized by December 2014 (see Agenda Item F.1.b, NMFS Report).

9. **Trawl CP - Glacier Fish Co Lawsuit (Cost Recovery)**

On January 9, 2014, Glacier Fish Company LLC filed a suit in relation to the cost recovery regulations challenging the categorization of the catcher-processor co-op program as a limited access privilege program, challenging the status of co-op members as limited access privilege holders, claiming that the cost recovery regulations were not properly promulgated, and claiming adequate documentation of the basis of the cost figure has not been provided. Responding to this suit will require the time of NOAA GC attorneys, as well as other NMFS staff, who are also integral to making progress on the development and implementation of groundfish actions.

10. Trawl IFQ - Joint Registration and Prohibition of Processing IFQ Sablefish

At its April 2012 meeting, the Council recommended allowing a fixed gear permit and a trawl permit to be registered to the same vessel at the same time. Implementation is expected by the winter of 2014/2015, as part of the upcoming Sablefish Rule (see Agenda Item F.1.b, NMFS Report).

11. Trawl IFQ - Move Shorebased Whiting Season Opening Dates

At its November 2012 meeting, the Council recommended moving the shoreside sector primary whiting season opening date to May 15, starting in 2013 to the extent that such a change could be made without requiring a plan amendment. It is expected that the season date change can be made for all areas north of 40°30′ north latitude. The current April 15 opening will remain in place south of that line. Implementation is expected by May 2015 (see Agenda Item F.1.b, NMFS Report).

12. Trawl IFQ - Continue Adaptive Management Program Pass-Through

Under this agenda item, the Council will likely extend the current AMP pass-through for a number of additional years (see Agenda Item F.3.a, Attachment 1). A regulatory action, completed by the end of the year, will be required to implement that extension (see Agenda Item F.1.b, NMFS Report).

13. Trawl IFQ - Update eTicket for Web-based Submissions

Pacific States Marine Fisheries Commission is improving the trawl IFQ e-Ticket system by moving to a web-based platform. This will require some regulatory changes and may be implemented over the winter of 2014/2015, as part of the upcoming Sablefish Rule (see Agenda Item F.1.b, NMFS Report), if the Council recommends e-tickets for the sablefish fishery (see Item 16).

14. Trawl IFQ - Rule for Forfeitures for Exceeding Aggregate NonWhiting Control Limit

Current regulations require forfeiture of QS held in excess of control limits as of November 30, 2015. There is no guidance in the regulations for which QS would be revoked if a QS permit owner does not get their individual and collective QS amounts under the aggregate nonwhiting QS control limit. This issue may not require Council action and may only be a clarification of policy if the situation arises. In the interim, QS permit owners are encouraged to get their own QS permits/accounts under the QS control limits listed at 660.140(d)(4)(i) by November 30, 2015, so that NMFS does not have to take an administrative action. NMFS notified QS permit owners that were over QS control limits of the amounts they were over when NMFS issued initial QS permits. Later in 2014, NMFS will again notify QS permit owners that are over QS control limits. NMFS has several tools available on the QS Permit and Accounts website at: http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/quota_share_permits_accounts.html. The website includes the table of IFQ accumulation limits (i.e., QS control limits), and tools for QS permit owners to calculate their non-whiting groundfish aggregate QS to determine if they are over the limit.

15. LEFG - Revise Limited Entry Fixed Gear Permit Control Rule (If Recommended in June 2014)

At this meeting, the Council will decide whether or not to recommend a revision to the limited entry fixed gear permit control rule (Agenda Item F.6). If the Council recommends such revisions, the recommendation will be in the NMFS approval and implementation phase by the time of the September Council meeting, with the attendant workload for NMFS and Council staff, including regulatory deeming. Implementation would be expected by the winter of 2014/2015, as part of the upcoming Sablefish Rule (see Agenda Item F.1.b, NMFS Report).

16. LEFG and OA - Require E-Tickets for Sablefish Landings (If Recommended in June 2014)

At this meeting, the Council will decide whether or not to recommend that electronic fish tickets be required for limited entry fixed gear and open access sablefish landings (Agenda Item F.6). If the Council recommends such regulations, the recommendation will be in the NMFS approval and implementation phase by the time of the September Council meeting, with the attendant workload for NMFS and Council staff, including regulatory deeming. Implementation would be expected by the winter of 2014/2015, as part of the upcoming Sablefish Rule (see Agenda Item F.1.b, NMFS Report).

17. LEFG and OA - Sablefish North of 36 Degrees - Allocation Correction

The May 2014 version of the groundfish FMP accurately represents the Council intent for sablefish catch accounting and allocations. That is, consistent with the Amendment 6 catch accounting rules, sablefish landed north of 36 deg. N. lat. by vessels registered to a LE fixed gear permit, regardless of their intended target (i.e., groundfish or non-groundfish species), will be debited against the LE fixed gear daily trip limit allocation (LE DTL). Sablefish landings by vessels not registered to a LE permit, regardless of their intended target (e.g. groundfish or non-groundfish species), will be debited against the OA fixed gear daily trip limit allocation (OA DTL). Action is needed to revise the groundfish regulations to be consistent with the FMP.

18. LEFG and OA - Logbooks for Fixed Gear

At its June 2008 meeting, as part of the preferred alternative for the 2009-2010 harvest specification and management measures, the Council recommended that NMFS develop and implement a mandatory Federal logbook for limited entry and open access fixed gear vessels. The Council's Groundfish Management Team, the West Coast Groundfish Observer Program, NMFS, and state staffs worked with Pacific States Marine Fisheries Commission to prepare a draft fixed gear logbook. The logbook has not been finalized and implemented due to concerns raised by NMFS, including lack of funding.

19. OA - Amendment 22 - Open Access License Limitation

In June 2009, the Council recommended a registration program for fishermen intending to land groundfish in the open access fishery, whether targeting those species or taking them incidentally while fishing for non-groundfish species (e.g., salmon, pink shrimp, California halibut) or nearshore species (e.g., cabezon, black rockfish). The Council has taken final action on Amendment 22 yet the registration program has not been implemented. More recently, some OA vessels are required to have an authorization on board under the Marine Mammal Protection Act (i.e., sablefish pot vessels) and NMFS is having difficulty getting addresses for those vessels. An OA registration system would address this issue.

B. Immediate and Long-Term Commitments

20. Trawl, Non-Trawl, and Rec - Inseason Management (Sept 2014 and beyond, excluding March 2015)

Management measures for groundfish are set by the Council with the general understanding that these measures will likely need to be adjusted within the biennium to attain, but not exceed, the ACLs. On the Year at a Glance, inseason adjustments are scheduled to be discussed at the Sept-Nov 2014 meetings as well as in 2015 (except March).

21. Trawl, Non-Trawl, and Rec - Adopt Final Stock Assessment Plan and TOR for 2015

In September and November of the even numbered years (e.g., 2014), the Council develops a stock assessment plan for the upcoming biennium and a Terms of Reference (TOR) for conducting the assessments.

22. Trawl, Non-Trawl, and Rec - Develop a COP for Groundfish Methodology Review Process (Sept and Nov 2014)

The Council recommended developing a Council Operating Procedure (COP) for conducting groundfish methodology reviews, similar to COP 15 for salmon. The Council is scheduled to adopt the COP at the September and November 2014 meetings.

23. Trawl, Non-Trawl, Rec – Omnibus Regulation Changes (Sept and Nov 2014, Mar-June 2015)

On the Year at a Glance, Omnibus Regulation changes are scheduled to be discussed at the Sept-Nov 2014 meetings as well as in 2015. Any prioritized management measures (e.g., those included under Category C: Candidate Items for Prioritization) could be considered under the Omnibus Regulation Changes agenda item.

24. **Trawl, Non-Trawl, and Rec - Essential Fish Habitat – Phase 3 of the 5 Year Review (Sept 2014 and Mar 2015)**

As the first step in the Phase 3 process, the Council requested that the Northwest and Southwest Fisheries Science Centers investigate the question of Essential Fish Habitat (EFH) effectiveness, accuracy, and completeness and to present their findings in the advance Briefing Book for consideration at the September 2014 Council meeting. At the September 2014 meeting, the Council is tentatively scheduled to initiate a fishery management plan amendment, including alternatives for refining elements of groundfish EFH as warranted by new information, the Science Center evaluation, and proposals received.

25. **Trawl, Non-Trawl, and Rec - Amendment 25: Comprehensive Ecosystem-Based Amendment (Sept 2014 and Mar 2015)**

In April 2014, The Council approved a range of alternatives for protecting unfished and unmanaged forage fish species and identified the Ecosystem Trophic Role pathway as a preliminary preferred alternative. Under this pathway, protective measures for forage species would be added to each of the Council's four FMPs, perhaps under an omnibus process aggregating the four actions into one process. The Council is scheduled to review the alternatives and proposed amendatory language for the groundfish FMP at the September 2014 Council meeting.

26. **Trawl, Non-Trawl, Rec – 2015 Pacific Halibut Catch Sharing Plan (Sept and Nov 2014)**

Each September and November meeting, the Council considers proposed changes to the Pacific halibut regulations and Catch Sharing Plan (CSP) for Area 2A. Starting in 2014, in response to recent unusually high harvests of Pacific halibut off Southern Oregon and Northern California, the Council established a new management line at the Oregon/California border, creating separate Oregon and California subareas with area-specific CSP allocations and management measures. The Council is scheduled to consider, at the September and November 2014 meetings, whether additional changes to the 2A CSP allocations are necessary and whether additional adjustments to management measures are necessary to comply with allocation provisions of the CSP. The anticipated rulemaking schedule is outlined in Agenda Item F.1.b, NMFS Report.

27. **Trawl, Non-Trawl, Rec – 2015 Incidental Regulations for Pacific Halibut (Mar and Apr 2015)**

Regulations governing incidental harvest of halibut in the salmon troll fishery and primary fixed gear fishery for sablefish north of Point Chehalis require the Council to adopt halibut landing restrictions to allow incidental harvest while assuring quotas are not exceeded. The Council is scheduled to recommend incidental halibut regulations at the March and April 2015 meetings.

28. Trawl, Non-Trawl, Rec - Stock Assessments for 2017-2018 Biennium (June 2015)

At this meeting, under Agenda Item F.8, the Council is scheduled to adopt for public review the list of stocks to be assessed in 2015 for use in 2017 and beyond and a stock assessment review schedule. The first stock assessment is scheduled for Council adoption in June 2015.

29. Trawl, Non-Trawl, Rec - Start of the Process to Establish 2017-2018 Specifications and Management Measures (June 2015)

In most cycles, the start of the process to establish the biennial regulations begins in June of the odd numbered years (e.g., June 2015).

30. Trawl IFQ & MS - Electronic Monitoring Regulations (Sept 2014, June 2015)

The Council has received funding and is in the middle of a process for the consideration of electronic monitoring as a replacement for the monitoring function of at-sea observers. This action is currently scheduled for completion by the September Council meeting though it appears likely that further deliberations will be required for at least some sectors. See Agenda Item F.2 for additional background.

31. Trawl - Five Year Review (Starts in 2016)

The trawl rationalization program will complete its fifth year at the end of 2015. Planning for the review might begin during 2015 but the compilation of data sets for the review will not occur until sometime during 2016 – when the final data becomes available.

32. Trawl - QS/QP Control Rule - Safe Harbor for Risk Pools - post 5-year review

At its September 2011 meeting, the Council recommended providing risk pools a safe harbor from the QS control rules. At its September 2013 meeting, the Council agreed that risk pools appeared to be functioning adequately under current regulations and that implementation of this recommendation could wait until the five year program review.

33. Trawl - Resolve Long-term Whiting Surplus Carryover Provision - post 5-year review

A workshop was held on November 2, 2012 to explore possibilities for fully implementing whiting surplus carryover in 2013 and a report was presented to the Council at its November 2012 meeting. The Council decided that it will review this issue again during the 5 year program review, scheduled for 2016.

C. Candidate Items for Prioritization in September

34. Trawl, Non-Trawl, and Rec - Rebuilding Revision Rules (signal vs. noise)

The Council recommended consideration of rebuilding revision rules during Amendment 24 and the 2015-2016 harvest specifications and management measures process. Such rules involve assessing adequacy of progress toward rebuilding and altering rebuilding plans, given a change in stock status. Some have referred to the rebuilding revision rules as separating the signal (true rebuilding) from the noise (variability in the estimates). The management strategy evaluation necessary to inform potential rebuilding revision rules is ongoing and will not be completed in time to be implemented with Amendment 24.

35. Trawl, Non-Trawl, and Rec - Further Consideration for Reorganizing Stock Complexes

During the past few cycles, the Council has made progress evaluating the performance of the existing stock complexes relative to the revised National Standard 1 Guidelines. In the event the Council wishes to further consider reorganizing the stock complexes, such work should be completed prior to the start of the biennial analysis (e.g., June 2015 prior to the 2017-2018 cycle).

36. Trawl and Non-Trawl - Groundfish Conservation Areas for Rougheye Rockfish

During the development of the 2015-2016 harvest specifications and management measures, the Council recommended an analysis be conducted to explore the impacts of implementing a Groundfish Conservation Area to reduce the catch of rougheye and blackspotted rockfish. Due to complexities in the analysis and competing workload in the 2015-2016 process, the Council recommended that this measure be discussed and prioritized accordingly during the omnibus regulation changes process.

37. Trawl and Non-Trawl - New Dressed to Round Conversion Factors for Sablefish

New information may be coming available on dressed to round conversion factors for sablefish, including conversion factors for product forms that are currently not covered with existing factors.

38. Trawl and Non-Trawl - Increase VMS Ping Rates

An Administrative Law Judge ruling on the F/V RISA LYNN case has raised question as to whether or not the current hourly locational pings used in the VMS system are sufficient to enforce area closures. This possible need to increase ping rates was first brought to the Council's attention at its November 2013 meeting and discussed in more detail at its March 2014 meeting, at which NMFS Office of Law Enforcement (Agenda Item H.1.b, NMFS OLE Report, March 2014) and the Enforcement Consultants (Agenda Item H.1.c, EC Report, March 2014) each provided reports. Additionally, the Groundfish Advisory Subpanel identified alternative tools for addressing the concern: "data loggers in conjunction with electronic logbooks, specific polygons in the RCA, automatic identification systems, and more." (Agenda Item H.1.c, GAP Report, March 2014). At that time, the Council deferred further action until this meeting in order to determine the relative priority for this issue among other potential groundfish actions.

39. Trawl and Non-Trawl (LE) – Eliminate Permit Size Endorsements

Gear Workshop Report from the November 2012 Council meeting (Agenda Item I.5.a, Attachment 4 – Gear Workshop Report) stated: "The trawl permit length endorsement and associated permit transfer provisions are no longer needed as vessel capacity is no longer an issue under the IFQ program. However, there may be impacts to non-target species and to target species taken with fixed gear under gear switching that will need to be taken into account." It has also been suggested that the size endorsements are no longer needed for the fixed gear sablefish endorsed permits." This issue was also been identified in The Trawl Rationalization Regulatory Evaluation Committee (TRREC) Report from the November 2011 Council meeting (Agenda Item E.7.b, Supplemental TRREC Report).

40. Trawl and Non-Trawl – Seabird Avoidance Devices for Vessels less than 55 feet

In 2012, the U.S. Fish and Wildlife Service (USFWS) published a biological opinion considering the effects of West Coast groundfish fisheries to Endangered Species Act (ESA) listed marine species, including seabirds. The opinion includes reasonable and prudent measures (RPMs), terms and conditions, and conservation recommendations to minimize take of seabirds, particularly the endangered short-tailed albatross. The RPMs stipulate that NMFS shall 1) minimize the risk of short-tailed albatross interactions with commercial hook and line gear, 2) establish a work group as an advisory body to NMFS and USFWS for the purposes of reducing risk to short-tailed albatross (and other ESA-listed species), 3) monitor and report all observed, reported, and estimated short-tailed albatross take as well as report on the efficacy of avoidance and minimization measures, and 4) facilitate the salvage of short-tailed albatross carcasses taken by longline gear. In 2013, the Council recommended streamer line regulations for vessels 55 feet and greater (see item #39); however regulations are also needed for vessels less than 55 feet. SeaGrant research results are expected in 2015 and should inform the development of these regulations.

41. Trawl IFQ, MS & CP - Revise Length of Time Required for the Trawl Fleet to Retain Records

As described in September 2013 (Agenda Item G.9.a, Attachment 1), consider revising regulations that require the trawl fleet to retain records for three years and make them available upon request (660.113(a)(2)) to clarify how that works with regulations that require retention of records on board for 15 days into the next cumulative limit period (660.13(c)).

42. Trawl IFQ (& MS &CP?) - Fishery Declaration Enhancements (With Gear Stowed and Testing Gear)

It has been suggested that declarations for transiting with gear stowed and for testing trawl gear (with no retention) be implemented and that on trips with these declarations no observer coverage would be required.

43. Trawl IFQ, MS & CP - Year Round Whiting Season and Other Modifications

The November 2011 TRREC Report recommended as a first priority the movement of all shorebased whiting season start dates to May 15 and elimination of the 5 percent cap on the early season California fishery. Council action to move the shoreside season openings for the area north of 40°30′ north latitude (see Item 15) has been completed but the April 15 start date for the area south of that line remains, along with the 5 percent cap have not been implemented (due to the need for a FMP amendment to modify these provisions). The TRREC recommended as a secondary priority the consideration of a year round whiting season.

44. Trawl IFQ, MS & CP - Revise Regulations on At-Sea and Shoreside Flow Scales

As described in September 2013 (Agenda Item G.9.a, Attachment 1), NMFS Alaska Region is currently revising at-sea flow scale regulations for the North Pacific because incidences of manipulation were discovered. West coast trawl rationalization program regulations at 660.15 may need to be revised in coordination with revisions to North Pacific regulations which are expected for 2015. New regulations are required to address the need for daily scale testing criteria for the new shoreside flow scales.

45. Trawl IFQ - Gear Use - Multiple Gears Onboard and Use

TRREC Report from the November 2011 Council meeting and the Gear Workshop Report from the November 2012 Council meeting (see item #39) both contained recommendations for the carrying and use of multiple gear types on a single trip, including both trawl and fixed gears.

46. Trawl IFQ - Remove Certain Area-Management Restrictions

Both the TRREC and Gear Workshop Reports (see item #39) included recommendations relative to area management restrictions. The TRREC report identified this issue as a general topic for consideration, plus the need to consider allowing vessels to fish in more than one area. The Gear Workshop report recommended allowing year-round use of midwater gear in the RCA be considered and elimination of the selective flatfish gear requirement in place shoreward of the RCA. It also recommended that the use of midwater gear be allowed in in all groundfish essential fish habitat conservation areas coastwide and year round (except that targeting on whiting would be subject to whiting regulations); and that vessels be allowed to move fixed gear across management lines without going to shore (currently that movement is considered to be fishing in two areas on the same trip).

47. Trawl IFQ - Remove Certain Restrictions on Trawl Gear Configuration

The TRREC (see item #39) suggested that with the individual incentives provided by the trawl rationalization program it would be possible to "Eliminate codend, chafing gear, mesh size and selective flatfish trawl gear requirements and restrictions" but that large and small footrope distinctions would have to remain due to EFH considerations—though they might be modified. For similar reasons, the Gear Workshop (see item #39) recommended reducing the minimum mesh size for bottom trawl by ½ inch, to 4 inches and also recommended eliminating the selective flatfish trawl requirement. One particular obstacle presented by the selective flatfish requirement is that the nets are two seamed nets and it is not possible to put rockfish excluders in two seamed nets.

48. Trawl IFQ - Resolve Long-term Non-Whiting Surplus Carryover Provision

The trawl IFQ program allows up to 10 percent of a vessel's QP to be carried from one year to the next, either as a deficit covered with following year QP or an unused surplus which can be fished in the following year. Concern that the surplus carryover provision might be interpreted as violating allowable catch limits has led NMFS to not issue surplus carryover for some species in some years. A consultative process between NMFS and the Council was developed as part of the 2013-2014 biennial specifications, to inform the NMFS decision process about whether or not to issue the surplus carryover. However, there continues to be uncertainty each year as to whether or not surplus quota pounds from the previous year will be reissued. The uncertainty may be encouraging vessels to fish into deficit to avoid the loss of QP which would occur if surplus QP are not reissued. The Council has requested further analysis and development of options to ensure that, in the long term, the surplus carryover provisions can be implemented with greater certainty.

49. Trawl IFQ - Carryover When Management Units Change

As described in September 2013 (Agenda Item G.9.a, Attachment 1), the regulations do not cover how carryover should be handled when there is a reallocation as a result of changes in management areas (area subdivision, combination, or line movement) or subdivision of a species group that cause shifts in the distribution of QS. This issue was identified with the recent geographic subdivision of lingcod and relates to 660.140(c)(3)(vii).

50. Trawl IFQ - Allow Trading of Previous Year Quota Pounds in Current Year

At the April 2013 Council meeting, it was proposed that the trading of QP issued for a previous year be allowed to occur in the current year up until the last landings data for the previous year is in the catch and QP accounting system. This would allow greater flexibility for the fleet as a whole to use unused QP from a previous year to cover catch in that year. For example, in situations where a vessel was in deficit at the end of the year, during the subsequent calendar year it might acquire QP from a vessel that had a surplus at the end of that same year, rather than having to use QP from the subsequent year to cover previous year catch. Further action on this issue was deferred, to be take up as part of the next trawl rationalization trailing action package.

51. Trawl IFQ - Widow Rockfish QS Reallocation

At its April 2012 meeting, the Council decided to consider reallocation of the widow rockfish QS, now that widow rockfish is rebuilt. At its June 2012 meeting, the Council decided that for widow rockfish QS, the moratorium on QS trading should be continued until December 31, 2014, or until the widow rockfish reallocation process is complete, whichever comes first. Consequently, the Council recommended and NMFS implemented an indefinite extension on the widow rockfish QS moratorium through the reconsideration of the allocation of whiting (78 FR 18879, March 28, 2013). Therefore, while QS trading started for all other species in January 2014, the moratorium continues for widow rockfish QS. Some implementation issues have resulted due to the moratorium on transfer of widow rockfish QS affecting QS owners wanting to leave the fishery or change business arrangements. QS permit owners who are trying to retire or otherwise sell their QS are stuck with their widow QS until such time as the Council makes a decision on reallocation. Even though they will just be carrying one IFQ species in their QS account, they still will have the same renewal, paperwork, and QP transfer burden as all other QS owners and could result in stranded widow QP. Similarly, situations have occurred where a corporation is dissolved, wants to change ownership, or wants to change their structure by registering in a new state, perhaps with a new tax ID number. With the moratorium on widow QS transfer, the corporation will have to decide if it is in their best interest to dissolve and risk losing widow QS or remain a corporation to keep their widow QS until it is transferrable.

52. Trawl IFQ - Discard Survival Credit for Lingcod and Sablefish

The annual estimates of groundfish mortality, prepared by the West Coast Groundfish Observer Program, include discard survival credits for sablefish (50 percent for trawl, 20 percent for fixed gear) and lingcod (50 percent mortality for trawl). However, within the shorebased IFQ program, total catch, regardless of survival, is debited from vessel QP accounts and tracked inseason against the trawl allocation and annual catch limits. Industry has requested the consideration of an IFQ survival credit for discarded lingcod and sablefish, and particularly for the discard of small sized lingcod—for which discard is currently required.

53. Trawl IFQ - Require Posting of First Receiver Site Licenses

As described in September 2013 (Agenda Item G.9.a, Attachment 1), add a requirement that first receivers possess and display a valid first receiver site license at each processing site. This would be similar to existing requirements at 660.12(d)(1) and 660.25(b)(1)(iii) that require vessels registered to limited entry permits to carry valid permit onboard the vessel.

54. Trawl IFQ - Develop Criteria for Distributing Adaptive Management Program QP

Under the Amendment 20 trawl rationalization program, the shoreside IFQ program includes a set aside of 10 percent of the nonwhiting QS (including halibut individual bycatch quota, IBQ) for an Adaptive Management Program (AMP). The AMP QP, issued each year for those QS, are to be distributed to address the following objectives: community stability; processor stability; conservation; unintended/unforeseen consequences of IFQ management; and facilitating new entrants. However, to date, the QP associated with this program have been passed through to QS holders on a pro rata basis in proportion to their QS holdings. Under this agenda item, the Council will be considering whether and for how long to continue that pass-through (see Agenda Item F.3.a, Attachment 3). Regardless of that decision, it will take some time to develop and analyze alternative criteria for distribution of the AMP QP. The Council may wish to prioritize beginning work on these criteria in anticipation of having that work completed on time for the expiration of the next pass-through period (if there is one).

55. Non-Trawl - Cost Recovery for the Permit Stacking Program

The limited entry fixed gear sablefish stacking program is considered a limited access privilege program (a LAPP). The MSA requires LAPPs to develop a methodology and means to identify and assess cost of management, data collection and analysis, and enforcement programs that are directly related to and in support of the LAPP. Further, the Secretary of Commerce is authorized to establish and collect fees paid by holders of limited access privileges that will cover the costs of management, data collection and analysis, and enforcement activities; not to exceed 3 percent of the ex-vessel value of the fish harvested under the program. The LEFG sablefish program was established prior to the addition of these requirements in the MSA and, to this point, a means to identify costs or policy to establish a cost recovery program have not been developed. This issue is discussed further in the fixed gear sablefish program sablefish review (Agenda Item, F.6.a, Attachment 1).

56. LEFG and OA - Commercial Gear Restriction for Targeting Flatfish in CA

In California, commercial vessels using a specific gear configuration designed to target flatfish species are authorized to fish in several Groundfish Conservation Areas, including the non-trawl RCA, Cowcod Conservation Area, Farallon Islands, and Cordell Banks. During the development of the 2015-2016 harvest specifications and management measures, the Council recommended an analysis be conducted to explore the impacts of either removing or modifying restrictions on the gear and where those vessels can fish. Due to complexities surrounding the analysis and competing workload in the 2015-2016 process, the Council recommended that this measure be discussed and prioritized accordingly during the omnibus regulation changes process.

57. LEFG and OA - Retain Pacific Halibut in the Sablefish Fishery (South of Pt. Chehalis, WA)

At the September 2010 meeting, the Council recommended an analysis be conducted to explore the impacts of allowing incidental Pacific halibut retention in the sablefish fixed gear fishery south of Point Chehalis, Washington; which could include both limited entry and open access sectors. The analysis was intended to be completed in time to inform the development of the 2012 Pacific Halibut Catch Sharing Plan, though there was some discussion such a timeline was ambitious. Initial queries indicate that no analysis of the measure has been completed to date.

58. Recreational - 50 fm Depth Restriction (WA and OR)

Federal regulations provide coordinates for a 50 fm recreational Rockfish Conservation Area. During the development of the 2015-2016 harvest specifications and management measures, Washington and Oregon recommended analyzing the impacts of implementing the 50 fm line, if recommended. Due to the complexities surrounding the analysis and competing workload in the 2015-2016 process, the Council recommended that this measure be discussed and prioritized accordingly during the omnibus regulation changes process.

59. Recreational - Mid-water Sport Fishery (OR and CA)

In June 2013, the Council voted to move forward with evaluation of a midwater sport fishery in Oregon and California, as proposed in Agenda Item F.3.c, June, 2013, Holloway Proposal, with a potential implementation of January 1, 2015. This topic was originally scheduled for Council action in November 2013 and March 2014; however, the analysis was delayed due to competing workload.

CONSIDERATIONS FOR PRIORITIZING THE LIST OF GROUNDFISH MANAGEMENT MEASURES

The following are some of the factors the Council may wish have in mind for determining what it will include on the omnibus list and for its September prioritization exercise.

Magnuson Stevens Act National Standards

Section 301(a) of the MSA states: "Any fishery management plan prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the following national standards for fishery conservation and management" The following are those national standards (NS):

NS-1 Conservation and management measures shall prevent overfishing while achieving,on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

NS-2 Conservation and management measures shall be based upon the best scientific information available.

NS-3 To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

NS-4 Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

NS-5 Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

NS-6 Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

NS-7 Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

NS-8 Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

NS-9 Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

NS-10 Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The Council FMP Goals and Objectives

With respect to goals and objectives, the Council's FMP reads as follows

> Section 2.1 Goals and Objectives for Managing the Pacific Coast Groundfish Fishery
>
> The Council is committed to developing long-range plans for managing the Washington, Oregon, and California groundfish fisheries that will promote a stable planning environment for the seafood industry, including marine recreation interests, and will maintain the health of the resource and environment. In developing allocation and harvesting systems, the Council will give consideration to maximizing economic benefits to the United States, consistent with resource stewardship responsibilities for the continuing welfare of the living marine resources. Thus, management must be flexible enough to meet changing social and economic needs of the fishery as well as to address fluctuations in the marine resources supporting the fishery. The following goals have been established in order of priority for managing the west coast groundfish fisheries, to be considered in conjunction with the national standards of the Magnuson-Stevens Act.
>
> **Management Goals**
>
> Goal 1 - Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.
>
> Goal 2 - Economics. Maximize the value of the groundfish resource as a whole.
>
> Goal 3 - Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

Objectives. To accomplish these management goals, a number of objectives will be considered and followed as closely as practicable:

Conservation

Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.

Objective 3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.

Objective 4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.

Objective 5. Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.

Economics

Objective 6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.

Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization

Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.

Objective 10. Recognize the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.

Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors.

Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

Objective 13. Minimize gear conflicts among resource users.

Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.

Objective 15. Avoid unnecessary adverse impacts on small entities.

Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

Objective 17. Promote the safety of human life at sea.

[Amended; 7, 11, 13, 16-1, 18, 16-4]

Trawl Rationalization Goals and Objectives (Amendment 20)

Trawl Rationalization goals and objectives from Amendment 20 are as follows.

Goal

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

Objectives

The above goal is supported by the following objectives:
1. Provide a mechanism for total catch accounting.
2. Provide for a viable, profitable, and efficient groundfish fishery.
3. Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.
4. Increase operational flexibility.
5. Minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical.
6. Promote measurable economic and employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry.
7. Provide quality product for the consumer.
8. Increase safety in the fishery.

Constraints and Guiding Principles

The above goals and objectives should be achieved while the following occurs:
1. Take into account the biological structure of the stocks including, but not limited to, populations and genetics.
2. Take into account the need to ensure that the total OYs and allowable biological catch (ABC) are not exceeded.
3. Minimize negative impacts resulting from localized concentrations of fishing effort.
4. Account for total groundfish mortality.
5. Avoid provisions where the primary intent is a change in marketing power balance between harvesting and processing sectors.
6. Avoid excessive quota concentration.
7. Provide efficient and effective monitoring and enforcement.
8. Design a responsive mechanism for program review, evaluation, and modification.
9. Take into account the management and administrative costs of implementing and oversee the IFQ or co-op program and complementary catch monitoring programs, as well as the limited state and Federal resources available.

Sablefish Permit Stacking Program (Amendment 14)

Key objectives of Amendment 14 and the permit stacking program were further defined as follows.

Key Objective	Consistency with Management Objectives of the FMP and MSA
1. Rationalize the fleet and promote efficiency	Capacity reduction is one of the key elements of the Council's strategic plan. The strategic plan generally approaches capacity reduction by reducing the number of fishing vessels. This reduction does not of itself imply the rationalization of the fleet or increased efficiency. It is possible that the most efficient fixed gear sablefish harvest could involve a greater number of vessels taking sablefish as bycatch in other fisheries. However, given the high degree of overcapitalization in the fishery, it is believed that a reduction in capacity will generally move the fishery toward greater efficiency, addressing National Standard (NS) 5 and FMP Objective 6 on net national benefits.
2. Maintain or direct benefits toward fishing communities	This objective relates to NS 8 on fishing communities and FMP Objective 16 on fishing communities.
3. Prevent excessive concentration of harvest privileges	This objective relates to NS 4 on allocation, NS 8 on fishing communities, and FMP Objective 15 on avoiding adverse impacts to small entities.
4. Mitigate the reallocational effects of recent policies (3-tier system and equal limits)	This objective relates to NS 4 on allocation and FMP Objectives 12 on equitable allocation and 14 on minimizing disruption.
5. Promote equity	This objective relates to NS 4 on allocation and FMP Objective 12 on equitable sharing.
6. Resolve or prevent new allocation issues from arising	This objective relates to NS 4 on allocation and FMP Objectives 12 on equitable sharing and 14 on minimizing disruption.
7. Promote safety	This objective relates to NS 10 and FMP Objective 17 on safety.
8. Improve product quality and value	This objective relates to NS 5 on efficiency and FMP Objective 6 on net national benefits.
9. Take action without creating substantial new disruptive effects.	This objective relates to FMP Objective 14 on minimizing disruption.
10. Create a program that will readily transition to a multi-month IQ program.	This objective relates to capacity reduction recommendations in the strategic plan. Where individual quotas are transferable and divisible, they address NS 6 by providing the fleet with substantial flexibility to respond to changing conditions in the fishery and NS 5 by taking efficiency into account. FMP Objective 6 is also addressed.

Groundfish Strategic Plan From 2000

The following pages contain the groundfish strategic plan from the year 2000.

Pacific Fishery Management Council
Groundfish Fishery
Strategic Plan

“Transition to Sustainability”

Executive Summary

Prepared by
The Ad-Hoc Pacific Groundfish Fishery
Strategic Plan Development Committee

For
The Pacific Fishery Management Council

October 2000

Statement of Purpose and Acknowledgments

The Ad-Hoc Pacific Groundfish Fishery Strategic Plan Development Committee was formed by the Pacific Fishery Management Council and tasked with the development of a Draft Groundfish Strategic Plan for review and comment by the Council, its Advisory Entities, and the Public.

The members of the Ad-Hoc Committee were selected from the Council membership or as a Council member's designee.

This draft document was prepared through a consensus decision-making process and is the work-product of all members of the Committee.

The Groundfish Strategic Plan Document is *not* proposed as a Fishery Management Plan amendment. Rather, the purpose of the Groundfish Strategic Plan is to guide the future management of the Groundfish Fishery, including development of Plan amendments, regulations, and other implementation actions as needed.

Ad-Hoc Groundfish Strategic Plan Committee Members

Robert Alverson, Fishing Vessel Owners Association
Phil Anderson, Washington Department of Fish & Wildlife
Ralph Brown, Commercial Fisherman
Neal Coenen, Oregon Department of Fish & Wildlife
Bob Fletcher, Sportfishing Association of California
Dave Hanson, Committee Chair, Pacific States Marine Fisheries Commission
Bill Robinson, National Marine Fisheries Service
Patty Wolf, California Department of Fish & Game

Council Staff, NOAA Legal Counsel and Facilitator

Don McIsaac/Jim Glock, Pacific Fishery Management Council
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Pacific Fishery Management Council
Groundfish Fishery
Strategic Plan

Table of Contents

The Pacific Fishery Management Council
Pacific Groundfish Fishery
Strategic Plan

<u>Executive Summary</u>

I. The Strategic Plan Overview – "Where Do We Want To Go?"

<u>A. Context and Need for Strategic Planning in the Groundfish Fishery</u>

The Pacific Fishery Management Council (Council) formed the Groundfish Strategic Planning Committee because it needed an advisory group that could work outside of the hectic Council meetings to craft a long-term vision for the future of groundfish fisheries and groundfish management. Several groundfish stocks are severely depleted and need strong protective management to rebuild. Commercial and recreational discards are not monitored, and those discards have unknown effects on the health of groundfish stocks. There is little information about the effects of fishing and non-fishing activities on groundfish habitat. Scientific efforts to assess the status of groundfish stocks, life histories, and habitat needs have been grossly underfunded.

The groundfish resource is cannot support the number of vessels now catching and landing groundfish. There are over 2,000 licensed West Coast commercial fishers, and many thousands of sport fishers. To bring harvest capacity in line with resource productivity, the number of vessels in most fishery sectors will have to be reduced by at least 50%. Coastal ports have significant shoreside infrastructures to support this once-prosperous industry, such as processing plants, boat yards, machine shops, marine supply stores, motels, and restaurants. Fishing fleet overcapitalization has been a major factor in fish stock depletion, and the industry and coastal communities are facing an economic and social crisis.

This strategic plan is intended to provide guidance for groundfish management in 2001 and beyond. It is intended to be a resource for Council efforts to rebuild depleted stocks and maintain healthy stocks. And, it is intended to guide Council efforts to reduce the size of the fishing fleet to a level that is both biologically sustainable for the resource and economically sustainable for the fishing fleet.

The Committee expects that, to be effective, this strategic plan will have to address the difficult issues of: reducing fishing capacity, setting more responsible harvest rates, making allocation decisions, meeting scientific needs, protecting habitat, and improving the Council management processes. This planning work will take place during a time when fishery restrictions will be used to rebuild overfished stocks. These conditions provide the clearest evidence of the need for a longer-term vision and road map for the future of groundfish management.

The Committee designed a process and schedule to get key information, identify specific problems and develop a range of solutions. The Committee has developed a draft strategic plan document for Council and public review that:

$ Recommends new management goals and objectives;
$ Initiates new groundfish plan amendments for the 2001 management cycle;
$ Outlines detailed actions for Council work plans and a schedule of priorities for the next 3-5 years; and
$ Develops specific recommendations for other entities to address that will complement the Council's needed management changes; such recommendations may propose changes in law, calls for budget support, and expectations for improving coordination between industry, government and educational institutions.

B. Vision For The Future Of The Groundfish Fishery

The Strategic Plan's vision for the future of the groundfish fishery assumes that the Plan's recommended actions are fully implemented with passage of sufficient time for the anticipated benefits to have been fully realized. The Plan's drafters recognize that the transition to this future will require major changes in the structure and operation of the fishery, which will certainly have short-term adverse effects on current participants. The plan envisions that fishery management decisions are based on sound scientific data and analysis and an open and fair Council process.

1. The Fishery

We envision a future where Pacific groundfish stocks will be healthy, resilient, and where substantial progress has been made rebuilding overfished stocks. Harvest policies will result in total fishery removals that are consistent with the long-term sustainability of the resource. The fishing industry will be substantially reduced in numbers and harvest capacity will be reduced to a level that is in balance with the economic value of the available resource. Those remaining in the fishery will operate in an environment that is diverse, stable, market-driven, profitable, and adaptive over a range of ocean conditions and stock sizes.

Unlimited or open access to the groundfish fishery will no longer exist because current open access participants will be brought into the limited entry program and the number of participants reduced to those who are most dependent on and committed to the fishery.

Whenever possible, management approaches will create incentives for fishers to operate in ways that are consistent with management goals and objectives.

Allocation disputes will be resolved and all harvest sectors will believe they were treated fairly, including those non-groundfish fisheries where groundfish is an unavoidable incidental catch. Discarded bycatch by all gear groups will be minimal and quantified.

Fishery regulations will be less complex and more easily enforced. Council management may be simplified by removing some species from the FMP through delegation or deferral to state management.

Essential groundfish habitat will be adequately protected and adverse effects from all groundfish fishing gears will be reduced to minimal levels. Marine reserves, or no take zones, will provide a base level of protection as an insurance policy to reduce the risks of uncertain science and long stock rebuilding periods.

The improved operating conditions and profitability for those remaining in the fishery will allow participants to accept responsibility for a portion of the cost of effective science and management, including an at-sea observer program, that is commensurate with the level of benefits associated with exclusive access to the fishery.

Finally, the Council will have full access to all fishery management tools and will use them to provide protection for and reasonable access to groundfish stocks.

2. The Science

The basis for future management of the groundfish fishery relies to a very large degree on the availability of good science. West Coast groundfish science will meet national and international standards, be accepted as credible and will be understood by the all stakeholders. Scientific data collection will be a collaborative process involving partnerships between federal, state, and tribal agencies, the fishing industry, and academia, and may include contributions from private foundations.

Data collection and monitoring programs will provide stock assessments with acceptable levels of uncertainty for use by the Council's scientific, management, and advisory committees. Scientific data collected from the fishery will provide the capability to accurately assess the effects of current and potential fishery management measures on groundfish stocks and fishery participants. Finally, scientific tools will have been developed to provide stock assessments throughout the distribution of the various groundfish stocks geographic ranges incorporating the variability and effects of ocean regime shifts.

3. The Council

Future Council activities will be characterized as open to all stakeholders, inclusive of all views, credible and interactive. Council actions will be documented and easily understood and developed with meaningful involvement by the public, including environmental, commercial and recreational representatives. Council decisions will be documented with readily available explanation and analysis of the underlying biological and socio-economic considerations. Council advisory entities will work together to contribute advice and expertise that results in recommendations that are accepted by stakeholders. Regulations development will be simplified and streamlined. Regulations will be generally stable over multi-year periods, but there will be flexibility to respond quickly when changes are needed.

C. Consequences of Inaction

There is another vision from that presented above. The Council could continue attempting to manage an overcapitalized fleet in the face of declining resource abundance and the necessity to meet stock rebuilding requirements. This will most certainly result in shorter fishing seasons, smaller trip limits, higher discard rates, and the continuous inability to accurately account for fishery-related mortalities. Many fishers will not be able to meet their basic financial responsibilities and will be forced from the fishery by a feeling of futility or bankruptcy. The Council and participating agencies will be overwhelmed by the need to implement short term fixes to long term problems with little or no chance to focus on the underlying problems of the fishery or to develop a long term management strategy.

To avoid this other vision of the future, the Council will have to act swiftly and soon. The Council has a choice in charting the future of the groundfish fishery. Decisions that the Council makes now will have profound effects for years to come.

II. The Strategic Plan "What Will We Do To Get There?"

A. Groundfish Fishery Management

1. Overall Fishery Management Concerns

Strategic Plan Goal For Management Policies

To adopt understandable, enforceable, and stable regulations that, to the greatest extent possible, meet the FMP's goals and objectives and the requirements of the Magnuson-Stevens Act.

Management Policies Recommendations

These recommendations assume that the objective of maintaining year-round harvesting and processing opportunity remains the Council's highest social and economic priority. In that case, it is imperative that Recommendation 1 for capacity reduction be implemented as rapidly as possible. If substantial harvest capacity reductions are not possible or are delayed, the Council must consider several of the alternative strategies for restructuring the fishery to restrict access by some portion of the fishing fleet for major periods.

In the event that none of the recommended measures or alternatives are viable or effective, the Council may have to shorten the annual fishing season. The Strategic Planning Committee cannot emphasize strongly enough the need for some level of observer coverage to evaluate the effectiveness of different management strategies.

1. Develop an implementation plan to reduce capacity initially by at least 50% in each sector. However, the capacity reduction goal will not be fully realized until capacity has been reduced to a level that is in balance with the economic value of the resource and those remaining in the fishery are able to operate profitably and flexibly. The implementation plan should take into account the need to implement other Plan recommendations (i.e., allocations, nearshore rockfish delegation) prior to or at the same time as capacity reduction. Reducing capacity will relieve the need to adopt management policies that are both inefficient and ineffective at achieving the FMP's goals and objectives. By better matching fleet capacity to resource availability, the regulatory structure will become more stable, resulting in regulations that are more enforceable.

2. Explore the use of higher landing limits or other incentives to encourage fisherman to fish with bycatch friendly fishing gear or to fish in areas where bycatch is less likely.

3. Make the necessary allocation decisions so that fishery participants in each sector can plan on a specific share of future OY's. Allocations may be outright percentages or a framework with criteria that specify how the allocation changes as resource availability changes.

4. Consider delegating or deferring nearshore rockfish and other groundfish species, such as scorpionfish, greenling, and cabezon, to the States.

5. All commercial fisheries should be limited through state and/or federal license or permit programs.

2. Harvest Policies

Strategic Plan Goal for Harvest Policies

To establish an allowable level of catch that prevents overfishing while achieving optimum yield based on best available science.

Harvest Policies Recommendations

1. In consideration of the uncertainties in the estimation of ABCs, set optimum yields (OYs) lower than the ABC, manage the fishery to a fixed OY(s), and close the fisheries when the OY is reached.

2. Harvest levels must be increasingly precautionary when less biological information is available, and particularly if monitoring programs fail to provide reliable estimates of total fishery-related mortality. Consider a hierarchal approach, where increased levels of conservatism would be required based on the specific quantity and quality of biological and fisheries information that is available.

3. For unassessed stocks, set precautionary harvest levels based on simple parameters such as a fixed proportion of the mean catch or survey abundance, or as a function of the lowest rate allowed for an assessed stock.

4. To protect weak stocks harvested in multi-species fisheries, adopt a policy requiring closure of the fishery when the ABC or OY of the weak stock has been taken. In setting the OYs, determine whether benefit/cost considerations might justify overfishing a particular weak stock under the mixed-stock exception in the National Standard Guidelines. Do not knowingly allow harvest rates that drive the stock below the level defined in the FMP as "overfished" or to a condition warranting listing under the ESA.

5. Without an international agreement on setting and sharing the total allowable catch for trans-boundary stocks, the Council should conserve that portion of the stock within the geographic range of its authority.

3. Capacity Reduction

Strategic Plan Goal for Capacity Reduction

To have a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems. For the short term, adjust harvest capacity to a level consistent with the allowable harvest levels for the 2000 fishing year, under the assumption that stock rebuilding will require reduced harvests for at least the next two decades. Maintaining a year-round fishery may not be a short-term priority.

Capacity Reduction Recommendations

The highest priority for reducing capacity is Recommendation #1 from the Management Policy section. That recommendation is to develop an implementation plan to reduce capacity initially by at least 50% in each sector. As noted earlier, the capacity reduction goal will not be fully realized until capacity has been reduced to a level that is in balance with the economic value of the resource and those remaining in the fishery are able to operate profitably and flexibly. In designing capacity reduction, the Council should consider fleet structure, profile, and diversity, with a goal of maintaining a mix of small and large vessels.

The capacity reduction plan should take into account the need to implement other strategic plan recommendations (i.e., allocations, nearshore rockfish delegation) prior to or at the same time as capacity reduction. Reducing capacity will relieve the need to adopt management policies that are both inefficient and ineffective at achieving the FMP's goals and objectives. By better matching fleet capacity to resource availability, the regulatory structure will become more stable, resulting in regulations that are more enforceable.

These capacity reduction recommendations include both the short and long-term and transitional elements discussed below, such as license-limitation (for the targeted open access fishery), permit stacking, and IFQs either individually or in combination with a vessel buyback program.

Short to Intermediate Term

1. Separate the current open access fishery into a sector that directly targets groundfish and a sector that lands groundfish as bycatch in non-groundfish fisheries. Require current open access vessels that directly target groundfish to obtain a federal limited entry permit (B permit) based on historical landings and current participation. Minimum landing requirements for a federal permit should reflect significant dependence on the fishery. Consider developing and implementing a voluntary permit stacking program for the B permit. Require a federal permit ("C" permit) to land groundfish taken incidentally in non-groundfish fisheries.

2. Divide the current open access allocation into separate allocations for the “B” and “C” permit holders and manage each sector to stay within its allocation each year.

3. Consider using historical landings only from 1994-1999 and recent participation from either 1998 or 1999 for initially qualifying B permit holders.

4. For the limited entry fixed gear fishery, immediately develop and implement a voluntary permit stacking program with the intent of transitioning to an IFQ program to provide for a multiple month season. The Permit Stacking allowance should be implemented prior to the 2001 regular sablefish season. Stacked permits should **NOT** allow increased access to the daily sablefish trip limit. Simultaneously, develop an IFQ system for fixed-gear sablefish for implementation in 2002. If Congress continues to prohibit IFQ programs, consider making the permit-stacking program mandatory.

5. For the limited entry trawl fleet, immediately develop and implement a voluntary permit-stacking program that links each permit with a cumulative period landing limit with the intent to transition to an IFQ program. The first, or base permit should be entitled to a full period landing limit, while each stacked permit should entitle the vessel to additional landing limits on a discounted basis as one alternative. Another alternative is to have the full period landing limit the same for all permits. If Congress continues to prohibit IFQ programs, consider making the permit-stacking program mandatory.

6. To prevent future overcapacity in the whiting fishery, consider developing and implementing a whiting species endorsement that restricts future participation in the whiting fishery to vessels registered to a permit with a whiting endorsement. Qualification for a whiting endorsement should be based on a permit’s whiting landings since 1994 when the current limited entry program began. Consider setting a threshold quantity of whiting above which a whiting endorsement is required for a landing. Individual landings below the threshold would not require an endorsement.

7. Pursue a buyback program to remove latent capacity.

Intermediate to Long Term

8. Develop of a comprehensive IFQ program for the limited entry trawl fishery, or in the alternative, a mandatory permit-stacking program.

9. Consider establishing a rockfish endorsement for the limited entry fixed gear fleet and open access (B permit) fleet. Qualifying criteria would be based on historical landings and recent participation.

10. Consider access limitation for commercial passenger fishing vessels. (This program may be better managed by the states.)

4. Allocation of Groundfish Resources

Strategic Plan Goal for Allocation

To distribute the harvestable surplus among competing interests in a way that resolves allocation issues on a long-term basis.

Allocation Recommendations

General Allocation Principles

1. All fishing sectors and gear types will contribute to achieving conservation goals (no sector will be held harmless). The fair and equitable standard will be applied to all allocation decisions but is not interpreted to mean exactly proportional impacts or benefits.

2. Non-groundfish fisheries that take groundfish incidentally should receive only the minimal groundfish allocations needed to efficiently harvest their target (non-groundfish) species. To determine the amount of allocation required, identify the economic values and benefits associated with the non-groundfish species. Directed fishery harvest of some groundfish may need to be restricted to incidental levels to maintain the non-groundfish fishery. Consider gear modification in the non-groundfish fishery to minimize its incidental harvest.

3. Modify directed rockfish gears, as needed, to improve their ability to target healthy groundfish species and avoid or reduce mortality of weak groundfish species.

4. When information on total removals by gear type becomes available, consider discards in all allocations between sectors and/or gear types. Each sector will then receive adjustments for discard before allocation shares are distributed.

5. Fairly distribute community economic impacts and the benefits and costs of allocation coast-wide. Allocations should attempt to avoid concentration and assure reasonable

access to nearby resources. Consider the diversity of local and regional fisheries, community dependency on marine resources and processing capacity, and infrastructure in allocation decisions.

6. Consider impacts to habitat and recovery of overfished stocks or endangered species (dependent on affected habitats) when making allocation changes.

7. Allocation decisions should consider and attempt to minimize transfer of effort into other fishery sectors, particularly for state managed fisheries (crab and shrimp).

8. Allocation decisions will: (a) consider ability to meet increased administrative or management costs; and (b) be made if reasonably accurate in-season quota monitoring or annual catch accounting has been established or can be assured to be established and be effective.

9. As the tribe(s) expand their participation in groundfish fisheries, allocations of certain groundfish species may have to be specified for tribal use. In such cases, the Council should ask the affected parties to U.S. v. Washington to convene and develop an allocation recommendation.

Area Management as Related to Allocation

10. Structure allocations considering both the north-south geographic *and* nearshore, shelf and slope distributions of species and their accessibility by various sectors and gears.

11. In addressing recreational/commercial rockfish allocation issues, use the following fishery priorities by species group: for nearshore rockfish, states may recommend a recreational preference, with any excess to be made available for commercial use; for shelf rockfish, the Council may set a recreational preference only on a species-by-species basis; and for slope rockfish, commercial allocation.

12. Licenses, endorsements or quotas established through management or capacity reduction measures may be limited to specific areas through exclusive area registrations and consider port landing requirements.

5. Observer Program for Quantifying Bycatch, Total Catch, and Total Fishery-Related Mortality

Strategic Plan Goal for an Observer Program

To quantify the amount and species of fish caught by the various gears in the groundfish fishery and account for total fishery-related removals.

Observer Program Recommendations

1. Immediately implement an at-sea groundfish observer program, with determination of total groundfish catch and mortality as the first priority, consistent with established Council priorities.

2. Consider the following options to fund an observer program:

a) Seek federal/state funding;

b) Continue to support legislative change to provide authority to collect fees from the fishing fleet to support the observer program;

c) If federal/state or industry funding is not available, make individual vessels responsible for providing some level of observer coverage as a condition of participation in the fishery.

3. Even with limited funding, both trawl and non-trawl fleets should have some meaningful, but not necessarily the same, level of observer coverage. Determine which harvesting sector(s) will receive the initial observers.

4. Consider alternative monitoring approaches that augment an observer program, including logbooks and video.

5. When an effective observer program has been established, a full retention strategy may be considered to reduce discard and improve biological information collection.

6. As a secondary priority, an observer program should collect additional data for stock assessments. For example, the North Pacific Council requires its observers to dedicate a small portion of the working day to taking otoliths and length measurements, in order to supplement information on the age and size distribution of particular species.

6. Marine Reserves as a Groundfish Management Tool

Strategic Plan Goal for Marine Reserves

To use marine reserves as a fishery management tool that contributes to groundfish conservation and management goals, has measurable effects, and is integrated with other fishery management approaches.

Marine Reserves Recommendations

1. Adopt marine reserves as a fishery management tool for Pacific groundfish and proceed with implementation, as appropriate.

2. Identify the specific objectives that marine reserves are expected to meet.

3. Develop siting and design criteria, including the size of the reserve, that will meet specified marine reserve objectives. Analyze options for establishing reserves that include nearshore, shelf, and slope habitat.

4. Adopt final siting criteria, including reserve size and location, and proceed with implementation and evaluation as quickly as possible, to ensure compatibility with other management changes.

5. Direct the Scientific and Statistical Committee to recommend new methodologies for continued stock assessments and for establishing harvest levels outside the reserves following the implementation of reserves.

7. Groundfish Habitat

Strategic Plan Goal for Pacific Groundfish Habitat

To protect, maintain, and/or recover those habitats necessary for healthy fish populations and the productivity of those habitats.

Pacific Groundfish Habitat Recommendations

1. Consider regulatory changes (including incentive systems) that result in modification or elimination of fishing gears or fishing practices that are determined to adversely affect EFH areas of concern such as nearshore and shelf rock-reef habitats.

2. Develop and implement gear performance standards for hook and line, pot, set gillnet, and trawl to increase gear selectivity, protect habitat, and/or decrease ghost fishing by lost gear.

3. Promote scientific research on the effects of fishing gear on various habitats.

4. Promote research to modify existing gear and practices to provide practical, economically viable alternatives to fishing gear that adversely affects habitats.

5. Identify habitats necessary for healthy fish populations and identify locations of those habitats.

B. Science, Data Collection, Monitoring, and Analysis

Strategic Plan Goal for Science, Data Collection, Monitoring, and Analysis

To provide comprehensive, objective, reproducible, and credible information in an understandable and timely manner to meet our conservation and management objectives.

Science Recommendations

1. Prioritize stock assessments for suspected "weak stocks" in mixed-stock fisheries.

2. Create cooperative partnerships between state, federal, private foundations, and other private entities to collect and analyze the scientific data needed to manage groundfish.

3. Promote improved mutual understanding, communication and credibility between the fishing industry and scientists through increased communication and collaboration, including at-sea ride-alongs.

4. Develop methods for incorporating fisher observations into stock assessment and monitoring programs, including employing commercial fishing vessels to conduct cooperative resource surveys and to collect other scientific data.

5. Implement the Council's draft West Coast Fisheries Economic Data Plan.

6. Ensure that economists and social scientists are adequately included on Council plan teams and ad hoc committees where appropriate, to ensure that all dimensions of management issues, options, and solutions are well reflected in their input to the Council.

7. Hold an annual or bi-annual meeting of U.S./Canada and/or U.S./Mexico stock assessment scientists to plan upcoming (preferably joint) assessments of transboundary stocks. The U.S./Canada portion of this recommendation could be conducted under the umbrella of the existing U.S./Canada Groundfish Technical Subcommittee.

8. Meet annually with National Marine Fisheries Service's Northwest and Southwest Regions and Science Centers and the Pacific States Marine Fisheries Commission to integrate the Council's data and research needs into NOAA's budget process.

9. Meet with the states and NMFS to develop a joint multi-year research and data collection/analysis plan for west coast groundfish.

10. Direct scientific efforts to measure the changes in groundfish productivity due to ocean environmental changes.

11. Obtain a dedicated research vessel(s) to perform annual surveys and collect other data needed to manage the coastwide groundfish under Council jurisdiction.

C. Council Process and Effective Public Involvement During and Beyond the Transition

Strategic Plan Goals for Council Process

$ *To establish and maintain a management process that is transparent, participatory, understandable, accessible, consistent, effective, credible, and adaptable;*

$ *To provide a public forum that can respond in a timely way to the needs of the resource and to the communities and individuals who depend on them; and*

$ *To establish a long-term view with clear, measurable goals and objectives.*

Council Process Recommendations

1. Encourage long term thinking so the Council can suggest creative solutions to Congress and NMFS during the Magnuson-Stevens Act reauthorization process.

2. Establish a performance evaluation committee to periodically and critically review progress made towards Council goals and objectives. The committee should also analyze improvements needed in Council procedures to maintain efficiency.

3. Update goals and objectives in the FMP to incorporate the strategic plan's vision and goals. These updated goals and objectives should: (a) be measurable, (b) have minimal conflicts, and (c) be clearly prioritized wherever possible.

4. Continue to routinely update its mailing lists and ensure that they contain commercial and recreational fishing associations, conservation and environmental groups, commercial licensed fishers for groundfish and other fishery species, local port offices, media contacts, and community-based organizations.

5. More effectively use newsletters, web page displays, public forums, news releases, and public service announcements to improve public participation in Council activities and decisions.

6. Make draft agendas available earlier to the local media from fishing communities, highlighting key issues.

7. Sponsor workshops to explain the Council process, its role and responsibility relative to fishery management, the roles of its committees and advisory entities, and the various opportunities for public involvement. Workshops should be held by the Council and state agencies in local port communities.

III. "How Will We Measure Success?" Implementing and Updating the Strategic Plan

<u>A. Proposed Implementation Process</u>

Implementing the Strategic Plan Recommendations

1. At the September 2000 Council meeting, the Council adopts the Final Groundfish Strategic Plan document (per revisions incorporated after the summer public comment phase).

2. The Council directs the formation of a "Groundfish Strategic Plan Implementation Oversight Committee" which should be composed of Council members, some of which will have been members of the Strategic Plan Development Committee, to ensure continuity and an effective transition to implementation.

3. At its discretion, the Implementation Oversight Committee may establish small implementation development teams to develop specific alternative(s) for implementing elements of the Strategic Plan. Implementation development teams will be comprised of Council subpanel, management team, and committee members from the GMT, GAP, SSC, EC, and members of the public as deemed necessary by the Implementation Oversight Committee.

4. The Implementation Oversight Committee works at direction of the Council and is tasked with making recommendations regarding implementation of the strategic plan.

5. The Implementation Oversight Committee **goals** should include: (a) effective transition to the implementation phase, (b) ensuring the plan is implemented in a timely fashion, and (c) whenever possible, doing so in a fashion that provides for constituent acceptance and buy-in.

6. At the direction of the Council, the Implementation Oversight Committee will develop recommended schedules for carrying out all components of the strategic plan.

7. The Implementation Oversight Committee will develop recommendations for all components of the strategic plan that can be developed further: (a) directly by the Council, (b) via advisory entity assignments, or (c) through formation and use of a implementation development team approach, e.g., capacity reduction implementation development team(s), which would handle all of the complexities of addressing the implementation of capacity reduction. For example, there might be four teams – with industry representatives from trawl, fixed gear, open access with groundfish target, and open access with non-groundfish target. Each of these teams will also have a representative from the Implementation Oversight Committee, with a charge to develop a plan and product by “x” date. The Implementation Oversight Committee considers the work of the implementation development teams and develops the final recommendations for the Council. Clarification, input, and technical support will be available to all teams with “on-call” availability from Council staff, states, NMFS staff and General Counsel, etc.

8. It will be important to consider current conditions in the groundfish fishery, including the effects of recent changes in resource status, fishery management, and the environment, as part of the strategic plan implementation process.

B. Measuring Success

Options for Updating the Groundfish Strategic Plan Document

A good strategic plan is rigid enough to have clearly-stated, expected results but also flexible enough to modify when evaluation indicates change is necessary. The Council wishes to maximize the value of the time, energy, and money invested in its strategic plan by regularly evaluating the plan's effectiveness and initiating changes as deemed necessary to enhance success. The Council also recognizes that periodic review provides plan continuity for Council members and staff, and promotes public awareness.

Updating The Strategic Plan Recommendations

The Council should schedule a routine review every five years. If a Council member determines that a review should occur more frequently, the member could seek to have the review placed on the Council agenda in the same manner that other actions are placed on the agenda. When the review takes place, the Council should follow the standard Council meeting process and take written and oral public comment, and involve the appropriate advisory entities.

Agenda Item F.3.b
Supplemental EC Report
June 2014

ENFORCEMENT CONSULTANTS REPORT ON
OMNIBUS REGULATION CHANGES, PART I

The Enforcement Consultants (EC) has reviewed the documents pertaining to Agenda Item F.3.a, June 2014 and has the following comments. Referencing Attachment 2, *Initial Compilation of Possible Groundfish Management Measures for Council Considerations,* the EC recommends the following be moved forward for final rule making.

Table 1 (A):

- Seabird Rule-Mandatory Streamers for vessels fifty five feet or greater
- Fishery Declaration Enhancements
- Update E-Ticket for Web-based Submissions
- Require E-Tickets for Sablefish Landings

Seabird Rule-Mandatory Streamers: Council action has been completed. Considering the Endangered Species Act (ESA) implications for this fishery, completion of this rule should be considered a high priority.

Fishery Declaration Enhancement: Council action has been completed. The United States Coast Guard (USCG) notification problem identified under Council consideration of this action has been addressed by increasing NOAA Fisheries Office of Law Enforcement (OLE) and USCG daily/weekly communications. The EC suggests this action be rolled into the next Groundfish rule making opportunity.

Update E-Ticket for Web-based Submission: Moving E-Ticket to a web-based platform represents a significant enhancement for E-Ticket reporting on the West Coast and should be supported by federal rule making at the earliest opportunity.

Require E-Tickets for Sablefish Landings: A recently completed Department of Commerce (DOC) Office of Inspector General (OIG) report found that NMFS was not adequately tracking sablefish tier status' in-season and subsequently was not pursuing enforcement of tier overage violations. E-Ticket reporting of all West Coast sablefish landings will give enforcement the necessary tool to track individual limited entry permit (LEP) tier status and cumulative bi-monthly, weekly, and daily trip limits, in both the daily-trip-limit (DTL) and open access (OA) fisheries.

Table 1(C):

- Increase Vessel Monitoring System (VMS) Ping Rate.

Increase VMS Ping Rate: The EC places this issue among its highest priorities and asks the Council to schedule it for action at the earliest opportunity. In discussions with Council staff, if given a high priority for the September meeting, alternatives could be developed for the November Council meeting for Council action on a preliminary preferred alternative (PPA) in

March, with final action in April. This schedule establishes a realistic expectation that regulations could be in place by January 2016. In light of the significant need to maintain a vigorous Rockfish Conservation Area and essential fish habitat monitoring capability, any further delay of this action would be highly detrimental to enforcement's ability to ensure closed/conservation area integrity. The EC requests that this item be identified for focus in development of background information for September.

In conclusion the EC recommends:

1. The following be moved forward for final rule making.
   Table 1 (A):
   - Seabird Rule-Mandatory Streamers for Vessels greater than fifty five feet
   - Fishery Declaration Enhancements
   - Update E-Ticket for Web-based Submissions
   - Require E-Tickets for Sablefish Landings

2. Increasing the VMS ping rate be given a high September scheduling priority with follow-on expedited action.

PFMC
06/21/14

Agenda Item F.3.b
Supplemental GAP Report
June 2014

GROUNDFISH ADVISORY SUBPANEL REPORT ON GROUNDFISH OMNIBUS REGULATION CHANGES PART I/INITIAL COMPILATION OF MANAGEMENT MEASURES

The Groundfish Advisory Subpanel (GAP) heard a report by Ms. Kelly Ames and Mr. Jim Seger and offers the following comments on the Omnibus Regulation Changes.

Adaptive Management Program

As noted in No. 54 and (and No. 12) on the list, the GAP supports Alternative 2 for continued pass-through of Adaptive Management Program (AMP) quota pounds. Most recently, the GAP commented on this in March and in several statements before that. The GAP continues to believe that the AMP is a solution looking for a problem and that no valid problems have been brought forward that would be solved by initiating the AMP. There are many more pressing matters that could create efficiencies in the trawl rationalization program that should be considered before this issue. We suggest No. 54 simply be removed.

Sections A, B and C of the Omnibus list

First, we referred to and copied the template found in Agenda Item F.3.a, Initial Compilation of Possible Groundfish Management Measures for Council Consideration, so the discussion is easier to follow.

Second, we've added some columns to the right of each numbered item that we hope provides the Council guidance for prioritization of these issues in September. The columns are as follows:

- In sections A and B: GAP comments: We realize most of the issues in these sections are already in the works and that the Council is not prioritizing anything at this meeting. However, we request National Marine Fisheries Service (NMFS) provide the Council and advisory bodies with a clearer idea of which items *the agency* sees as a priority due to workload, budgets, staff, etc.

  The GAP recognizes that anything with a hard timeline imposed by courts or biological opinions or the like should be met.

- In section C: GAP "on or off" the list and comments: These boxes makes it clear which of the items we view as ones the Council should prioritize in September and which could be delayed. We expect further refinement of these items under F.9, Omnibus II and/or at the September Council meeting.

Third, we have listed eight issues at the end that we'd like to see added to the list. Any Council guidance related to these issues can be addressed in F.9, Omnibus II, or in September.

GAP discussion

As a prelude to consideration of individual items on the list, GAP members spent a bit of time expressing frustration at the laundry list of items, many of which should have been implemented years ago. On one hand, we – and the Council – have spent a several meetings shuffling some items from one list to another before they were put on this omnibus list; on the other hand, perhaps *this* omnibus list finally will allow for a consistent follow-through for completion. In short, let's stop spending our time making lists and instead get things done.

Many GAP members also expressed frustration at what seems to be a bottleneck at NMFS and are skeptical that few items in the omnibus will actually move forward. This points to the greater problem of damaging the successful working relationship industry has had with NMFS for years.

In addition to the greater level of analysis being required for action, multiple layers of review and bureaucracy is destroying a fishery and creating a dysfunctional system.

While the GAP recognizes these problems, we also request both NMFS and the Council consider what additional actions members of the GAP, as individuals and as an advisory panel, can take to assist in implementation of backlogged issues. The GAP would like to remind the Council that the trawl catch share program participants are now paying cost recovery fees to offset management costs and it is still unclear what tasks are actually being completed with these dollars. Continuing delays threaten the success of the quota share program.

Relative to the task at hand, the GAP recognizes the most important items deal with moving the annual harvest specifications and management measures through the process. Any efficiencies we can gain here are paramount as they will affect the entire industry. Items specific to individual sectors are secondary, but barely. While it may appear the omnibus list is overloaded with items related to the trawl rationalization program, many of these issues are not new and were in fact identified prior to implementation of the program. Without inferring any additional priority at this time, all sectors should have items that move forward for prioritization in September.

	Sector	Short Title	
A. Items on Which Council Action Has Been Completed Which Still Entail Some Workload			**GAP comments**
1.	Trawl, Non-Trawl, Rec	2015-2016 Harvest Specifications and Management Measures and Amendment 24 (June 2014)	This is of utmost importance to get accomplished so the new harvest specifications are available for harvest on Jan. 1, 2015 (e.g., higher petrale and sablefish ACLs).
2.	Trawl and Non-Trawl	Seabird Rule - Mandatory Streamers for vessels ≥ 55'	It's important for NMFS to meet the timeline dictated in the BiOp
3.	Trawl and Non-Trawl	Clarify Catch Accounting Rules for Amendment 21	--
4.	Trawl and Non-Trawl	Fishery Declaration Enhancements	--
5.	Trawl IFQ, MS, & CP	Cost Recovery Corrections	--
6.	Trawl IFQ & MS	Electronic Monitoring Exempted Fishing Permits (if final in June 2014)	This is important to the GAP, as we have stated in Agenda Items F.2 and F.5.
7.	Trawl IFQ & MS	Pacific Dawn Lawsuit Appeal to District Court	--
8.	Trawl IFQ & MS	Whiting Cleanup Rule, Including Maximized Retention Regulations	This should be simple to do, but why is this holding up the whiting season start date (No. 11)? It's important to finish so the shorebased whiting season date change goes into effect in 2015.
9.	Trawl CP	Glacier Fish Co Lawsuit (Cost Recovery)	--
10.	Trawl IFQ	Joint Registration and Prohibition of Processing IFQ Sablefish	Yes, move this forward. We understand the workload is not huge.
11.	Trawl IFQ	Move Shorebased Whiting Season Opening Dates	Yes, this is a priority for the GAP. See also No. 8.
12.	Trawl IFQ	Continue Adaptive Management Program Pass-Through	As the GAP has said in past statements, this should move forward indefinitely: Alternative 2, from F.3.a, Attachment 1, "AMP Quota Pound Pass-through."
13.	Trawl IFQ	Update eTicket for Web-based Submissions	Low priority; web-based submissions already are in use, but not required by regulation. As such, the timing of this measure isn't critical.
14.	Trawl IFQ	Rule for Forfeitures for Exceeding Aggregate NonWhiting Control Limit	The GAP suggests this move forward to be done by the transfer date deadline but any proposed date change is up to the Council.
15.	LEFG	Revise Limited Entry Fixed Gear Permit Control Rule (If Recommended)	These items were or will be addressed under agenda item F.6, Sablefish Catch Share Program Review.
16.	LEFG and OA	Require E-Tickets for Sablefish Landings (If Recommended)	
17.	LEFG and OA	Sablefish North of 36 Degrees - Allocation Correction	
18.	LEFG and OA	Logbooks for Fixed Gear	This is stale, not needed. Revisit the original purpose to see if the needs still apply.
19.	OA	Amendment 22 - Open Access License Limitation	This should move forward for situations such as the rougheye situation – it's important to reach the people involved. There are management benefits, such as more precise inseason trip limits for sablefish.

B. Immediate and Long-Term Commitments			
Currently on the Year at a Glance Schedule (See also Agenda Item C.6.a, Attachment 1)			**GAP comments**
20.	Trawl, Non-Trawl, Rec	Inseason Management (Sept 2014 and beyond, excluding March 2015)	No comment
21.	Trawl, Non-Trawl, Rec	Adopt Final Stock Assessment Plan and TOR for 2015 (Sept 2014)	No comment
22.	Trawl, Non-Trawl, Rec	Develop a COP for Groundfish Methodology Review Process (Sept and Nov 2014)	No comment
23.	Trawl, Non-Trawl, Rec	Omnibus Regulations Changes (Sept and Nov 2014, Mar-June 2015)	No comment
24.	Trawl, Non-Trawl, Rec	Essential Fish Habitat: Phase 3 of the 5 Year Review (Sept 2014)	Low priority
25.	Trawl, Non-Trawl, Rec	Amendment 25: Comprehensive Ecosystem-Based Amendment (Sept 2014 and Mar 2015)	Low priority
26.	Trawl, Non-Trawl, Rec	2015 Pacific Halibut Catch Sharing Plan (Sept and Nov 2014)	No comment
27.	Trawl, Non-Trawl, Rec	2015 Incidental Regulations for Pacific Halibut (Mar and Apr 2015)	No comment
28.	Trawl, Non-trawl, Rec	Stock Assessments for 2017-2018 Biennium (June 2015)	No comment
29.	Trawl, Non-Trawl, Rec	Start of the Process to Establish 2017-2018 Specifications and Regulations (June 2015)	High priority
30.	Trawl IFQ & MS	Electronic Monitoring Regulations (Sept 2014, June 2015)	High priority
Items on the Horizon			
31.	Trawl IFQ, MS, & CP	Five Year Review (Starts in 2016)	No comment
32.	Trawl IFQ	QS/QP Control Rule - Safe Harbor for Risk Pools - post 5-year review	Low priority
33.	Trawl IFQ	Resolve Long-term Whiting Surplus Carryover Provision - post 5- year review	Should be removed from prioritization, since this will be dealt with under the 5-year program review.

C. Candidate Items for Prioritization in September			Council notes	GAP on or off the list	GAP comments
34.	Trawl, Non-Trawl, Rec	Rebuilding Revision Rules (signal vs. noise)		ON	--
35.	Trawl, Non-Trawl, Rec	Further Consideration for Reorganizing Stock Complexes		OFF	--
36.	Trawl and Non-Trawl	Groundfish Conservation Areas for Rougheye Rockfish		OFF	--
37.	Trawl and Non-Trawl	New Dressed to Round Conversion Factors for Sablefish		ON	--
38.	Trawl and Non-Trawl	Increase VMS Ping Rates		OFF	--
39.	Trawl and Non-Trawl (LE)	Eliminate Permit Size Endorsements		n/a	Not applicable at this time. The GAP may discuss this further at a later date.
40.	Trawl and Non-Trawl	Seabird Avoidance Devices for Vessels less than 55 feet		ON	--
41.	Trawl IFQ, MS & CP	Revise Length of Time Required for the Trawl Fleet to Retain Records		OFF	--
42.	Trawl IFQ (& MS &CP?)	Fishery Declaration Enhancements (With Gear Stowed and Testing Gear)		ON	We would like to change the declaration requirements that would allow a catcher vessel that delivers its last delivery to a mothership to be able to make a declaration, then start a new fishing trip on the way to shore and deliver to a shoreside processor.
43.	Trawl IFQ, MS & CP	Year Round Whiting Season and Other Modifications		ON	As part of this package, the GAP requests other modifications include the ability for MS and CPs to process whiting below 42° N. lat.
44.	Trawl IFQ, MS & CP	Revise Regulations on At-Sea and Shoreside Flow Scales		ON	--
45.	Trawl IFQ	Gear Use - Multiple Gears Onboard and Use		ON	--
46.	Trawl IFQ and LE Pot	Remove Certain Area-Management Restrictions		ON	The GAP requests the Council/NMFS continue to refine non-trawl/rec RCA lines as well.
47.	Trawl IFQ	Remove Certain Restrictions on Trawl Gear Configuration		ON	--
48.	Trawl IFQ	Resolve Long-term Non-Whiting Surplus Carryover Provision		ON	--
49.	Trawl IFQ	Carryover when Management Units Change		ON	The GAP recognizes this also is likely dependent on keeping No. 48 on the priority list.
50.	Trawl IFQ	Allow Trading of Previous Year Quota Pounds in Current Year		ON	--
51.	Trawl IFQ	Widow Rockfish QS Reallocation		ON	--

C. Candidate Items for Prioritization in September			Council notes	GAP on or off the list	GAP comments
52.	Trawl IFQ	Discard Survival Credit for Lingcod and Sablefish		ON	--
53.	Trawl IFQ	Require Posting of First Receiver Site Licenses		OFF	--
54.	Trawl IFQ	Develop Criteria for Distributing Adaptive Management Program QP		OFF	See also comments under No. 12
55.	LEFG	Cost Recovery for the Permit Stacking Program		ON	--
56.	LEFG and OA	Commercial Gear Restriction for Targeting Flatfish in CA		OFF	--
57.	LEFG and OA	Retain Halibut in the Sablefish Fishery (South of Pt. Chehalis)		ON	--
58.	Recreational	50 fm Depth Restriction (WA and OR)		ON	--
59.	Recreational	Mid-water Sport Fishery (OR and CA)		ON	--

Items to be added to the prioritization list

The GAP requests the following five items be added to the prioritization list. Brief descriptions are provided here but we expect details of these issues to be made available in September.

1. Equal share rockfish transfer between sectors: Allow MS sector participants voluntary access to their quota pounds in their shoreside IFQ accounts of four rockfish species (canary, darkblotched, widow and POP) that are based on the "equal share" of the catch history of the permits retired through the buyback loan program. Allow transfer of these rockfish quota pounds to the at-sea mothership fishery cooperative on an annual basis and only up to the equal share allocation amount if constraining species bycatch limits are constraining the at-sea fishery operations and threatening participants' ability to obtain their whiting allocation.

2. The 60-mile bank RCA lines: An area known as the 60-mile bank is a cowcod-rich area along the U.S./Mexico border. This area is not marked with RCA lines, leaving it unenforceable by California Department of Fish and Wildlife (CDFW). This creates a huge area deeper than 60 fathoms that is fished without enforcement. The 60 mile bank needs to be clearly defined so both vessels and enforcement are on the same page and cowcod limits are not exceeded.

3. Blackgill allocation: The trawl/non-trawl allocations currently in place for blackgill rockfish management are currently incorrect, leading to complications between the traditional non-trawl fixed-gear fleet and the IFQ fixed-gear fleet in the Conception management area.

There has been an increase in the targeting of blackgill by the IFQ fleet, so fixing the allocation is necessary.

4. Oregon and Washington nearshore management: The GAP understands both the Oregon and Washington Departments of Fish and Wildlife are requesting state management of nearshore fisheries. The GAP understands this may cause some workload issues but supports adding these items to the Omnibus list.

5. Combine the LE DTL fishery and the tier fishery: The GAP would like to propose the addition of analysis to combine the daily trip limit fishery with the permitted tier fishery. The analysis would include selection of a window period and conversion of the pounds caught during that period to specific permits. This would also encompass the unendorsed sablefish permits. If the Council requests, we can make more information available about this option under F.9, Omnibus II.

6. Retrieve derelict crab gear in the RCA: At the request of some members of the public and the states, the GAP suggests exploring the ability to retrieve derelict Dungeness crab gear while transiting the RCA. Currently, derelict gear is a safety issue and also leads to gear conflicts. This may be avoided by being able to pick up stray crab pots while returning from a sablefish trip, for example.

7. Exploration of flexible regulations that allow transfer of overfished species between sectors to prevent stranding target fish.

8. The use of descending devices in the rod-and-reel nearshore commercial fisheries. The GAP requests consideration of allowing the same depth-based mortality rates for cowcod, canary and yelloweye in the commercial fisheries as allowed in the recreational fisheries.

PFMC
06/21/14

GROUNDFISH MANAGEMENT TEAM REPORT ON OMNIBUS REGULATION CHANGES - PART I

The Groundfish Management Team (GMT) reviewed and discussed the materials provided under this Agenda Item and provides the following comments.

Trawl Individual Fishing Quota Program Adaptive Management Program (AMP) Pass-Through

The GMT only spent a small amount of time discussing the alternatives for AMP in the trawl individual fishing quota (IFQ) program, but sees value in Action Alternative 1, Sub-Option B (Agenda Item F.3.a Attachment 1) that would consider AMP quota pound (QP) allocation procedures as part of the five-year review and specifically, after the implementation of regulations resulting from the five-year review. Issues may rise to the surface during the review that will provide further direction on how best to handle the distribution of non-whiting quota shares and Pacific halibut individual bycatch quota pounds currently reserved for the AMP. The GMT notes that additional work will be needed on AMP if the Council selects Alternative 1B, which could be added to Section B, Immediate and Long-Term Commitments, on the list of management measures identified as "on the horizon" (Agenda Item F.3.a Attachment 2).

New Rule Clarifications for Trawl Trailing Actions

At the time of the GMT discussion, we understand that the National Marine Fisheries Service (NMFS) had not identified any issues with implementation of the chafing gear rule and the observer/catch monitoring rule.

Omnibus Regulation Changes

The GMT reviewed and discussed the initial compilation of management measures for Council consideration (Agenda Item F.3.a, Attachment 2) and the summary of documents intended to help the Council in the prioritization exercise (Agenda Item F.3.a, Attachment 3). While the list of near complete, near and long-term commitments, along with new management measures provided in Attachment 2 may seem overwhelming, the GMT appreciates that listing them all in one place presents the opportunity to evaluate groundfish management measures in a holistic manner that provides a process for establishing Council priorities and addressing workload issues.

The GMT often provides comments during the Future Council Meeting Agenda and Workload Planning agenda items to highlight the expected workload associated with analyzing groundfish issues under Council consideration. This has become more important as the level of analysis and documentation has changed and now requires much more time and effort. In addition, the GMT's role in stock assessment review (STAR) panels (item B-21) has increased with members of the GMT often responsible for providing detailed summaries of regulations and working with stock assessment authors in advance to ensure that correct data are used; all of this requires additional time, not just for the GMT but for all advisory bodies (e.g., the GAP and Scientific andn Statistical Committee, SSC). As science advancements provide the opportunity for a greater number of assessments (e.g., increase in data moderate assessments), it has become clear that sufficient time is necessary to develop corresponding management measures (items B-28 and B-29). It has become increasingly difficult to have the necessary discussions, conduct analysis, and complete reports within the time frames we have traditionally used. Therefore, we see this prioritization exercise as an opportunity to be more strategic and consider new ways for packaging multiple management measures in ways that provide the biggest efficiencies.

The GMT discussed that the current list of management measures is dominated by those focused on the trawl sector; however, we recognize that a lot of the trawl items address issues that arose following the implementation of the trawl IFQ program and are needed for regulatory streamlining. While there was some discussion about whether future measures should be more evenly distributed by sector, the GMT acknowledged that items should be considered based on need rather than an attempt to set an arbitrary standard of even representation. Alternatively, we do not want to see items being repeatedly delayed or postponed, such as the recreational midwater fishery item which first appeared on a "year-at-a-glance" calendar in November of 2012 (Agenda Item F.4.a, Supplemental Attachment 3, November 2012), for discussion in June 2013, but has yet to occur.

Next, the GMT discussed alternative ways of creating packages of regulatory bundles that might be easier to analyze and more efficient to implement. These regulatory packages could be bundled in a variety of ways, we provide a couple of examples below:

- Items that would be relatively easy versus those that would be more complicated, in terms of both the analysis needed and implementation
- Enforcement issues
- Groundfish management areas for all groundfish (commercial and recreational) sectors

The GMT provides some initial thoughts on the items within the sections (A, B, and C of Attachment 2) with the understanding that more information will be available from NMFS and Council staff in September to further inform prioritization.

Section A: Items Which Action Has Been Completed Which Still Entail Some Workload

At this time, the GMT has no additions to the items in Section A.

Section B: Immediate and Long-Term Commitments

The GMT recommends that discard mortality rates currently used in the nearshore bycatch model and by the West Coast Groundfish Observer Program (WCGOP) in the annual groundfish mortality reports be added to the list in Section B, Immediate and Long-Term Commitments. There is little documentation for applying the discard mortality rates (100 percent) for some rockfish in the deeper depth strata (e.g., deeper than 20 fathoms). This rate is higher than that used in the recreational fisheries and the GMT would like to ensure it's accurate. This would require GMT time as well as the appropriate review by the SSC, if changes to the rates are needed.

Section C: Candidate Items for Prioritization in September

The GMT also identified management measures that we recommend be included in Section C, Candidate Items for Prioritization in September (the order below is not prioritized).

- Further consideration for ecosystem component (EC) species, for example developing management measures for EC species that would prevent future fisheries from starting up.
- Evaluate groundfish management performance and the need to adjustment management measures by comparing the multi-year average catch against an average annual catch limit (ACL). National Standard 1 Guidelines (see 74 FR 3178) references such an approach which could provide stability for industry and reduce workload for the Council and NMFS.
- Consider mortality rates reflecting the use of descending devices in the rod-and-reel component of the commercial nearshore fishery.
- Continuation of model reviews and refinement

If the Council provides guidance on the criteria for prioritization the GMT could further evaluate the management measures as well as the Public Comment submitted under this agenda item. To further assist the Council in prioritizing these items, the GMT could provide information on what work has been done, how complex the discussions about the items may be, as well as the anticipated workload, for each management measure in Section C of the list in Attachment 2 under Agenda Item F.9 at this meeting.

GMT Recommendations:

1. The GMT recommends that discard mortality rates currently used in the nearshore bycatch model and by the West Coast Groundfish Observer Program (WCGOP) in the annual groundfish mortality reports be added to the list in Section B, Immediate and Long-Term Commitments.
2. The GMT recommends including the items listed above under Section C, Candidate Items for Prioritization in September be added to the list.

PFMC
06/21/14

OREGON DEPARTMENT OF FISH AND WILDLIFE REPORT ON DEFFERING NEARSHORE GROUNDFISH MANAGEMENT AUTHORITY TO THE STATE OF OREGON

We, the Oregon Department of Fish and Wildlife (ODFW), request exploration of deferral of nearshore species (i.e., nearshore rockfish, cabezon, and kelp greenling) management to state oversight, specifically, by adding this issue to the 'Omnibus' list.

Since these species principally occur entirely within our state waters, full deferral to the state for the entire stock ranges is most efficient and logical. Per federal law, the Submerged Lands Act (43 USC 1301-1315) and the Magnuson-Stevens Act (16 USC 1801-1882) provide jurisdiction of marine resources, including fisheries stocks, to the states. Accordingly, to officially transfer management authority of the stocks to the states, the Pacific Fishery Management Council (PFMC) and National Marine Fisheries Service (NMFS) will have to amend the federal Groundfish Fishery Management Plan (FMP) to exclude each state's respective component stocks. In doing so, the onus will shift to our state management process, which already includes a strategic management framework for these species, with goals synonymous to those of the National Standards, but with greater emphasis on local conservation, communities, and economies.

Additionally, the Council recognized the appropriateness of deferral of nearshore management to the states during the development of the Groundfish Fishery Strategic Plan (plan), adopted in 2000. When answering the question "What are some strategies for increasing enforcement effectiveness and reducing complexity", the need for deferring nearshore species is detailed: "Review the scope of the management unit, particularly with respect to nearshore rockfish management. Consider delegating or deferring to the states management of nearshore rockfish species that reside in and are harvested primarily within state waters." This review would equally apply to cabezon and kelp greenling.

Overview:

The nearshore groundfish stocks occurring within our state waters (i.e., 0-3 nautical miles) support some of the most diverse and complex fisheries within our nation, including the kayak fleet of Depoe Bay, the dory fleets of Pacific City, the live-fish fishery of Port Orford, the spear fishermen of Cape Arago, the charter operators of Garibaldi, the cliff anglers of Cape Foulweather, and many more.

Understanding and meeting the localized needs of these diverse interest groups and communities is a time consuming and resource intensive task that would further constrain the already limited capacity of PFMC and NMFS. While we applaud the larger, regional scale efforts undertaken in the federal process, we have concerns about the ability to address our local stakeholder needs. Accordingly, we seek management oversight of our nearshore groundfish fisheries and stocks, specifically to provide more localized support to the diversity of communities and interest groups that occur in Oregon.

We are fully capable of managing these stocks sustainably, while also better addressing the immensely diverse needs of our local communities. There is no greater exemplification of our abilities than the recent Marine Stewardship Council certifications of our state managed commercial Dungeness crab and pink shrimp fisheries. More directly related to state oversight of nearshore groundfish, we have a long and dedicated track record of managing these stocks more conservatively at the state level for both our commercial nearshore and sport fisheries.

Specifically, we developed more conservative state landing caps for both the sport and commercial fisheries, and implemented a limited-entry permit system to control the growth and prevent overcapitalization of our commercial nearshore fishery. We currently have in place more conservative bag limits, spatial and temporal closures, and size limits in our sport fisheries and trip limits, size limits, spatial management, and reporting requirements (e.g., mandatory logbooks) in our commercial fishery.

While many of our more conservative state actions have caused huge upheavals among our fleets, it is important to document that we have the backbone to close or restrict our fisheries amid conservation concerns. Most notable was our decision to close our sport groundfish fisheries prior to Labor Day in 2004, due to attainment of the black rockfish sport landing cap. This closure, known as "Black Friday" to the sport fleet, still resonates to date.

Our request for state oversight only pertains to species in the Groundfish FMP that principally occur within our state waters and are non-migratory (i.e., nearshore rockfish, cabezon, and kelp greenling). As such, our state oversight would have minimal or no bearing to the fisheries and stocks occurring in the other states.

The remainder of this document describes in greater detail how we, given state oversight of nearshore groundfish stocks, could ensure sustainable management practices, while also more fully meeting the needs of our immensely diverse stakeholder groups.

Population (stock) Assessments:

We have the expertise and data to comprehensively assess nearshore groundfish stocks to ensure sustainable fisheries under state management

To prevent overfishing and ensure long-term viability of fisheries, timely and accurate population assessments are needed to establish sustainable catch limits. We employ multiple staff (including contractors), with extensive backgrounds in population modeling, who can be entrusted to provide robust assessments of the nearshore groundfish stocks. Most notable, pertaining to nearshore groundfish, our staff conducted the most recent federal assessment of black rockfish, the most important nearshore groundfish stock to both our commercial nearshore (in terms of value) and sport groundfish fisheries (in terms of effort and catch).

In addition to modeling expertise, we also collect and provide the bulk of the data that has been used in "full", "data-poor", and "data-moderate" federal stock assessments of nearshore groundfish, including: sport and commercial catch histories (e.g., sport and commercial CPUEs and sport total morality estimates) and biological data (e.g., age, size, sex, maturity, and fecundity).

And finally, we are proactively taking actions to improve the quality of nearshore groundfish stock assessments. While not to say that the outputs of the recent "data-moderate" and "data-poor" federal assessments are erroneous, we do, however, want to acknowledge that the results are highly uncertain, and possibly inaccurate, because limited fishery-dependent data was used (additional available fishery-dependent data was not used in the assessments due to model methodology structure). Fishery-independent survey data was not included because it does not exist; nearshore groundfish live in habitats too shallow and rocky to be sampled by the NMFS bottom trawl survey. Accordingly, our researchers have begun using video-landers, capable of surveying shallow and rocky reef habitats, to better our understanding of nearshore groundfish stock dynamics.

Research:

Our research team is dedicated to resolving key management issues and uncertainties, such as reducing bycatch and protecting critical habitats to improve our state management of nearshore groundfish.

To further our understanding of nearshore groundfish stock dynamics and thus better manage them, we are seeking to determine the influences of ecological drivers on fish stocks, as trophic or environmental shifts greatly affect abundances (especially for short-lived species). By doing so, our researchers can resolve some of the key uncertainties associated with setting long-term sustainable harvest levels. For instance, we are currently researching the influence of hypoxic events on fishery catch rates, which is a primary driver of nearshore assessments.

In addition to enhancing our understanding of nearshore groundfish stock dynamics, our researchers are also working together with industry to reduce bycatch. Notable examples of bycatch reduction efforts include: 1) identification of protected species hotspots (e.g., Stonewall Bank Yelloweye Rockfish Conservation Area), 2) developing clean-gear innovations (e.g., excluder panels in shrimp trawls), and 3) evaluating methods to reduce mortality of bycatch (e.g., rockfish descending devices).

Management:

We best understand the diverse needs of our local stakeholder groups, which is essential for ensuring that divisions of available catch are equitable and economically optimal

After sustainable catch limits have been determined via stocks assessments, fisheries managers have to divide the available catch among stakeholders in an equitable, yet economically optimal manner, while also ensuring the safety of the fleet. In order to accomplish this, managers must have an innate knowledge of the degree of fishery dependence for each individual stakeholder group or community. Determination of stakeholder fishery dependence at such a localized level is an extremely time and resource consuming task, beyond what PFMC and NMFS can provide due to their commitments with larger, regional issues.

In fact, the Groundfish Strategic Plan states: “Increasingly, the Council has been asked to adopt complex regulations designed to respond to the particular needs of communities in specific geographic locations. Most of these requests relate to very small vessels accessing local rockfish stocks and marketing them within the area. The Council is not well equipped to evaluate these requests and accommodating them increases the complexity of the regulations. In addition, the Council and NMFS are not well suited to assess the biological requirements of many of these local populations, to assess the social and economic issues associated with them, or to monitor localized fisheries". We assert that these issues are still relevant today and that the state is best able to address these needs.

In order to acquire this stakeholder or community information, we have had to invest heavily into our communication networks: 1) sport and commercial advisory bodies; 2) public meetings throughout the entire coast; 3) e-mail and mailing lists (containing ~5,000 contacts); 4) online surveys and 5) one-on-one communications via phone or e-mail. Since the user groups and their needs change continuously, we have to maintain our communication network in order to learn of these changes as they arise.

Without these communication networks, we would have no other way of knowing, for example, that there is a kayak fleet from Depoe Bay or whether the needs for commercial fishermen who target black rockfish differ than those who target minor nearshore rockfish. Extensive knowledge of user groups, such as this, is critically vital to ensuring that divisions of catch are fair and equitable.

Our state management processes have the capabilities to address stakeholder needs in a timely, responsive, and comprehensive manner. First, we already have the strategic management frameworks in place to address fisheries, conservation, and ocean policy issues (i.e., Oregon's Nearshore Strategy), with goals similar to those of the National Standards, but with more emphasis on local stocks, economies, and communities. Second, our policy makers (i.e., Oregon Fish and Wildlife Commission) are already proficient in state fisheries management, and they are able to address issues more responsively because they meet frequently throughout the year. The timeframe for permanent rulemaking is approximately two months. Oregon has an efficient quick response system to address inseason management needs and action can be taken in as short a time as a single day.

Monitoring:

Our sampling programs are well-recognized for providing timely and accurate estimates, thus we would continue to manage the nearshore groundfish resource responsively in order to ensure catches stay within limits

In order to prevent overfishing, fisheries managers have to monitor catches to ensure that they stay within sustainable limits. Our state sampling programs, currently responsible for providing landings of sport and commercial nearshore groundfish, are well recognized by external reviewers (such as the National Resource Council and NOAA's Marine Recreational Information Program) for providing robust and timely catch estimates. Landings of commercially harvested fish are recorded on state fish tickets. Spatial information is collected through a state-mandated logbook program, as is information on discards. Biological information, including length, weight, sex, age and maturity structures, etc., is collected by our commercial port sampling program. On the sport side, precise and accurate estimates are ensured via relatively high sample rates for all spatial and temporal stratums. Our dock-side sampling program also collects biological information such as length, weight, and sex. The state-funded sport observer program collects information on fish discarded at-sea, as well as biological information such as age structures. The state has a staff person devoted to aging structures collected from nearshore species to determine ages of catch and maturity curves, when paired with gonad analysis.

Enforcement:

Law officers ensure that fishers comply with the conservation-based regulations set forth by fisheries managers

As for catch monitoring, the onus of enforcement for the commercial nearshore and sport fisheries already falls upon the state. Our enforcement unit, the Oregon State Police, is responsible for both dock-side and at-sea operations. Accordingly, we have the enforcement capabilities to ensure that regulations set forth by state fisheries managers would be abided by.

Conclusion:

We have been entrusted by the citizens of Oregon to protect their resources and to hear their voices, and we have delivered upon those promises with our state managed fisheries for many years. We have the track record, the infrastructure, the capability and the desire to ensure the same level of success for nearshore groundfish under state oversight. The state of Oregon already assumes responsibility for the management of these stocks through more conservative state regulations. The 2000 Groundfish Strategic Plan recommends exploration of deferral of nearshore rockfish, cabezon, and kelp greenling to the states in effort to reduce regulation and process complexity and increasing enforcement effectiveness. We request to add this issue to the list of evaluations through the omnibus process.

Agenda Item F.3.c
Public Comment
June 2014

May 19, 2014

Pacific Fishery Management Council
7700 NE Ambassador Pl., Suite 101
Portland, Oregon 97220-1384

RE: CORRECTING BLACKGILL ROCKFISH TRAWL/NON-TRAWL ALLOCATION

Madame Chair and Council,

Gerry Richter (GAP fixed gear rep) here again to remind the Council that the trawl/non-trawl allocations currently in place for management of Blackgill rockfish are incorrect and need to be fixed. The non-IFQ fixed gear fleet in the Conception management area is becoming increasingly concerned about the IFQ fixed gear targeting of Blackgill rockfish in our area. You'll recall that current stock status stands at around 30% depletion which is barely above the overfishing level of 25% B/o. It appears there is little that can be done management wise to prevent IFQ targeting of this important species so it becomes even more critical that we correct the allocations. My hope is this could be done within the "Omnibus Regulation Changes" agenda item of the upcoming June Council meeting.

I have included my letter and public testimony from the March 2012 Council meeting for background information.

Thank you,
Gerry Richter
GAP fixed gear

March 12, 2012

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

RE: TENTATIVE ADOPTION OF 2013/2014 BIENNIAL SPECS/BLACKGILL ROCKFISH ALLOCATION

Mr. Chairman and Council Members,

For the record, my name is Gerry Richter and I represent fixed gear fishermen as a member of the Groundfish Advisory Subpanel (GAP). You'll recall my public comment during the Emerging Issues portion of the March meeting where I informed the Council of a developing problem dealing with allocation of Blackgill rockfish for the 2013/2014 season.

Blackgill was assessed this past August, and the results of that assessment were much more pessimistic than the prior 2005 review. Current stock status stands at about 30% depletion and there are indications the species may have been overfished from the 1990's up until around 2008. We are looking at drastically reduced 2013/2014 ABC's, OFL's and ACL's with trip limits reduced accordingly as well.
Blackgill is a component of the Minor Slope rockfish complex in the south. The species has been a very important contributor to fixed gear fisheries catches from Morro Bay all the way south to the Mexican border. Catches in southern California alone averaged over 400 tons per year from the late 1970's thru the mid 1990's. Gear types were vertical longline, horizontal longline, rod & reel and set gill nets.

The emerging issue with Blackgill is the way it will be allocated for the 2013/2014 season. Per Amendment 21, Slope rockfish were allocated at 63% to the trawl sector while 37% went to fixed gear. While as a total Slope complex component this allocation is likely accurate, it is not accurate for the individual Blackgill species itself. Historical catches favor fixed gear in any time frame one wishes to choose. The entire 2000 to 2010 catch period produces a 52% fixed gear to 48% trawl result. Going back 20 years the landings from 1990 to 2010 favor fixed gear 63% to 37% (Interestingly exact opposite of what Amend. 21 produced). If one were to go back to the late 70's the percentages increase to 4 to 1 fixed gear over trawl.

I'm not commenting here to rip trawl or the IFQ program, I'm not about that and never have been. This is about what is right and fair and believe me the fixed gear sector is going to need every last pound of Blackgill it can get! Trip limits of 10,000 to 40,000 pounds of Slope rockfish, of which could have been all Blackgill, could well be dropping down to as low as 250 to 700 pounds or so. Those very low numbers may affect the directed Sablefish fishery just as a bycatch species. It is critically important to this fixed gear representative that we correct the allocation error per Amend. 21 for Blackgill rockfish and correct it in time for the start of the 2013 fishing season.

Thank you for your consideration of this very important emerging issue,
Gerry Richter
GAP fixed gear

From: **Bill James** <Halibutbill@live.com>
Date: Fri, May 23, 2014 at 12:13 AM
Subject: F.9 Omnibus Regulation Change
To: "pfmc." <pfmc.comments@noaa.gov>
Cc: Bill James <Halibutbill@live.com>

Madame Chair members of the Council: My name is Bill James . I am the fishery consultant for PSLCFA out of Avila Beach California.

Our Open Access and Fixed gear commercial fishermen fishing Blackcod and Blackgill Rockfish are experiencing problems from large IQ out of state vessels fishing the ocean waters front Point Lopez to Point Conception. They are saturating the fishing grounds with 200 to 500 pots per vessel. These boats occupy the area for 3 to 4 weeks at a time and then leave trucking their fish back north. For at least a month after their visit our vessels cannot catch enough fish to make it worthwhile.

What is happening I believe is in violation of quite a few National Standards of the Magnuson Stevens Fishery Conservation and Management Act. and many of the objectives in the Pacific Coast Groundfish Management Plan.

Please develop some regulations that makes it a more level playing field. Thank you, Bill James

From: **S Hackleman** <stevenwh1@yahoo.com>
Date: Fri, May 23, 2014 at 9:20 PM
Subject: PFMC June 2014 meeting comments
To: "pfmc.comments@noaa.gov" <pfmc.comments@noaa.gov>

Dear Madam Chair and Council members,

It has been brought to our attention that there has been concern about the status of Conception area sablefish. We are part of about 40 longline permit holders who call this area home, and southern sablefish are a very important component of our livelihoods as groundfish fishermen in California. We are concerned about the new concentrations of intense single species fishing effort by large, out of town, trap vessels, fishing trawl IFQ close to our home ports that now threatens an existing stable LEP sector. Most of us fish in boats less than 40 feet in length with hand baited artisanal longline gear. We are proud, providing fresh sablefish and other groundfish to California residents for over three decades. Large vessels are now targeting Conception area sablefish in traditional fishing areas of our small longline operations. We are concerned about the extremely high rate of harvest, significant amounts of abandoned trap gear, and nearly exclusive targeting of the spawning female biomass by these large vessels fishing under the trawl IFQ program. We feel that these new operations are in stark contrast to the historic nature of the trawl fishery of Conception area sablefish, and changes should be considered to protect the livelihoods of our small town fishing fleets and the associated fishing infrastructure in our homeport communities.

Beginning in 2011, large trap vessels from as far as Alaska began flocking to central and southern California to take advantage of the gear switching provision of the new trawl IFQ program and excellent markets for frozen sablefish exported to Asia emerging in 2011. These vessels, each with hundreds of sablefish traps, began inundating our traditional fishing areas with massive amounts of trap gear, harvesting Conception area sablefish at staggering rates. Markets for exported frozen sablefish have fluctuated over the past few years, but they are again becoming stronger and we are concerned about massive effort by these large IFQ vessels displacing our small vessels that are limited to areas close to port. As recently as this year, landings close to 100,000 pounds in a single month have been relatively common by IFQ boats. These vessels far exceed historic levels of take by the trawl fleet in central California, which had catch limits exceeding 15,000 pounds in a single two month period. This fast extraction has had devastating effects on some of our local fishing grounds. Each line of traps set by these large vessels is one to three miles long and each vessel sets four to eight of these sets. These traps are often kept in the same areas, often close to our harbors, for several weeks or even months, forcing those of us in small vessels to venture farther from port to avoid losing our longlines by tangling with traps, putting us in more danger from inclement weather. This practice has effectively closed off many miles of prime fishing areas close to port for weeks or even months at a time. This fast rate of harvest also devastates the fishing in these areas, leading to declines in CPUE for many months after.

Each two mile set of trap gear lost off our coast results in another area small scale longliners cannot fish due to risk of snagged and lost lines. Traps are normally left unattended at sea while returning to port to unload fish, often in areas of high ship traffic. Miles of heavy rope with traps have been lost in Conception area sablefish habitat off our coasts every year since 2011, leaving more and more area littered with derelict traps, which make it impossible for us to return to fish these spots with our lighter longlines without losing them on the traps and rope. Although these big boats have considerable range and ability to withstand rough weather conditions, they have fished close to Morro Bay and Santa Barbara with very few exceptions, leaving lost gear in traditional fishing areas close to these ports. Requiring all traps to be retrieved before returning to port and considering trap limits for each vessel could help to reduce gear loss by the new IFQ trap fishery.

We are also deeply concerned about the nearly exclusive targeting of the large mature females by these vessels, which fetch a much higher price than averaged sized male sablefish. Traps are fished in deep water with large escape rings, which allow all but the large female fish to escape. The importance of the spawning females to the future of the sablefish fishery is made very clear in the 2011 stock assessment. We think it would be prudent to limit the maximum size of escape rings used in sablefish traps, and special consideration given to the change in sizes of sablefish harvested by the trawl fleet since the beginning of the IFQ program began, to prevent over harvest of the spawning female biomass by new trap boats.

Rates of sablefish harvest by the fixed gear trawl sector should reflect the historic nature of that fishery. Trap limits and requiring sablefish gear to be more closely attended to can help protect our local waters from derelict fishing gear, and the local fishing communities that rely on these fishing areas. These steps are being considered as limitations for considering allowing sablefish traps in Alaska by the North Pacific Fisheries Management Council, and we believe they deserve consideration for Conception area sablefish as well. In light of the 2011 stock assessment, the importance of the spawning female biomass for west coast sablefish cannot be overstated, and we believe the use of large escape rings to exclusively target large female sablefish is not acceptable for the long-term future of the fishery.

Many of us have grown up fishing these waters and we all feel a strong sense of stewardship for our local resources, as they allow us to provide for our families and at the same time provide an economic benefit to our local homeport fishing communities and associated infrastructure. Please consider our concerns for our fishery and the jobs and high quality seafood it provides for thousands of Californians.

Sincerely,

Owen Hackleman
(FV Provision/GFO633)

Steve Hackleman
(FV Ruth Anne II/GFO377)

Roger Cullen
(FV Dorado/GFO388)

Coastal Trollers Association

RECEIVED

APR 23 2014

PFMC

Created to enhance and protect an economically viable Washington salmon troll fishery.

April 18, 2014

Dr. Donald McIsaac
PFMC Executive Director
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Dear Dr. McIsaac:

The Coastal Trollers Association welcomes the opportunity to speak on behalf of its members who have VMS units and take incidental ling cod and yellowtail rockfish while trolling for salmon. The CTA is against NOAA's request to change the ping rate from once per hour to four times per hour for salmon trollers for several reasons.

First, trollers have been against the VMS requirement since it was first required. At an Ad Hoc VMS Committee (VMSC) meeting in Portland chaired by Mark Cedergreen, two of our members spoke out that there were no rockfish conservation areas to stay out of. However, later, with the assistance of WDFW's Ms. Michelle Culver, trollers volunteered to refrain from fishing in a known yelloweye rockfish habitat. This Yelloweye RCA has been on the books for several years now.

Second, an email with WDFW's Enforcement Officer Mike Cenci confirmed that there have been no citations issued to trollers for trespassing into the RCA. Apparently, the VMS requirement and once per hour ping rate is working. In fact, the PFMC Enforcement Consultants wrote in their Supplemental EC Report for Agenda Item H.1.c dated March 2014, "the EC supports the list (of 8 gear types) , but recommends removing salmon troll gear from the 15 minute ping rate requirement." They concluded, "We do not believe this gear type requires any ping rate modification."

Given this history of cooperation by our troll fleet, we see this ping rate change to be an unnecessary financial burden. According to an April 12, 2013 mailing to All Licensed Washington Troll Fishers from the WDFW, "Salmon troll vessels with VMS may retain up to one pound of yellowtail rockfish for every two pounds of salmon landed, with a cumulative limit of 200 pounds per month... In addition to rockfish, salmon trollers may retain and land up to 1 lingcod per 15 Chinook per trip, plus 1 lingcod per trip, up to a limit of 10 lingcod..." With these severe restrictions on ling cod and yellowtail rockfish and given the prices paid to fishermen at the dock, it may be difficult for trollers to maintain a profit given the ping rate hike. That rate hike is estimated to be as little as $25 more per month to as much as $129. per month, depending on the service provider (as described in the NMFS OLE Report for Agenda Item H.1.b, dated March 2014). This ping rate action may force those with VMS on board to unplug them.

Finally, others support our request to be excluded besides the PFMC **Enforcement Consultants**. The **Salmon Advisory Subpanel** wrote in their Supplemental SAS Report for Agenda Item H.1.c dated March 2014, "The SAS requests that the Council exempt open access salmon troll vessels from the requirement to increase the ping rate from one hour intervals to a 15 minute ping rate. Regarding all 8 gear types, the **Groundfish Advisory Subpanel** Supplemental GAP Report for Agenda Item H.1.c dated March 2014 concludes, "This matter is strictly an issue of an increased financial burden for what is perceived as a retaliatory action. Further, other options are available that have not fully been considered for an environment in which the goal should be compliance, not conviction." And, leaders of the **Coastal Trollers Association** and the **Washington Trollers Association** gave public testimony at the Westport meeting held March 24th asking for trollers to be exempted. Even the conservative organization **Oceana**, represented by Ben Enticknap, recommended an exemption for trollers in a Tuesday, March 11th public comment before the Council.

If NOAA is truly interested in reducing bycatch in our fisheries, we would hope to see regulations that aid us in that goal, not make it more economically restrictive. We join with others and ask that NOAA's ping rate request be amended to exempt salmon troll from their list of eight gear types.

Sincerely,

Jeremy Brown, President
FV/ Barcarole

Geoff Lebon, Vice President
FV/ Halmia

Cindy Olson, Treasurer
FV/ Cynthia T

Steve Wilson, Secretary
FV/ Deep Threat

Ken Anderson, Director
FV/ Spring Skier

Louis Javete, Director
FV/ Spencer

P.O. Box 2434, Auburn, WA 98071
www.coastaltrollersassociation.com

OCEANgold

May 23, 2014

Ms. Dorothy: Lowman: Council Chair:
Mr. Frank Lockhart
Groundfish Program Manager:
Sustainable Fisheries Division:

RE: WHITING FAIR START WITH OTHER SECTORS

Dear Dorothy and Frank,

I feel the need to express my great disappointment in the bureaucratic nonsense of the National Marine Fisheries Service (NMFS) and Pacific Fishery Management Council (PFMC) that allows two sectors, Catcher Processors(CP) and Mother ships(MS), to get an early start on the Pacific Whiting season, while making the third sector, Shore side(SS) Processors, wait.

Ocean Gold Seafood's, Inc., and her vessels, are being denied access due to the fact that the CP and MS are allowed to scoop up "their" allocations and have what appears to be an entitlement to early markets which, in turn, gives them an economic advantage. SS Processors are penalized by being forced to sit and wait on the sidelines an additional month.

What is the fairness in this? Why does this process feel the need to punish and/or jeopardize our jobs and families? The Pacific Whiting season is just as important to us, our employees, and the community that we support. Does your agency believe that SS jobs and production are less important than that of CP and MS? How can you just sit there and allow the CP and MS to camp right on our doorstep, just off of Westport, WA and Newport, OR, and let them fish, while we are forced to wait for permission from "The Man" to make a living? Either your agency is blind, or have not given any thought to the lives and communities it places in jeopardy.

The agency always keeps coming back to the same old line, "We don't have funding to do that…", and continues to allow other trailing amendments to take priority. Seriously? How hard can it be to write a letter, put it in for public comment, and make it official? The agency seems more concerned about chafing gear than coastal jobs. What is clear to us is that the SS Processors are being stifled, and that this is economic exclusion.

Our jobs have to wait until the CP and the MS fill their bellies, and then run off to Alaska. Meanwhile, while we are waiting, the Pacific Whiting move further up the edge and into the higher by-catch zones. This is unfair.

In the Bering Sea, all sectors of the Pollock fisheries start both the “A” and “B” seasons at the same time. It seems to work well for them. All sectors are treated equally, and have equal access to the same markets. This is all we are asking for.

This one month delay excludes us in the early Pacific Whiting marketplace, and is a relic of the pre IQ fishery. The old regime was driven by the offshore sector that clearly receive an economic advantage, and you continue to let it happen, even though we are in a IQ fishery. It is very upsetting to watch this, year after year.

The bureaucratic circus puts the SS Fisheries on a lower rung of the economic ladder. With AIS now available on the net, our crews pays attention to vessel movement. Our employees come in, having seen that the Whiting season has started and ask when work begins, we have to explain to them that the government gave the offshore sector a month head start again this year, and we will have to wait.

Do you have any idea how it feels to tell someone you can’t work, strictly because some official agency feels that you’re not important enough? That other participants in this common fishery get favorable treatment because they are more astute in the council process?

We at Ocean Gold Seafood’s, Inc., want our employees to work. To do that, we need product for our employees to process. During the typical month of Pacific Whiting production, Ocean Gold Seafood’s, Inc., will have a payroll of $1,300,000 to $1,500,000, which goes directly back into our communities. The agency must understand that we need a fair start date in common with the other sectors to be competitive.

We are asking for a fair start.

We need a fair and even playing field.

Sincerely,

Greg Shaughnessy
General Manager
Ocean Gold Seafood’s, Inc.

May 20, 2014

Pacific Fishery Management Council
7700 NE Ambassador Pl., Suite 101
Portland, Oregon 97220-1384

Madame Chair and Council,

This is a letter requesting an amendment to Table 2 in the Federal Registry. Specifically, to amend the trip limits for shallow and deeper near shore species to allow more than one State issued Near Shore or Deeper Near Shore permit holder to make landings on the same vessel. I propose NMFS add to Table 2 a section that states that vessels with more than one State issued Near-Shore Permit aboard may retain twice the limit set by NMFS.

I want to clarify that in California the Near Shore and Deeper Near Shore species are retained only through State issued permits that are issued to individual licensees and that trip landings are allocated to these individual permit numbers, not to the fishing vessels. This is different from the Federal Limited Entry permits, which are registered to the fishing vessel with the associated vessel based cumulative trip limits. Federal LE permits do not allow retention of the Near Shore and Deeper Near shore species of rockfish in California but because these species are managed by the NMFS they are subject to the vessel based cumulative trip limits detailed in Table 2. Because Table 2 refers only to vessels, it doesn't account for fishermen who share a vessel but possess individual and separate Near Shore or Deeper Near shore permits. This is the issue that we are seeking to address with an amendment to Table 2.

My brother and I, along with many other partnered fishermen in California, are being greatly affected by this aspect of Table 2. We are partners in our fishing business and co-owners of our vessel, and we both possess State issued Near Shore permits. Currently we cannot land our individual Sebaste quotas on our boat because of the vessel based cumulative trip limit specification in Table 2. The only way for each of us to retain our Sebaste quota would be to buy another vessel. A new vessel along with the slip fees, VMS, and added maintenance and fuel costs is not financially feasible or ecologically responsible. The Sebaste allotment is only 600 to 1,000 pounds of fish over a two-month period, this is not worth the costs of obtaining another vessel but does impact our ability to make a living as commercial fishermen in the Near Shore and Deeper Near Shore fishery. We have invested in these permits and should be able to fully utilize them as they are intended.

I respectfully propose that NMFS add a section to Table 2 that states that vessels with more than one State issued Near Shore or Deeper Near Shore permit holder aboard may retain twice the limit set by NMFS and listed in Table 2.

Thank you,
Jason Robinson

May 20, 2014

Pacific Fisheries Management Council
7700 NE Ambassador Pl., Suite 101
Portland, Oregon 97220-1384

Madame Chair and Council,

This letter is regarding the "VMS enhancement" proposal by the Office of Law Enforcement to increase the VMS "ping rate" from once hourly four times an hour. This proposal is unacceptable because it fails to achieve the enforcement goals of the OLE and negatively impacts west coast commercial fishermen.

This action will not achieve the OLE's goal of better monitoring GCAs. I agree that it is important that the OLE has all the tools necessary to monitor and enforce restricted fishing areas and I assert that they have more than adequate resources to do so. The OLE has NOAA research vessels, coast guard cutters, coast guard helicopters, CFW patrol boats, CFW spotter planes, drone aircrafts, and a real time GPS monitoring system (VMS) on every boat with the ability to transmit every couple minutes. The OLE already has the ability to increase the ping rate of any vessel at any time they choose.

I am knowledgeable about the details of the VMS situation because I was recently engaged in a court case with the OLE where VMS data was the entirety of the OLE's case. The ALJ court ruled in my favor and stated that VMS data alone did not prove incursion and that additional investigation and documentation was required. It is apparent that this proposal is a retaliatory action for the loss they suffered in the ALJ court as well as an effort to continue using VMS as sole evidence instead of following the ruling of the Justice to employ additional verification procedures.

This proposal will negatively impact the west coast fishing fleet because the cost of the increased rate will be charged to the commercial fishermen, who will gain nothing and have done nothing to incur an additional expense. The notion that the price increase is small is a bogus justification when there are hundreds of "small costs" that add up to a very high overhead in the commercial fishing industry. An increased ping rate on the VMS will also increase a vessels battery usage, decreasing the life of the batteries and costing the fisherman even more.

It is important to recognize that even though the OLE claims that an increased ping rate is crucial for enforcement of the GCAs, they do not suggest extending the program to the recreational fishing sector. Recreational fishermen, who go about unmonitored with no tracking or catch data, land 80% of the rockfish in Southern California. This selective law enforcement criminalizes commercial fishermen, who have zero incentive to break fishing laws. It shows that GCAs are directed primarily toward commercial fishermen, who are the vast minority; this is either a huge oversight in fisheries management or clear discrimination. Either way, this proposed increase in the VMS ping rate for commercial fishing vessels is absurd. This proposal will not help the OLE protect closed areas and it hurts commercial fishermen. The only winner will be the VMS service provider who stands to increase profit by 400%. I respectfully suggest that this proposal be dismissed.

Sincerely,
Jason Robinson
Commercial Fisherman, Limited Entry Fixed Gear
Southern California Groundfish Association

From: **Michele Longo Eder** <michele@michelelongoeder.com>
Date: Thu, Jun 12, 2014 at 5:51 PM
Subject: Public Comment Agenda Item F. 3 Omnibus and Agenda Item F6 Fixed Gear
To: "pfmc.comments@noaa.gov" <pfmc.comments@noaa.gov>

Agenda Item F.3 Omnibus and F.6 Fixed GearPublic Comment

Dear Chair Lowman and Council Members:

My husband , Bob Eder and I are owner/operators of the F/V Timmy Boy , based in Newport Oregon. We fish for sablefish under the LE Fixed Gear program, and also participate in the trawl IQ program, using fixed gear.

We are submitting this letter as public comment under two agenda items, as I have received varying guidance from NMFS and Council staff as to where this would best fit.

We would like to propose a rule change to 50 CFR 660, Subpart C, Section 660.12 (a) (11). This rule currently provides that it is a violation to fail to remove all fish from the vessel at landing (as defined in § 660.11) and prior to beginning a new fishing trip. "Land or Landing" is defined in the regulations as: "To begin transfer of fish, offloading fish, or to offload fish from any vessel. Once transfer of fish begins, all fish aboard the vessel are counted as part of the landing. "

Recently, we've received various interpretations as to how this rule is applied, depending on whether it is Fixed Gear Limited Entry Sablefish, or Trawl IQ Sablefish. It appears that if it is our trawl sablefish, it can be unloaded at 2 different locations, as long as they are both licensed first receivers. Conversely, it appears that if it is fixed gear sablefish, the rule is being interpreted to require we offload all our fish at one time, which, practically speaking, means at one location.

We'd like a rule change so that when we come in with a load of fixed gear sablefish, we can unload some to a buyer at a public hoist, for example, and then deliver the remainder to our main processor. Fish tickets , paper or in the future, electronic, would be written at both places for the amount sold, and the LE fixed gear permit numbers would be on the tickets so the fish is accounted for.

One of the reasons we'd like to do this is so we can potentially add value to our fish. We'd like to sell to an emerging live sablefish market, which does pay premium prices. We may also want to deliver fish across the dock and sell some of our fish to our own fish company for custom processing. In either event, the rule currently prohibits our ability to develop markets for our fixed gear fish, other than selling the entire load at one place for one set of prices.

A change in the rule as described above would provide for additional economic opportunity and development, to benefit the entire coast wide fixed gear fleet, and the public it serves.

Thank you for your consideration.

Sincerely,

Michele Longo Eder and Bob Eder
F/V Timmy Boy
Argos, Inc.P.O. Box 721 Newport, OR 97365
541-265-3337 office, 541-270-1161 cell, 541-265-6633 fax, michele@michelelongoeder.com

CONSIDERATION OF INSEASON ADJUSTMENTS

Management measures for groundfish are set by the Council with the general understanding that these measures will likely need to be adjusted within the biennium to attain, but not exceed, the annual catch limits (ACL). This agenda item will consider inseason adjustments to ongoing 2014 fisheries. Potential inseason adjustments include adjustments to Rockfish Conservation Area (RCA) boundaries and adjustments to commercial and recreational fishery catch limits. Adjustments are, in part, based on recent landings and the latest information from the West Coast Groundfish Observer Program. Public comment received by the public comment deadline is included in the reference materials.

At its April 2013 meeting, the Council considered the performance of the shorebased individual fishing quota fishery in 2011 and 2012 and the progress to date in 2013, and recommended a 100 fm shoreward boundary and 150 fm seaward boundary for Period 6 in 2013 throughout 2014 in the area 40°10' to 48°10' N. latitude. The RCA boundary adjustments were intended to provide greater access to target species while allowing the individual accountability afforded by the rationalized fishery to minimize bycatch of overfished species. At its September 2013 meeting, the Council reaffirmed action taken in April after reviewing the draft Environmental Assessment prepared by the National Marine Fisheries Service (NMFS) (Agenda Item G.6.b, Draft EA, September 2013), Advisory Body reports (Agenda Item G.6.b, Supplemental GMT Report, September 2013, Agenda Item G.6.b, Supplemental GAP Report, September 2013, and Agenda Item G.6.b, Supplemental EC Report, September 2013), and public comment.

On April 17, 2014, NMFS partially approved the Council-recommended RCA boundary adjustments (Agenda Item F.4.a, Attachment 1; Agenda Item F.4.a, Attachment 2; and Agenda Item F.4.a, Attachment 3). NMFS disapproved the Council recommendations in the area 40°10' N. latitude to 45°46' N. latitude, and, as such, the seaward boundary of the RCA is scheduled to remain 200 fm in Periods 2 through 5 and 200 fm modified in Periods 1 and 6. Under Agenda Item F.4, the Council should consider and discuss the NMFS letter and implementing regulations.

At the March 2014 meeting, the Council recommended that NMFS issue the maximum eligible 2013 surplus carryover (up to 10 percent) for all non-whiting species into 2014 shorebased individual fishing quota (IFQ) program. In light of a recent D.C. District court decision, NMFS decided not to issue surplus carryover for those species where the ACL is equal to the acceptable biological catch (ABC) (Agenda Item F.4.a, Attachment 4). Surplus carryover was issued for the 19 IFQ species/area categories for which the ABC is greater than the corresponding ACL. Under Agenda Item F.4, the Council should consider and discuss the NMFS letter regarding surplus carryover issuance.

Council Action:

1. **Consider information on the status of 2014 fisheries and adopt inseason adjustments, as necessary.**
2. **Consider and discuss the NMFS letter and implementing regulations for the trawl RCA boundaries.**
3. **Consider and discuss the NMFS letter regarding issuance of surplus carryover in 2014.**

Reference Materials:

1. Agenda Item F.4.a, Attachment 1: NMFS Letter re: Council Recommendations for the Trawl Rockfish Conservation Area Configuration for 2013-2014 Groundfish Fisheries.
2. Agenda Item F.4.a, Attachment 2: Final RCA Rule: Federal Register Notice 79FR21639; NOAA Fisheries announces change to the Pacific coast groundfish trawl Rockfish Conservation Area boundaries; effective April 17, 2014.
3. Agenda Item F.4.a, Attachment 3: RCA Rule Correction: Federal Register Notice 79FR28455 Correction to the 2013-2014 Pacific coast groundfish fishery harvest specifications and management measures, effective May 16, 2014.
4. Agenda Item F.4.a, Attachment 4: NMFS Letter re: Shorebased IFQ Surplus Carryover Decision for 2014.
5. Agenda Item F.4.c, Public Comment.

Agenda Order:

a. Agenda Item Overview — Kelly Ames
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Adopt Inseason Adjustments to 2014 Groundfish Fisheries

PFMC
05/27/14

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E.
Seattle, Washington 98115

April 17, 2014

Dorothy Lowman, Chair
Pacific Fisheries Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

RE: Council Recommendations for the Trawl Rockfish Conservation Area Configuration for 2013-2014 Groundfish Fisheries

Dear Chair Lowman:

This letter responds to the Pacific Fisheries Management Council's (Council) inseason transmittal letters dated on April 30, 2013, and September 30, 2013, recommending the shoreward boundary of the trawl rockfish conservation area (RCA) be moved from 75 to 100 fathoms year-round, and the seaward boundary of the trawl RCA be moved from 200 fathoms to 150 fathoms year-round, from the area 40° 10' to 48° 10' N. latitude.

The final rule associated with this action (79 FR 21639) adopts all Council recommendations with the exception of the seaward boundary area (between 40° 10' N. latitude and 45° 46' N. latitude), which will remain as status quo (i.e., closed). The final rule will allow fishermen significantly more access to the current trawl RCA than under existing regulations, and will increase year-round groundfish bottom trawl access to over 2,300 square miles of fishing grounds. Furthermore, additional refinements to the trawl RCA boundaries can still be made in the future. Our rationale for this decision follows.

The Council did not include any analysis of the seaward upper slope area between 40° 10' N. latitude and 45° 46' N. latitude (herein referred to as the identified area) in making their recommendations. Fishery management plans are required to describe and identify Essential Fish Habitat (EFH) and take measures to minimize adverse effects on EFH caused by fishing to the extent practicable (16 U.S.C. § 1853(7)). Logbook data analyzed in the Environmental Assessment (EA) associated with this rule demonstrate an absence of bottom trawling activities, both pink shrimp bottom trawling and groundfish bottom trawling since September 2004, providing a decade in which habitat has had a greater chance to recover from potentially adverse impacts. NMFS analysis included in the EA demonstrated that the identified area is in a more recovered state than the adjacent core RCA area that was not recommended for opening. In NMFS's view, the Council did not sufficiently acknowledge or contribute additional analysis to minimize the potential for adverse impacts on the identified area as compared to the other recommended areas, and did not provide sufficient rationale when they made their initial recommendation at the

2013 April Council meeting, nor when they reaffirmed their recommendation at the 2013 September Council meeting. At this time, NMFS concludes that allowing trawling in the identified area is likely to have adverse impacts on some of the bottom substrate.

Further, to address the "practicable" elements of section 303(a)(7) of the Magnuson Stevens Act, there is not sufficient information at this time to conclude that opening the identified area would have a substantial enough beneficial economic impact for the groundfish bottom trawl fleet to outweigh the potential adverse impacts on EFH. At the September 2013 Council meeting, industry representatives expressed a desire to use bottom trawl gear in the identified area, but did not demonstrate a sufficient need to fish in the identified area using groundfish bottom trawl gear. Furthermore, during public comment industry representatives stated that access to the identified area is desirable, but not crucial to the industry in light of the other areas that would be opened. NMFS also received comments from environmental organizations on the proposed rule and draft EA, who asserted that an Environmental Impact Statement (EIS) would be required before NMFS could open this area and that the rule as proposed called into question whether the Council and NMFS were meeting their duty to minimize adverse effects on EFH caused by fishing to the extent practicable.

As noted above, the Council and NMFS must minimize adverse effects of fishing to the extent practicable on EFH. NMFS believes opening the identified area could affect EFH in a manner that is more than minimal and not temporary in nature. Therefore, we conclude that keeping the identified area closed, at this time, minimizes to the extent practicable adverse effects on this habitat caused by bottom trawl fishing.

The Council continues to have the ability to refine the RCA boundaries, including the identified area, provided the record concerns reflected above are considered and adequately addressed.

Should your staff have any questions regarding NMFS's decision on this matter, please contact me at your convenience.

Sincerely,

Robert Turner for

William W. Stelle, Jr.
Regional Administrator

cc: Dr. D.O. McIsaac

Federal Register / Vol. 79, No. 74 / Thursday, April 17, 2014 / Rules and Regulations 21639

PART 622—FISHERIES OF THE CARIBBEAN, GULF, AND SOUTH ATLANTIC

■ 1. The authority citation for part 622 continues to read as follows:

Authority: 16 U.S.C. 1801 *et seq.*

■ 2. In § 622.193, paragraph (h) is suspended and paragraphs (z) and (aa) are added to read as follows:

§ 622.193 Annual catch limits (ACLs), annual catch targets (ACTs), and accountability measures (AMs).

* * * * *

(z) *Deep-water complex (including yellowedge grouper, silk snapper, misty grouper, queen snapper, sand tilefish, black snapper, and blackfin snapper)*—(1) *Commercial sector*—(i) If commercial landings for the deep-water complex, as estimated by the SRD, reach or are projected to reach the commercial ACL of 60,371 lb (27,384 kg), round weight, the AA will file a notification with the Office of the Federal Register to close the commercial sector for this complex for the remainder of the fishing year. On and after the effective date of such a notification, all sale or purchase of deep-water complex species is prohibited and harvest or possession of these species in or from the South Atlantic EEZ is limited to the bag and possession limit. This bag and possession limit applies in the South Atlantic on board a vessel for which a valid Federal commercial or charter vessel/headboat permit for South Atlantic snapper-grouper has been issued, without regard to where such species were harvested, *i.e.*, in state or Federal waters.

(ii) If commercial landings exceed the ACL, and at least one of the species in the deep-water complex is overfished, based on the most recent Status of U.S. Fisheries Report to Congress, the AA will file a notification with the Office of the Federal Register, at or near the beginning of the following fishing year to reduce the ACL for that following year by the amount of the overage in the prior fishing year.

(2) *Recreational sector.* If recreational landings for the deep-water complex, as estimated by the SRD, exceed the recreational ACL of 19,313 lb (8,760 kg), round weight, then during the following fishing year, recreational landings will be monitored for a persistence in increased landings and, if necessary, the AA will file a notification with the Office of the Federal Register, to reduce the length of the following recreational fishing season by the amount necessary to ensure recreational landings do not exceed the recreational ACL in the following fishing year. However, the length of the recreational season will also not be reduced during the following fishing year if the RA determines, using the best scientific information available, that a reduction in the length of the following fishing season is unnecessary.

(aa) *Blueline tilefish*—(1) *Commercial sector.* If commercial landings for the blueline tilefish, as estimated by the SRD, reach or are projected to reach the commercial ACL of 112,207 lb (50,896 kg), round weight, the AA will file a notification with the Office of the Federal Register to close the commercial sector for the remainder of the fishing year. On and after the effective date of such a notification, all sale or purchase of blueline tilefish is prohibited and harvest or possession of blueline tilefish in or from the South Atlantic EEZ is limited to the bag and possession limit. This bag and possession limit applies in the South Atlantic on board a vessel for which a valid Federal commercial or charter vessel/headboat permit for South Atlantic snapper-grouper has been issued, without regard to where such species were harvested, *i.e.*, in state or Federal waters.

(2) *Recreational sector.* If recreational landings of blueline tilefish, as estimated by the SRD, reach or are projected to reach the recreational ACL of 111,893 lb (50,754 kg), round weight, then the AA will file a notification with the Office of the Federal Register to close the recreational sector for blueline tilefish for the remainder of the fishing year. On and after the effective date of such notification, the bag and possession limit of blueline tilefish in or from the South Atlantic EEZ is zero. This bag and possession limit also applies in the South Atlantic on board a vessel for which a valid Federal commercial or charter vessel/headboat permit for South Atlantic snapper-grouper has been issued, without regard to where such species were harvested, *i.e.*, in state or Federal waters.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 660

[Docket No. 130808694–4318–02]

RIN 0648–BD37

Fisheries off West Coast States; Pacific Coast Groundfish Fishery Management Plan; Commercial Groundfish Fishery Management Measures; Rockfish Conservation Area Boundaries for Vessels Using Bottom Trawl Gear

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: This final rule will implement revisions to the boundaries of the Rockfish Conservation Area (RCA) that is currently closed to vessels fishing groundfish with bottom trawl gear. This rule will affect the limited entry bottom trawl sector managed under the Pacific Coast Groundfish Fishery Management Plan (FMP) by liberalizing RCA boundaries to improve access to target species.

DATES: Effective on April 17, 2014.

ADDRESSES: NMFS prepared a Final Regulatory Flexibility Analysis (FRFA), which is summarized in the Classification section of this final rule. NMFS also prepared an Initial Regulatory Flexibility Analysis (IRFA) for the proposed rule. Copies of the IRFA, FRFA the Small Entity Compliance Guide, and the Environmental Assessment (EA) NMFS prepared for this action are available from the NMFS West Coast Regional Office: William W. Stelle, Jr., Regional Administrator, West Coast Region, NMFS, 7600 Sand Point Way NE., Seattle, WA 98115–0070; Attn: Colby Brady. This final rule also is accessible via the Internet at the Federal eRulemaking portal at *http://www.regulations.gov*, identified by NOAA–NMFS–2013–0134, or at the Office of the Federal Register Web site at *http://www.access.gpo.gov.* Background information and documents, including electronic copies of the Final Regulatory Flexibility Analysis (FRFA) prepared for this action may are available at the NMFS West Coast Region Web site at *http://www.westcoast.fisheries.noaa.gov/fisheries/management.html* and at the Council's Web site at *http://www.pcouncil.org.*

FOR FURTHER INFORMATION CONTACT: Colby Brady, 206–526–6117; (fax) 206–526–6736; *Colby.Brady@noaa.gov.*

SUPPLEMENTARY INFORMATION:

Background

Since 2002 NMFS has used large-scale, depth-based closures to reduce catch of overfished groundfish, while still allowing the harvest of healthy stocks to the extent possible. RCAs are gear specific closures, and apply to vessels that take and retain groundfish species. Through this final rule, NMFS is changing portions of the boundaries defining the RCA that is closed to vessels fishing for groundfish with bottom trawl gear, or the "trawl RCA." This rule will not change how the trawl RCA applies to vessels fishing for groundfish using bottom trawl gear; rather, it will only change the boundaries of the trawl RCA.

This final rule implements the RCA boundary modifications as recommend by the Pacific Fishery Management Council (Council), and as proposed at 78 FR 56641 (September 13, 2013), with the exception of the seaward boundary change between 45°46′ N. lat. and 40°10′ N. lat. NMFS originally proposed moving the seaward boundary line between 45°46′ N. lat. and 40°10′ N. lat. from a line approximating 200 fathoms (fm) (366-m) to a line approximating 150 fm (274-m), during periods 1–6 (note that the "modified 200 fm (366-m)" line, which is a version of the 200 fm (366-m) line modified to increase access to stocks such as petrale sole, is currently in place in periods 1 and 6). However, after considering comments received on the proposed rule and the record as a whole, NMFS has determined that there is an insufficient basis to proceed with the seaward boundary change between 45°46′ N. lat. and 40°10′ N. lat. prior to the conclusion of the Council's groundfish Essential Fish Habitat (EFH) review. Therefore, as explained more fully below, this rule maintains the seaward trawl RCA boundary between 45°46′ N. lat. and 40°10′ N. lat. as currently established through the 2013–2014 harvest specifications and management measures. 78 FR 580 (January 3, 2013). The remaining boundary changes are implemented as proposed.

A detailed description of the trawl RCA boundaries that NMFS proposed, and the alternative boundaries that NMFS considered in the EA, can be found in the proposed rule 78 FR 56641 (September 13, 2013), and in the tables below. The changes from the proposed rule are discussed more fully in the section titled "Changes from Proposed Rule."

Table 1: Status Quo Trawl RCA Boundaries (48°10' N. latitude to 40°10' N. latitude).

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
48°10' N. lat. - 45°46' N. lat.	75 fm line - modified 200 fm line	75 fm line - 150 fm line	100 fm line - 150 fm line			75 fm line - 150 fm line
45°46' N. lat. - 40°10' N. lat.		75 fm line - 200 fm line	100 fm line - 200 fm line			75 fm line - modified 200 fm line

Table 2: Council Recommended Trawl RCA Boundaries (Alternative 1) as proposed at 78 FR 56641.

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
48°10' N. lat. - 40°10' N. lat.	100 fm line - 150 fm line					

Table 3: Alternative 2, Considered in the EA and described further at 78 FR 56641.

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
48°10' N. lat. - 45°16' N. lat.	100 fm line - 150 fm line					
45°46' N. lat. - 40°10' N. lat.	100 fm line - modified 200 fm line					

Changes From the Proposed Rule

As mentioned above, the only change from the proposed rule is maintaining the status quo seaward boundary line between 40°10′ N. latitude to 45°46′ N. latitude. This final rule implements trawl RCA boundaries as follows, and as reflected in table 4:

- Shoreward 100 fm (183-m)(year-round) between 40°10′ N. latitude to 48°10′ N. latitude, and;
- Seaward 150 fm (274-m)(year-round) north of 45°46′ N. latitude to 48°10′ N. latitude, and;
- Seaward 200 fm (366-m) between 40°10′ N. latitude to 45°46′ N. latitude during periods 2–5, and modified 200 fm (366-m) in periods 1 and 6 (i.e., status quo).

Table 4: RCA boundaries implemented through this final rule.

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
48°10' N. lat. - 45°46' N. lat.	100 fm line- 150 fm line					
45°46' N. lat. - 40°10' N. lat.	Shoreward 100 fm line (Seaward line below)					
45°46' N. lat. - 40°10' N. lat.	Seaward modified 200 fm line	Seaward 200 fm line				Seaward modified 200 fm line

As described in the proposed rule, in addition to the Council recommended boundaries, NMFS considered and requested comments on alternative boundaries that were somewhat different from what the Council recommended in April 2013. The alternative trawl RCA boundaries would have been the same as the Council's recommended trawl RCA boundaries, except that they would have kept closed the area between the boundary line approximating the 150 fm (274-m) depth contour and the boundary line approximating the modified 200 fm (366-m) depth contour off Southern Oregon and Northern California (between 40°10′ N. latitude to 45°46′ N. latitude); this area has been largely closed to groundfish bottom trawling since 2004 and would have been opened under the initial recommendations of the Council from its April 2013 meeting.

At the Council's September 12–17, 2013 meeting in Boise, Idaho, NMFS consulted with the Council and provided additional information from the draft EA regarding the alternative boundaries. After considering the information NMFS presented, reports from the Council's advisory bodies, and public comment, the Council reaffirmed its recommendation to modify the trawl RCA boundaries as originally proposed.

After reviewing public comment on the proposed rule, information being developed through the Council's groundfish EFH review, the Council's recommendations, and the EA for this action, NMFS has determined that there is an insufficient record to conclude that the seaward boundary modification between 45°46′ N. lat. and 40°10′ N. lat., as originally proposed, minimizes adverse effects on groundfish EFH caused by fishing to the extent practicable. Therefore, NMFS is not implementing that seaward boundary change at this time.

NMFS and the Council initially established trawl RCAs to minimize catch of overfished species while still allowing the harvest of target stocks to the extent possible. Despite the fact that the trawl RCAs were not established to serve as habitat protection, the seaward areas between 45°46′ N. lat. and 40°10′ N. lat.. between the 150 fm (274-m) and modified 200 fm (366-m) lines have largely been closed since 2004. The EA for this action indicates that this is the only large-scale area that would be opened under the originally proposed boundaries where benthic habitats may have, to some extent, recovered from previous groundfish bottom trawling impacts.

The Council's ongoing groundfish EFH review will likely address whether any changes to EFH designations or measures to minimize adverse effects to the extent practicable are warranted. This includes consideration of whether areas currently closed year-round to groundfish bottom trawling by the RCAs should receive additional protection through management measures designed to minimize to the extent practicable adverse effects on groundfish EFH caused by fishing. During the public comment period for the proposed rule, it became evident that some of the groundfish EFH proposals that may be considered by the Council during its review include proposals for new EFH conservation areas within the portion of the RCA that has essentially been closed to groundfish bottom trawling year-round since 2004. In light of that information, opening year-round closed areas to groundfish bottom trawling now, before the merits of those proposals have been considered and additional progress has been made on the groundfish EFH review, is premature. This final rule will only increase year-round access to areas that are already open to bottom trawling at some times during the year. NMFS and the Council have yet to determine whether groundfish EFH changes are warranted or practicable, but at its November 2013 and March 2014 meetings, the Council indicated its intent to continue with the EFH review process.

This final rule will increase year-round groundfish bottom trawl access to approximately 2,389 square miles of fishing grounds in a fishery where participants are motivated by Individual Fishing Quota (IFQ) to keep bycatch of overfished species low, irrespective of trawl RCA boundaries. The increased access may enable higher attainment of available quota pounds for several valuable species that are currently not fully harvested, while still protecting overfished rockfish species.

The trawl RCA boundaries being implemented are expected to have a favorable economic impact on groundfish fishing vessels and for businesses and ports where groundfish are landed. The benefits of not opening the upper slope area between 45°46′ N. lat. and 40°10′ N. lat., compared to the majority of areas that will be opened are unknown at this time. Accordingly, the potential cost and safety benefits and the increased access to target stocks on the slope would be somewhat reduced as compared to the proposed boundaries. However, it would still be an overall improvement compared to not making any changes.

Finally, NMFS notes that at the Council's September 2013 meeting several industry groups and environmental nongovernmental organizations submitted a joint letter indicating their intent to collaborate on long term RCA proposals (Agenda Item G.9.d, Supplemental Public Comment 2). That effort, coordinated with the ongoing EFH review, could provide one option for considering the catch control aspects of RCAs along with the habitat aspects, potentially yielding increased access to fishing grounds while continuing to protect areas with extremely sensitive habitat or unacceptably high bycatch risks.

Comments and Responses

NMFS solicited public comment on the trawl RCA proposed rule (78 FR 56641, September 13, 2013). The comment period ended October 15, 2013. NMFS received five letters of comments on the proposed rule submitted by individuals or organizations.

Comment 1: Bottom trawl gear should be declared illegal. Trawl gear exacerbates the problem of whales and other large ocean fish becoming entangled in lines. Instead of opening the trawl RCAs, NMFS should consider expanding them.

Response: This rule does not affect the types bottom trawl gear allowed in the Pacific coast groundfish fishery, it only affects where vessels may fish with that gear. NMFS disagrees with the commenter that bottom trawl gear should be declared illegal. Bottom trawl gear is particularly efficient at targeting high volumes of species such as various flatfish (e.g., dover sole, English sole), roundfish such as Pacific cod, and other healthy bottom dwelling species such as thornyhead species; all of which are more inefficiently harvested with other groundfish gears. Therefore, groundfish bottom trawl gear can offer substantial benefits to the Nation in terms of providing consistent healthy protein supply and economic benefits when carefully managed. In addition, entanglements with marine mammals or other large ocean fish are comparatively rare in the groundfish bottom trawl fishery. For example, the groundfish bottom trawl fishery is considered a Category III fishery under the Marine Mammal Protection Act, indicating a remote likelihood of or no known serious injuries or mortalities to marine mammals. *See* 78 FR 73477 (December 6, 2013), which may have been updated prior to publication of this final rule.

With respect to expanding RCAs, NMFS notes that expansion of trawl RCAs continues to be an option available to the Council and NMFS through inseason modifications to the Code of Federal Regulations if needed. However, the purpose of this rule includes increasing access to target stocks, not reducing access.

Comment 2: The rule as proposed (Alternative 1) provides increased access to target stocks and better achieves optimum yield, consistent with National Standard 1 of the Magnuson Stevens Fishery Conservation and Management Act (MSA). The rule as proposed will provide vessels opportunities seaward of the RCAs to catch target species, primarily Dover Sole.

Response: NMFS agrees that the Council's recommendation as contained in the proposed rule would provide IFQ vessels fishing with bottom trawl gear increased access to target species catch, including Dover sole. However, even in the most uninhibited regulatory scenarios, attainment of all groundfish ACLs is affected by natural inter-annual ecosystem changes, market priorities, and other business realities. This final rule will still allow some increased opportunities seaward of the RCA North of 45°46′ N. latitude, will liberalize all of the shoreward RCA boundaries as recommended by the Council, and is consistent with National Standard 1. The trawl RCA boundaries being implemented are expected to have a favorable economic impact on groundfish fishing vessels and for businesses and ports where groundfish are landed. Moreover, additional refinements of RCA boundaries can still occur once habitat and other aspects associated with opening long-term RCA closures have been addressed.

Comment 3: Under the IFQ program, the Pacific groundfish trawl fishery operates with enhanced monitoring and individual accountability. Bycatch of overfished species and discard of target species has decreased dramatically from pre-IFQ years, as noted by NMFS own scientists. Therefore the boundaries as proposed in the rule will not create problems with increased catch of overfished species. The risk of exceeding bycatch of overfished species is minimal given the draft EA results and the IFQ program. The chances of an overfished species "lightning strike" are slim to none, as evidenced by NMFS' trawl surveys, which fish in these areas and presumably do not try to avoid overfished species. If NMFS believes the IFQ system has not been responsible for reducing bycatch, then NMFS must immediately direct the Council to end the IFQ program.

Response: NMFS agrees with the commenter that the IFQ program has been very effective at reducing bycatch of some overfished species. NMFS also agrees that increased bycatch of overfished species as a result of this rule, either as proposed or as implemented, is unlikely to result in exceeding annual catch limits. However, NMFS notes that at some point a large unanticipated tow of overfished species may occur, and management measures are in place for action should the Council and NMFS need to respond. Regarding NMFS' trawl surveys, although those vessels are not actively trying to avoid certain rockfish species, and survey activities have not resulted in high overfished species catch events that would threaten continued commercial activities, the scientific surveys have dramatically different aims than that of commercial vessels. Trawl surveys typically use 15 minute tows, while commercial bottom trawl gear deployments of 3–6 hours are common, and may even exceed that, in which case undesired bycatch events of overfished species may be more likely to occur.

Comment 4: There is no reason to keep RCA areas closed until habitat areas of particular concern (HAPC) are modified. When the Council established its first groundfish HAPC designations, it included areas that had been subjected to extensive trawling. If the Council determines through the groundfish EFH review that all or a portion of the RCA that will be opened under this rule deserves additional protection, the Council can still do that later through the existing process. In addition, the RCA being considered in the proposed rule has been subject to trawling prior to the establishment of the RCA and restrictions on trawl gear use. The area has also been subject to fishing by other bottom contact gears and research surveys. This is not virgin wilderness that has been and should remain untouched. NMFS should implement the rule as proposed. Furthermore, EFH concerns are not the intent of RCAs, which were implemented to reduce catch of rebuilding rockfish stocks, and EFH should not be considered when deciding whether to liberalize RCAs.

Response: NMFS agrees that benthic habitat that would be exposed to groundfish bottom trawling by opening the seaward areas between 45°46′ N. lat. and 40°10′ N. lat. has likely been impacted to some degree in the past. NMFS further acknowledges that prior to the closure of these areas, substantially less restrictive trawl gear regulations were in place. Historical bottom trawl gear types were more destructive to sensitive habitat than current bottom trawl gear restrictions. Current restrictions have reduced incentives to deploy bottom trawl gear in hard and mixed substrate areas, particularly high-relief hard pinnacle areas where the greatest abundance of sensitive biogenic habitat (corals and sponges) are found. NMFS also agrees that the seaward areas between 45°46′ N. lat. and 40°10′ N. lat. have been subject to fishing by other gear types and some limited trawling activity by NMFS' scientific surveys.

Nevertheless, the seaward areas between 45°46′ N. lat. and 40°10′ N. lat., between the 150 fm (274-m) and modified 200 fm (366-m) line have largely been closed to groundfish bottom trawling since 2004, and the other gear types and survey activities have relatively lower impacts to benthic habitats. The EA indicates that this area is more likely than others to have recovered from the impacts of groundfish bottom trawling. In fact, this area may currently have greater conservation value than portions of the actual "core" RCA (between the 100 fm and 150 fm lines, 183-m and 274-m). That core RCA has been closed to groundfish bottom trawling since at least 2003, but some of the areas are currently impacted by pink shrimp bottom trawl gear, whereas the seaward areas between 45°46′ N. lat. and 40°10′ N. lat., between the 150 fm (274-m) and modified 200 fm (366-m) are not. The recovery estimates provided in the 2005 EFH Environmental Impact Statement and subsequent 2012 and 2013 EFH review reports (excluding coral and sponge regeneration/recovery time) support NMFS' conclusion that this area has had some opportunity to recover from trawling impacts.

NMFS agrees that the trawl RCAs were implemented primarily to reduce the catch of rebuilding rockfish stocks by closing off areas to bottom trawl activity where those species of concern were found in higher densities or where larger bycatch events had previously occurred. However, when long term closures such as the seaward area at issue have allowed for some level of habitat recovery, NMFS must take that into account.

While it is true that the Council and NMFS adopted EFH conservation areas through Amendment 19 encompassing habitat that had been previously been trawled, opening the seaward area between 45°46′ N. lat. and 40°10′ N. lat., between the 150 fm (274-m) and modified 200 fm (366-m) line now has the potential to adversely impact habitat that has partially recovered, prior to the Council considering whether additional protections are warranted. Doing so could negate some of the recovery that has occurred. At its November 2013 meeting, the Council decided to move forward with phase III of its groundfish EFH review after determining that there was sufficient new information to warrant continuing evaluation of its existing groundfish EFH designations. Liberalizing the seaward RCA boundary between 40°10′ N. latitude and 45°46′ N. latitude, between the 150 fm (274-m) and modified 200 fm (366-m), may ultimately be consistent with the Council's EFH responsibilities. This rulemaking did not address the question of whether any of the seaward areas between 45°46′ N. lat. and 40°10′ N. lat. and the 150 fm (274-m) and modified 200 fm (366-m) lines, should ultimately receive additional protection through management measures designed to minimize, to the extent practicable, adverse effects on EFH from fishing. It did, however, highlight that additional analysis of this area is needed. Prior to the completion of the phase III review of EFH proposals, or additional consideration of whether practicable measures exist that could minimize impacts of bottom trawling between 40°10′ N. latitude and 45°46′ N. latitude and the 150fm (274-m) and modified 200fm (366-m) RCA lines, NMFS believes there is an insufficient basis to open this year-round closed area to bottom trawling.

Comment 5: The proposed rule provides increased harvest opportunities consistent with National Standards 5, 7, and 8 by considering efficiency in the utilization of fishery resources, minimizing costs, and taking into account the importance of fishery resources to fishing communities. The costs for participating in the west coast groundfish fishery continue to increase with the pending 3 percent cost recovery fee, the annual 5 percent buyback loan payments, state landing taxes, observer costs, and the possible implementation of the adaptive management program that could reduce 10 percent of the available quota pounds. Harvesters need the access to fishing grounds allowed by the rule as proposed.

Response: NMFS is aware that fishermen have costs associated with the buyback repayment, state landing taxes, observer coverage, and cost recovery. However, participants in the IFQ program have already started realizing the benefits of the program even with these costs. Preliminary data from the mandatory economic data collection program compares data from 2009 and 2010 (pre-trawl rationalization) versus 2011 (post-trawl rationalization) (see Agenda Item F.2 from the Council's June 2013 meeting), and shows that when looking at net revenue, the fleet is still profitable even with increased costs (e.g., high fuel prices, observer costs). However, with only one year of data post-trawl rationalization, it is too early to make conclusions on the economic benefits of the program.

While buyback loan repayment is a cost to industry, the harvesters that remained and are now in the Shorebased IFQ program have benefitted from the buyback program. NMFS also understands that fishermen are petitioning Congress to approve legislation that would refinance the buyback loan, extending the term of the loan and capping the fee rate at three percent of ex-vessel value, down from five percent.

NMFS is evaluating whether electronic monitoring could reduce the cost of monitoring the fishery. With respect to the adaptive management program, it is unclear at this time how it will be structured or affect the fleet. Ultimately, this final rule will increase access to fishing grounds and is consistent with the National Standards.

Comment 6: The potential for gear conflicts resulting from liberalized RCAs was an issue raised at the Council's September 2013 meeting. However, fishing gears of various types are already in use throughout the area currently open to fishing with no indication that extensive gear conflicts are occurring. Allowing trawling in deeper water on the continental shelf out to 100 fathoms instead of the current 75 fathoms could actually reduce gear conflicts because there would be more area for vessels to operate.

Response: The Groundfish Advisory Subpanel and Groundfish Management Team considered the possibility of gear conflicts at the September 2013 Council meeting. By increasing the areas available to trawlers, including the deeper water on the continental shelf out to 100 fathoms, this final rule could potentially reduce concentration of gear between the trawl and fixed gear sectors in the areas where they currently overlap. Additionally, the shoreward boundary change could potentially reduce gear conflicts between crab and groundfish bottom trawl vessels. During public comment under this agenda item at the September Council meeting, trawl and fixed gear industry representatives commented and agreed with the above-mentioned assumptions. Any ancillary gear conflict consequences that might result from implementation of RCA boundary changes through this rule could likely be avoided through increased communications among vessels.

Comment 7: Alternative 2 in the EA falls short of providing meaningful access to healthy target species while the risks associated with both alternatives are virtually the same. The rule as proposed provides increased access to currently closed trawl RCA areas in a manner that allows trawl IFQ fishermen to continue to demonstrate the benefits of 100 percent accountability of catch and discards. Trawl RCAs are a relic of pre-IFQ management.

Response: NMFS agrees that trawl RCAs are to some extent a relic of pre-IFQ trawl fishery management, which depended largely on trip limits and area closures to control catch in the groundfish trawl fishery. On the other hand, RCAs can still serve as an additional tool for controlling catch in areas with unacceptably high bycatch risks. NMFS also agrees that increased access to currently closed trawl RCA areas allows trawl IFQ fishermen to continue to demonstrate the benefits of the program, including individual accountability of catch and discards.

However, NMFS disagrees that the trawl RCA boundaries implemented through this final rule fall short of providing meaningful access to healthy target species. This final rule provides approximately 2,389 square miles of additional year-round access to groundfish compared to taking no action (similar to Alternative 2 considered in the EA, which provide increased year-round access to approximately 2,600 square miles). This is still a meaningful increase in access to fishing grounds. Both the rule as proposed and the boundaries as implemented would provide more benefit than the no-action alternative. This increased access should provide greater access to healthy groundfish stocks, which could improve efforts to more fully attain harvest levels. The Council and NMFS can still consider additional modifications to trawl RCA boundaries in the future in manner that addresses the catch control aspects of RCAs along with the habitat aspects.

With respect to the risks associated with the different trawl RCA boundary configurations, NMFS notes that while the EA determined that the boundaries as proposed presented relatively little risk of greatly increased overfished species catch, the trawl RCA boundaries implemented through this final rule would not increase access beyond the seaward line of the current RCA between 45°46′ N. lat. and 40°10′ N. lat. Therefore, to the extent there are any increased impacts to overfished species by opening new fishing areas, they are expected to be lower in frequency and magnitude under this final rule, particularly for slope species, than under the proposed action.

Comment 8: NMFS should not implement the rule as proposed. The draft EA makes several erroneous assertions about past impacts to benthic habitat, arguing that the degraded baseline state of the benthic environment means that the impacts from opening the RCA to groundfish bottom trawling will be relatively lower. Illegal incursions into the RCA, fishing by other gears and fisheries, NMFS' trawl surveys, and pre-RCA trawling do not mean that the rule as proposed will have insignificant impacts. Most of these activities are relatively less harmful to benthic habitat, but trawl nets still bring up sponges and corals even in areas frequently trawled, as evidenced by NMFS West Coast Groundfish Observer Program (WCGOP) bycatch data.

Response: NMFS disagrees that prior impacts to benthic habitat in the RCAs are irrelevant to assessing the state of the affected environment and the types of impacts that could be anticipated from opening up areas to groundfish bottom trawling. The EA demonstrates that various activities have impacted benthic habitat in the past, including those activities mentioned by the commenter. NMFS agrees that fixed gear is generally ranked lower with respect to overall benthic habitat impacts when compared to bottom trawl gear. However, fixed gear is particularly adept at accessing some rocky areas such as hard/mixed rocky pinnacles with substantially less risk of damage to fishing gear, as compared to bottom trawl gear. Fixed gear impacts, in practice, can be greater in areas that bottom trawl vessels actively avoid or are considered untrawlable. NMFS also notes that although coral and sponges are present in trawlable habitat of all substrate types (soft, medium, hard), the magnitude of coral and sponges generally increases in hard areas that are untrawlable, and in which other fixed gear types are actively engaged in fishing activities.

Ultimately, recognizing the degree of previous and ongoing impacts to benthic habitat within the RCA boundaries under consideration contributed to NMFS' conclusion that the upper slope area should remain closed, at least until additional groundfish EFH consideration has occurred. The area between 40°10′ N. latitude and 45°46′ N. latitude and the 150fm (274-m) and modified 200fm (366-m) RCA lines has not been trawled in almost a decade by groundfish bottom trawl gear, and in practice is not trawled by pink shrimp trawl gear. As such, this area has at least partially recovered from the relatively more substantial trawl impacts, despite still being subjected to fixed gear effort and occasional research trawls or inadvertent incursions.

In addition, while intensive trawling from the 1970s through early 2000s likely did destroy a significant amount of biogenic habitat, NMFS agrees that any assumption that none remains would be unwarranted and that NMFS bottom trawl survey and WCGOP data show coral and sponge bycatch, even in areas of high fishing effort. Trawling effort is heterogeneously distributed, with some areas trawled repeatedly and others less often or in some cases not at all. Ultimately, NMFS concluded that the RCA boundaries implemented through this final rule will not significantly affect the quality of the human environment. All of the additional areas opened through this rule are currently subjected to groundfish bottom trawling at some point during the year. This rule would only change the boundaries to allow year-round access.

Comment 9: The proposed rule could have significant impacts on corals, sponges, and other marine life. Removal by bottom trawling of slow growing corals could cause long-term changes in associated megafauna, which provide shelter and food sources for juvenile fish and shellfish. Corals, sponges, and Pennantulacea (sea whips and sea pens) also create three-dimensional structures that form habitat for bottomfish, shellfish, invertebrates, and other marine life, and impacts by bottom trawling may impact fish stocks. Some corals may live in excess of 2,000 years, some sponges may be over 220 years old, and some mounds formed by sponges appear have been estimated to be between 9,000 to 125,000 years old. NMFS needs to consider impacts to biogenic habitat in conjunction with impacts to substrate. The impacts to ocean floor substrate and impacts to biogenic habitat such as corals and sponges may be different.

Response: NMFS agrees that corals, sponges, and Pennantulacea (sea whips and sea pens) have the potential to create three-dimensional structures that form habitat for marine life, and impacts by bottom trawling may have an impact on fish stocks. This was considered in the EFH synthesis review documents that informed the EA associated with this final rule. As the EA points out, recolonization and recovery rates and recovery times may be greater than 100 years for deep-sea corals. NMFS agrees that some corals may live in excess of 2,000 years, some sponges may be over 220 years old, and that some mounds formed by sponges appear to have been estimated to be between 9,000 to 125,000 years old. However, many of these habitats and mounds are particularly inaccessible to bottom trawl gear given current gear restrictions. In addition, all of the areas opened through this rule are currently subjected to groundfish bottom trawling at some point during the year.

NMFS agrees that impacts to ocean floor substrate and impacts to biogenic habitat, such as corals and sponges, may be different and that the physical environment of the seafloor is formed by the combination of invertebrates with sediment structures. NMFS fully considered the physical environment of the seafloor formed by the combination of invertebrates with sediment structures in the EA for this action. The recovery tables and other information provided by the EFH habitat synthesis review products are utilized in the EA, which considers impacts to biogenic habitat in conjunction with impacts to substrate types. Citing recovery times from those reviews, the EA specifically excludes structure-forming invertebrates in the recovery table, and qualifies the limitations of biogenic habitat recovery estimates regarding the available analysis. Although the recovery tables in the EA are mostly relevant to seafloor areas lacking biogenic habitat, impacts to biogenic habitat such as corals, sponges, and sea whips/pens are explained elsewhere in detail in the EA (as well as in the 2005 EFH EIS and recent EFH synthesis analysis review documents). NMFS notes that the majority of scientific peer-reviewed literature on biogenic habitat abundance suggests that the abundance of slow growing epibenthic coral and sponge fauna tends to be greater in mixed/hard and hard substrates, as opposed to soft sand and mud habitat. Soft sandy/mud habitat is estimated to comprise over 90 percent of groundfish habitat substrate within all RCA areas, including those that will remain closed after this final action. This rule would only change the boundaries to allow year-round access. NMFS disagrees that this rule will have significant impacts.

Comment 10: Trawl vessels do not avoid hard and mixed substrate sufficiently to mitigate impacts to areas with coral or sponge. The rule as proposed will allow trawling in areas with mixed and hard substrate and adversely impact corals and sponges.

Response: NMFS agrees that not all areas of hard and mixed substrate are untrawlable or actively avoided by vessels, and that trawling has the potential to impact corals and sponges when encountered. However, as the commenter acknowledged, at least some areas may be avoided due to potential negative impacts on trawl gear. Despite the fact that trawl vessels do tow over some trawlable smooth hard and mixed substrates, some high relief areas are considered untrawlable because of the potential for severe damage to trawl gear. These areas provide a financial and safety disincentive for vessels to engage in trawling, regardless of RCA configuration.

Comment 11: The proposed rule raises doubts about the adequacy of the existing measures to protect groundfish EFH habitat from the adverse effects caused by fishing to the extent practicable, as required by the MSA.

Response: As described earlier in the preamble to this final rule, after reviewing public comment on the proposed rule, information developed through the Council's groundfish EFH review, the Council's recommendations, and the EA for this action, NMFS has determined that additional consideration regarding the impacts of the seaward boundary modification on groundfish EFH between 45°46′ N. lat. and 40°10′ N. lat., between the 150 fm (274-m) and modified 200 fm (366-m) is warranted. Therefore, NMFS is not implementing that seaward boundary change at this time.

Comment 12: Changes to the RCA should be made through a comprehensive coastwide process in coordination with revisions to EFH.

Response: NMFS agrees that addressing changes to RCAs and revisions to EFH in a more coordinated and comprehensive manner could have some benefits. However, there are numerous procedural avenues available to the Council and NMFS that could accomplish these goals. As mentioned previously, at the Council's September 2013 meeting several industry groups and environmental nongovernmental organizations submitted a joint letter indicating their intent to collaborate on long term RCA proposals (Agenda Item G.9.d, Supplemental Public Comment 2). That effort, coordinated with the ongoing EFH review, could provide one option for considering the catch control aspects of RCAs along with the habitat aspects.

Classification

The NMFS Assistant Administrator has determined that this final rule is consistent with the Pacific Coast Groundfish FMP, other provisions of the MSA, and other applicable law. To the extent that the regulations in this final rule differ from what was deemed by the Council, NMFS invokes its independent authority under 16 U.S.C. 1855(d).

An Environmental Assessment (EA) was prepared for this action. The EA includes socio-economic information that was used to prepare the RIR and FRFA. A copy of the final EA is available online at *www.westcoast.fisheries.noaa.gov.*

NMFS finds good cause to waive the 30-day delay in effectiveness pursuant to 5 U.S.C. 553(d), so that this final rule may become effective April 17, 2014. This rule reduces regulatory restrictions by allowing trawl vessels access to areas previously closed to fishing at certain times during the year. Failure to waive the 30-day delayed effectiveness would result in missed opportunities for trawl vessels to increase profits by attempting to increase their catch of healthy fish stocks that are under harvested. Implementing this rule quickly will allow these additional fishing opportunities during the months of March and April that would otherwise be forgone. Moreover, this rule adds no requirements, duties, or obligations on the affected entities, and therefore they do not need time to modify their behavior to come into compliance with the rule. Accordingly, NMFS finds good cause to waive the delay in effectiveness.

A Regulatory Impact Review (RIR) was prepared on the action and is included as part of the final regulatory flexibility analysis (FRFA) on the regulatory changes. The FRFA and RIR describe the impact this rule will have on small entities. A description of the action, why it is being considered, and the legal basis for this action are contained at the beginning of this section in the preamble and in the **SUMMARY** section of the preamble. A copy of the FRFA is available from NMFS (see **ADDRESSES**) and a summary of the FRFA, per the requirements of 5 U.S.C. 603(a), follows:

The trawl RCA is an area is closed to vessels fishing groundfish with bottom trawl gear. This action would revises the bimonthly boundaries of the RCA that is closed to vessels fishing groundfish with bottom trawl gear. This rule affects the limited entry bottom trawl sector managed under the Pacific Coast Groundfish FMP. This RCA was designed to prevent the fleet from exceeding harvest quotas when fishing under trip limits. Since the implementation of the IFQ program, the industry has shown a remarkable ability to avoid bycatch. Therefore, the industry is seeking a reduction in the RCA area so that it can have a greater chance to fish more of their individual quotas.

NMFS considered three alternative RCA boundary configurations, as described above, and the RCA boundaries of Alternative 1 as modified in this final rule. The alternative considered were: The current trawl RCA boundaries for 2014 (no action), the Council recommended proposed trawl RCA boundaries between 48°10′ N. lat. and 40°10′ N. lat., (Alternative 1, Table 1), alternative trawl RCA boundaries between 48°10′ N. lat. and 40°10′ N. lat. added by NMFS (Alternative 2, Table 2), and the proposed trawl RCA boundaries between 48°10′ N. lat. and 40°10′ N. lat., as recommended by the Council in April 2013 with no seaward action between 45°46′ N. lat. and 40°10′ N. lat.

The amount of increased catch and reduced costs resulting from the proposed alternatives is not known due to limitations of the available data and models. However, the regulatory changes associated with Alternative 1, Alternative 2, and Alternative 1 as modified will have positive economic effects including reduced fuel, improved safety, and increased access to important target species. Overall, the most likely potential impacts are higher attainments of the trawl allocations than would be expected under the No-Action alternative. Alternative 1 as implemented in this final rule is slightly more restrictive than Alternative 2; Alternative 2 is more restrictive compared to the non-implemented Alternative 1; Alternative 2 opens some areas that have been intermittently closed, but not as much new areas as Alternative 1 as proposed would have done.

This rulemaking directly affects bottom trawlers participating in the IFQ fishery. To fish in the IFQ fishery, a vessel must have a vessel account. As part of this year's permit application processes for the non-tribal fisheries, applicants indicate if they are "small" business based on a review of the Small Business Administration (SBA) size criteria. These criteria have recently changed. On June 20, 2013, the SBA issued a final rule revising the small business size standards for several industries effective July 22, 2013 (78 FR 37398, June 20, 2013). The rule increased the size standard for Finfish Fishing from $ 4.0 to 19.0 million, Shellfish Fishing from $ 4.0 to 5.0 million, and Other Marine Fishing from $4.0 to 7.0 million (Id. at 37400-Table 1). Based on the new size standard ($19 million), NMFS reassessed those businesses considered large under the old size standard ($4 million) based on information provided by these companies under the NMFS Northwest Fisheries Science Center's (NWFSC) Economic Data Collection Program. After taking into account NWFSC economic data, NMFS permit and ownership information, PacFIN landings data for 2012, and affiliation between entities, NMFS estimates that there are 66 entities affected by these proposed regulations, of which 56 are "small" businesses. As noted below, these small entities are not negatively impacted by this rule.

There were no significant issues raised by the public comments in response to the IRFA. Several comments to the proposed rule had economic content (see especially Comments 2, 3, and 5 and associated responses of the Final Rule.) Based upon comments explained above in the preamble, NMFS is implementing Alternative 1 with the exception of the seaward boundary change between 45°46′ N. lat. and 40°10′ N. lat., to provide IFQ participants with the increased flexibility to attain underutilized target species.

This final rule will increase access to fishing grounds in a fishery where the individual accountability of the IFQ program has a three-year track record of providing strong incentives to keep bycatch of overfished species low, irrespective of trawl RCA boundaries. The changes to the trawl RCA boundaries would continue to refine groundfish fishery management measures to enable higher attainment of available quota pounds for several valuable species, while still protecting overfished species. The EA demonstrates that the upper slope area benthic habitat between 45°46′ N. latitude to 40°10′ N. latitude, 150 to 200 fm, which would be opened under the Council-preferred Alternative 1, may have experienced some recovery from the effects of bottom trawling. This area has been closed to bottom-trawl gear impacts for almost a decade. NMFS has determined that the area between 45°46′ N. latitude to 40°10′ N. latitude, from the 150 fm to modified 200 fm lines should remain closed pending completion of the groundfish EFH review or additional consideration of whether opening that area is consistent with minimizing the adverse effects on groundfish EFH caused by fishing to the extent practicable. However, this final rule will still increase year-round access to areas that are already open to bottom trawling at some times during the year. This rule opens up approximately 2,389 square miles of additional year-round access to the bottom trawl fleet compared to taking no action.

Accordingly, NMFS believes that this rule will have a positive impact on small entities and will not have significant adverse economic impacts on a substantial number of small entities.

This final rule was developed after meaningful collaboration, through the Council process, with the tribal representative on the Council.

No Federal rules have been identified that duplicate, overlap, or conflict with the final action. Public comment is hereby solicited, identifying such rules.

This rule has been determined to be not significant for purposes of Executive Order 12866.

List of Subjects in 50 CFR Part 660

Fisheries, Fishing, and Indian fisheries.

Dated: April 11, 2014.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For the reasons stated in the preamble, 50 CFR part 660 is amended as follows:

PART 660—FISHERIES OFF WEST COAST STATES

■ 1. The authority citation for part 660 continues to read as follows:

Authority: 16 U.S.C. 1801 *et seq.* and 16 U.S.C. 773 *et seq.*

■ 2. Table 1 (North) to part 660, subpart D, is revised to read as follows:

Table 1 (North) to Part 660, Subpart D – Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances for non-IFQ Species and Pacific Whiting North of 40°10' N. Lat.

This table describes Rockfish Conservation Areas for vessels using groundfish trawl gear. This table describes incidental landing allowances for vessels registered to a Federal limited entry trawl permit and using groundfish trawl or groundfish non-trawl gears to harvest individual fishing quota (IFQ) species.

Other Limits and Requirements Apply – Read § 660.10 - § 660.399 before using this table 02012014

TABLE 1 (North)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:						
1	North of 48°10' N. lat.	shore - modified[2/] 200 fm line[1/]	shore - 200 fm line[1/]	shore - 150 fm line[1/]		shore - 200 fm line[1/]	shore - modified[2/] 200 fm line[1/]
2	48°10' N. lat. - 45°16' N. lat.	100 fm line[1/] - 150 fm line[1/]					
3	45° 10' N. lat. - 40°10' N. lat.	Shoreward 100 fm line (Seaward line below)[1/]					
4	45° 10' N. lat. - 40°10' N. lat.	Seaward modified[2/] 200 fm line[1/]	Seaward 200 fm line[1/]				Seaward modified[2/] 200 fm line[1/]

Selective flatfish trawl gear is required shoreward of the RCA; all bottom trawl gear (large footrope, selective flatfish trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope and small footrope trawl gears (except for selective flatfish trawl gear) are prohibited shoreward of the RCA. Midwater trawl gear is permitted only for vessels participating in the primary whiting season. **Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry groundfish trawl fishery landing allowances in this table, regardless of the type of fishing gear used. Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry fixed gear non-trawl RCA, as described in Tables 1 (North) and 1 (South) to Part 660, Subpart E.**

See § 660.60, § 660.130, and § 660.140 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.70-660.74 and §§ 660.76-660.79 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).

State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
3	**Minor nearshore rockfish & Black rockfish**	300 lb/ month					
4	**Whiting**						
5	midwater trawl	Before the primary whiting season: CLOSED. – During the primary season: mid-water trawl permitted in the RCA. See §660.131 for season and trip limit details. – After the primary whiting season: CLOSED.					
6	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. – During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.					
7	**Cabezon**						
8	North of 46°16' N. lat.	Unlimited					
9	46°16' N. lat. - 40°10' N. lat.	50 lb/ month					
10	**Shortbelly**	Unlimited					
11	**Spiny dogfish**	60,000 lb/ month					
12	**Longnose skate**	Unlimited					
13	**Other Fish[3/]**	Unlimited					

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours, and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to the RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ The "modified" fathom lines are modified to exclude certain petrale sole areas from the RCA.

3/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skate), ratfish, morids, grenadiers, and kelp greenling.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

[FR Doc. 2014–08732 Filed 4–16–14; 8:45 am]

BILLING CODE 3510–22–P

EPA-APPROVED GEORGIA NON-REGULATORY PROVISIONS

Name of non-regulatory SIP provision	Applicable geographic or nonattainment area	State submittal date/effective date	EPA approval date	Explanation
* * *	*	*	*	*
1997 Annual $PM_{2.5}$ Maintenance Plan for the Macon Area.	Bibb County and a portion of Monroe County, Macon, Georgia Nonattainment Area.	6/21/12	5/13/14 [Insert citation of publication].	....

PART 81—[AMENDED]

■ 3. The authority citation for part 81 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

■ 4. In § 81.311, the table entitled "Georgia—$PM_{2.5}$ (Annual NAAQS)" is amended under "Macon, GA" by revising the entry for "Bibb County and a portion of Monroe County" to read as follows:

§ 81.311 Georgia

* * * * *

GEORGIA—$PM_{2.5}$ (ANNUAL NAAQS)

Designated area	Designation [a]	
	Date [1]	Type
* * *	* * *	*
Macon, GA:		
Bibb County	This action is effective May 13, 2014	Attainment.
Monroe County (part)	This action is effective May 13, 2014	Attainment.
* * *	* * *	*

[a] Includes Indian Country located in each county or area, except as otherwise specified.
[1] This date is 90 days after January 5, 2005, unless otherwise noted.

* * * * *

[FR Doc. 2014–10842 Filed 5–12–14; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[MB Docket No. 05–263; RM–11269; DA 14–458]

Radio Broadcasting Services; Grants and Church Rock, New Mexico

AGENCY: Federal Communications Commission.

ACTION: Final rule; dismissal of petition for partial reconsideration.

SUMMARY: This document dismisses the Petition for Partial Reconsideration filed by Reynolds Technical Associates in response to the "Request to Dismiss." Reynolds Technical Associates states that it is no longer interested in pursuing the Petition for Partial Reconsideration, and it certifies that there is no agreement and no consideration received or promised in exchange for such withdrawal.

DATES: Effective May 13, 2014.

ADDRESSES: Federal Communications Commission, 445 12th Street SW., Washington, DC. 20554.

FOR FURTHER INFORMATION CONTACT: Rolanda F. Smith, Media Bureau, (202) 418–2700.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's *Memorandum Opinion and Order,* MB Docket No. 05–263, adopted April 3, 2014, and released April 4, 2014. The full text of this Commission decision is available for inspection and copying during normal business hours in the Commission's Reference Center 445 12th Street SW., Washington, DC 20554. The complete text of this decision may also be purchased from the Commission's duplicating contractor, Best Copy and Printing, Inc., 445 12th Street SW., Room CY–B402, Washington, DC 20554, telephone 1–800–378–3160 or *www.BCPIWEB.com.* This document is not subject to the Congressional Review Act. (The Commission is, therefore, not required to submit a copy of this *Memorandum Opinion and Order* to the General Accounting Office pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A), because the Petition for Partial Reconsideration was dismissed.

Federal Communications Commission.

Peter H. Doyle,

Chief, Audio Division, Media Bureau.

[FR Doc. 2014–10260 Filed 5–12–14; 8:45 am]

BILLING CODE 6712–01–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 660

[Docket No. 130808694–4378–03]

RIN 0648–BD37

Magnuson-Stevens Act Provisions; Fisheries off West Coast States; Pacific Coast Groundfish Fishery; Commercial Groundfish Fishery Management Measures; Rockfish Conservation Area Boundaries for Vessels Using Bottom Trawl Gear; Correction

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule; correcting amendment.

SUMMARY: This action contains coordinate corrections to the Rockfish

Conservation Area (RCA) boundary regulations that published in the **Federal Register** on April 17, 2014. This document corrects 2014 groundfish bottom trawl Rockfish Conservation Area boundary coordinates described in table 1 (North) that were inadvertently misreported in Rockfish Conservation Area Boundaries for Vessels Using Bottom Trawl Gear final rule.

DATES: This correcting amendment is effective May 13, 2014.

FOR FURTHER INFORMATION CONTACT: Colby Brady, 206–526–6117; *Colby.brady@noaa.gov.*

SUPPLEMENTARY INFORMATION:

Background

The 2013–2014 Biennial Specifications and Management Measures rule established the 2013–2014 harvest specifications and management measures for groundfish taken in the U.S. exclusive economic zone off the coasts of Washington, Oregon, and California consistent with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Pacific Coast Groundfish Fishery Management Plan (PCGFMP) (78 FR 580, January 3, 2013). Since 2002 NMFS has used large-scale, depth-based closures to reduce catch of overfished groundfish, while still allowing the harvest of healthy stocks to the extent possible. RCAs are gear specific closures, and apply to vessels that take and retain groundfish species. Regarding RCA coordinates, there was an error in the 2014 Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances table 1 (North) coordinates published in the **Federal Register** (79 FR 21639). Three intended references to 45°46′ N. lat. as published in lines 2, 3, and 4 of table 1 (North) were not correctly specified. As published, Line 2 incorrectly specified 45°16′ N. lat., instead of the correct reference, 45°46′ N. lat.; and lines 3 and 4 incorrectly specified 45°10′ N. lat., instead of the correct reference, 45°46′ N. lat. As published, line 3 described the shoreward line, and line 4 described the seaward lines. This rule will delete line 4 and describe the range of shoreward and seaward boundary lines within line 3, consistent with the format of the rest of the table. This action is to correct the 2014 Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances Table 1 (North) to part 660, subpart D as published, in order to properly reflect the trip limit table coordinates as intended by the Agency in the Trawl RCA final rule (79 FR 21639).

Classification

The Assistant Administrator (AA) for Fisheries, NOAA, finds that pursuant to 5 U.S.C.553(b)(B), there is good cause to waive prior notice and an opportunity for public comment on this action, as notice and comment would be impracticable and contrary to the public interest. This notice corrects coordinates in the 2014 Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances Table 1 (North) to part 660, subpart D that were inadvertently misreported in the Rockfish Conservation Area Boundaries for Vessels Using Bottom Trawl Gear final rule. This correction must be implemented in a timely manner to avoid confusion to the public likely to be caused by the errors in the table and avoid the potential for fishing in an area that was intended to be closed for conservation purposes. It would be contrary to the public interest to delay implementation of these changes until after public notice and comment, because making this regulatory change by May 13, 2014, corrects the errors and avoids confusion created by the above-referenced table and the potential for fishing in an area intended to be closed for conservation purposes. For the reasons above, the AA finds good cause under 5 U.S.C. 553(d)(3) to waive the 30-day delay in effectiveness and makes this rule effective immediately upon publication.

List of Subjects in 50 CFR Part 660

Fisheries, Fishing, and Indian fisheries.

Dated: May 7, 2014.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 660 is corrected by making the following correcting amendments:

PART 660—FISHERIES OFF WEST COAST STATES

■ 1. The authority citation for part 660 continues to read as follows:

Authority: 16 U.S.C. 1801 *et seq.* and 16 U.S.C. 773 *et seq.*

■ 2. Table 1 (North) to part 660, subpart D, is revised to read as follows:

BILLING CODE 3510–22–P

Table 1 (North) to Part 660, Subpart D -- Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances for non-IFQ Species and Pacific Whiting North of 40°10' N. Lat.

This table describes Rockfish Conservation Areas for vessels using groundfish trawl gear. This table describes incidental landing allowances for vessels registered to a Federal limited entry trawl permit and using groundfish trawl or groundfish non-trawl gears to harvest individual fishing quota (IFQ) species.

Other Limits and Requirements Apply -- Read § 660.10 - § 660.399 before using this table 04012014

TABLE 1 (North)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:						
1	North of 48°10' N. lat.	shore - modified[2/] 200 fm line[1/]	shore - 200 fm line[1/]	shore - 150 fm line[1/]		shore - 200 fm line[1/]	shore - modified[2/] 200 fm line[1/]
2	48°10' N. lat. - 45°46' N. lat.	100 fm line[1/] - 150 fm line[1/]					
3	45°46' N. lat. - 40°10' N. lat.	100 fm line[1/] - modified[2/] 200 fm line[1/]	100 fm line[1/] - 200 fm line[1/]				100 fm line[1/] - modified[2/] 200 fm line[1/]
	Selective flatfish trawl gear is required shoreward of the RCA; all bottom trawl gear (large footrope, selective flatfish trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope and small footrope trawl gears (except for selective flatfish trawl gear) are prohibited shoreward of the RCA. Midwater trawl gear is permitted only for vessels participating in the primary whiting season. **Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry groundfish trawl fishery landing allowances in this table, regardless of the type of fishing gear used. Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry fixed gear non-trawl RCA, as described in Tables 1 (North) and 1 (South) to Part 660, Subpart E.**						
	See § 660.60, § 660.130, and § 660.140 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.70-660.74 and §§ 660.76-660.79 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
4	**Minor nearshore rockfish & Black rockfish**	300 lb/ month					
5	**Whiting**						
6	midwater trawl	Before the primary whiting season: CLOSED. -- During the primary season: mid-water trawl permitted in the RCA. See §660.131 for season and trip limit details. -- After the primary whiting season: CLOSED.					
7	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. -- During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.					
8	**Cabezon**						
9	North of 46°16' N. lat.	Unlimited					
10	46°16' N. lat. - 40°10' N. lat.	50 lb/ month					
11	**Shortbelly**	Unlimited					
12	**Spiny dogfish**	60,000 lb/ month					
13	**Longnose skate**	Unlimited					
14	**Other Fish [3/]**	Unlimited					

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours, and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to the RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ The "modified" fathom lines are modified to exclude certain petrale sole areas from the RCA.

3/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skate), ratfish, morids, grenadiers, and kelp greenling.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

[FR Doc. 2014–10937 Filed 5–12–14; 8:45 am]

BILLING CODE 3510–22–C

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 660

[Docket No. 131119977–4381–02]

RIN 0648–BD75

Magnuson-Stevens Act Provisions; Fisheries off West Coast States; Pacific Coast Groundfish Fishery; Annual Specifications and Management Measures for the 2014 Tribal and Non-Tribal Fisheries for Pacific Whiting

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NMFS issues this final rule for the 2014 Pacific whiting fishery under the authority of the Pacific Coast Groundfish Fishery Management Plan (FMP), the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), and the Pacific Whiting Act of 2006. This final rule announces the 2014 U.S. TAC, establishes the tribal allocation of 55,336 metric tons of Pacific whiting for 2014, establishes a set-aside for research and bycatch of 1,500 metric tons, and announces the final allocations of Pacific whiting to the non-tribal fishery for 2014.

DATES: Effective May 13, 2014.

FOR FURTHER INFORMATION CONTACT: Kevin C. Duffy (Northwest Region, NMFS), phone: 206–526–4743, and email: *kevin.duffy@noaa.gov.*

SUPPLEMENTARY INFORMATION:

Electronic Access

This final rule is accessible via the Internet at the Office of the Federal Register Web site at *https://www.federalregister.gov.* Background information and documents are available at the NMFS West Coast Region Web site at *http://www.westcoast.fisheries.noaa.gov/fisheries/management/whiting/pacific_whiting.html* and at the Pacific Fishery Management Council's Web site at *http://www.pcouncil.org/.*

Copies of the final environmental impact statement (FEIS) for the 2013–2014 Groundfish Specifications and Management Measures are available from Donald McIsaac, Executive Director, Pacific Fishery Management

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E.
Seattle, Washington 98115

May 20, 2014

Dorothy Lowman
Chair
Pacific Fishery Management Council
7700 Ambassador Place, Suite 101
Portland, OR 97220-1384

Dear Chair Lowman:

This letter is to inform the Council of the list of species for which surplus carryover will be issued from 2013 into the 2014 season of the Shorebased Individual Fishing Quota (IFQ) Program. NMFS has decided to issue surplus carryover for 19 IFQ species that have 2014 Annual Catch Limits (ACLs) established at a level lower than their corresponding 2014 Acceptable Biological Catches (ABCs). NMFS will not issue surplus carryover for the remaining IFQ species that have 2014 ACLs established equal to their 2014 ABCs. This decision is the result of a recent court decision discussed below.

Court decision

On April 4, 2014, the D.C. District Court issued its decision in Conservation Law Foundation's (CLF's) challenge to Framework 50 to the New England Groundfish Fishery Management Plan (FMP), *Conservation Law Foundation v. Pritzker*, No. 13-00821 (D.D.C. Apr. 4, 2014). The primary issue in that case was a challenge to NMFS's authority to allow carryover of unused catch in fishing year 2013 that resulted in a total allocation of catch higher than the ABC recommended by the Scientific and Statistical Committee (SSC). The court held that carryover is inconsistent with the Magnuson-Stevens Act if it results in a total potential catch level that exceeds the ABCs recommended by the SSC.

In light of the court's holding, NMFS West Coast Region has decided that 2014 ACLs, including carryover from 2013, should not exceed the ABCs recommended by the SSC. Thus we will not be issuing carryover for any IFQ species where adding 2013 carryover onto the 2014 ACL would result in exceeding an IFQ species' ABC.

There are 19 IFQ species/area categories for which the ABC is greater than the corresponding ACL, and NMFS will issue surplus carryover in 2014 for all of them: Bocaccio Rockfish South of 40°10' N., Canary Rockfish, Cowcod South of 40°10' N., Darkblotched Rockfish, Dover Sole, Longspine Thornyheads North of 34°27' N., Minor Shelf Rockfish North of 40°10' N., Minor Shelf Rockfish South Of 40°10' N., Minor Slope Rockfish North of 40°10' N., Other Flatfish, Pacific Cod, Pacific Halibut (IBQ) North Of 40°10' N., Pacific Ocean Perch North of 40°10' N., Sablefish North of 36° N., Sablefish South of 36° N., Shortspine Thornyheads North of 34°27' N., Shortspine Thornyheads South of 34°27' N., Widow Rockfish, and Yelloweye Rockfish. These species will receive full eligible surplus carryover pounds, after application of any necessary reductions according to regulation.

Consistent with the PFMC recommendation, NMFS will not issue surplus carryover for Pacific whiting due to the need for adherence to the international whiting agreement, where a method for addressing carryover of unused Pacific whiting already exists. Since the Pacific halibut Total Constant Exploitation Yield for area 2A (Washington, Oregon and California) is set by international agreement, and there is no ACL, the court's holding is not applicable to this species, and NMFS will continue with its past practice.

As listed above, NMFS is issuing surplus carryover for Sablefish North of 36° N. In the first 3 years of the catch shares program, NMFS had established a policy that we would not issue surplus carryover for IFQ species with overall attainment at or above 100 percent of the Shorebased IFQ Program allocation in the prior year. This policy would have precluded issuance of carryover for Sablefish North of 36° N. into the 2014 season. However, now that the program is in its fourth year, we have available three years of catch data that show: 1) The fleet has not gone into deficit in aggregate for any species, and 2) When NMFS issues carryover for high attainment species the fleet tends to catch more, but stays within the total amount issued. Given the performance of the fishery during the first three years, NMFS revisited the initial policy regarding high attainment of the allocation.

NMFS will make the decision of whether or not to issue carryover for species with very high attainment of the previous year's shorebased trawl allocation on a case-by-case basis, rather than automatically dismissing this possibility. The case-by-case analysis will at the minimum include a review of fleet behavior in the prior year, as well the potential for impacts of carryover on non-trawl sector allocations. NMFS may still deny issuance of carryover, especially if we determine that the risk of exceeding the ACL is unacceptably high, and we will continue to maintain a higher level of precaution for overfished species.

NMFS conducted additional analyses of Sablefish North of 36° N. based on the new policy. After considering our additional analyses, NMFS has decided to issue full eligible surplus carryover of sablefish north of 36 degrees N. latitude. We will carefully monitor catch throughout the year, and we are prepared to initiate AMs, should catch exceed expectations. Catch in 2014 is projected to remain within the coastwide OFL and ABC as well as the northern ACL, and the risk of exceeding the ACL is acceptably low.

NMFS also recommends that the Council explore measures to make the annual surplus carryover process in the Shorebased IFQ Program more efficient and predictable, while adhering to Magnuson-Stevens Act requirements and the recent court decision. Creating a solution will likely require a non-trivial amount of effort, and NMFS is prepared to participate in developing constructive solutions. We suggest that it may be most appropriate to include this issue as part of the 5-year review of the catch share program, but we are open to other schedule suggestions.

If you have any questions or comments regarding this letter, please contact me directly.

Sincerely,

Frank Lockhart
Program Director for Groundfish and CPS
Sustainable Fisheries Division
West Coast Region
National Marine Fisheries Service

cc: Dr. Donald O. McIsaac
Vice-Chair Herb Pollard

GROUNDFISH ADVISORY SUBPANEL REPORT ON CONSIDERATION OF INSEASON ADJUSTMENTS

The Groundfish Advisory Subpanel (GAP) met with the Groundfish Management Team (GMT) to discuss progress of this year's fishery and possible inseason adjustments. The GMT discussion was led by Mr. Bob Leos. The GAP offers the following recommendations and comments on proposed inseason adjustments to ongoing groundfish fisheries.

Limited Entry Fixed Gear Sablefish Fishery North of 36° N. Latitude

Current trip limit (950 weekly/2,850 bimonthly)

Industry has requested an increase in trip limits for sablefish for the balance of the year (periods 4 through 6). The GMT analyzed 2 alternatives for the Council to consider. The GAP supports **GMT Alternative 1, (1 landing per week of up to 1,000 lb., not to exceed 3,000 lb. per 2 months).** The model suggests a sufficient buffer (est. between 88 percent to 93 percent take) depending on which price assumption is used.

Open Access Fixed Gear Sablefish Fishery North of 36° N. Latitude

Current trip limit (300 daily/800 weekly/1,600 bimonthly)

Open Access representatives on the GAP have requested exploring the possibility of an increase in trip limits for sablefish for the remainder of the year (periods 4 through 6). Open access fishermen are currently working with a very narrow profit margin due to high fuel prices combined with very low trip limits. The GAP supports **GMT Alternative 1, (350 lb. per day, or 1 landing per week of up to 1,600 lb., not to exceed 3,200 lb. per 2 months).**

Limited Entry/Open Access Fixed Gear Shallow/Deeper Nearshore Rockfish South of 40° 10' N. Latitude

Current trip limit (900 lb. per 2 month period)

The Port San Luis Commercial Fishermen's Association requested an increase in the trip limits for both shallow nearshore and deeper nearshore rockfish for the balance of the year (periods 4 through 6). The GMT analyzed this request and has noted that this fishery has already been projected to exceed its allocation of Canary rockfish by .1 MT (GMT Table 4 Scorecard Projected Impacts). Therefore the GAP does not support this request as any increase in nearshore trip limits would likely increase this overage of Canary rockfish.

Open Access Fixed Gear Lingcod South of 42° N. Latitude

The Port San Luis Commercial Fishermen's Association requested opening Lingcod in December of this year with a 400 pound monthly limit. The GAP notes this fishery has been closed to Lingcod fishing for decades during this time of year to protect nesting spawning females. The GAP believes bycatch impacts to Canary and/or Yelloweye rockfish would increase with this request. We note that a similar request has been brought forward for the 2015/2016 fishing seasons and is currently being analyzed under the Biennial Specifications package. The GAP does not support this request as an inseason action and prefers holding off until the final Specs analysis has been completed before considering again in the future.

Summary of GAP recommendations

1) Limited Entry Fixed Gear Sablefish Fishery North of 36° N. Latitude

GMT Alternative 1, (1 landing per week of up to 1,000 lb., not to exceed 3,000 lb. per 2 months)

2) Open Access Fixed Gear Sablefish Fishery North of 36° N. Latitude

GMT Alternative 1, (350 lb. per day or 1 landing per week of up to 1,600 lb., not to exceed 3,200 lb. per 2 months)

PFMC
06/21/14

GROUNDFISH MANAGEMENT TEAM REPORT ON CONSIDERATION OF INSEASON ADJUSTMENTS

Action items:

- Proposed trip limit increases for the limited entry and open access fixed-gear sablefish DTL sectors north of 36° N. latitude for 2014.
- Request for increased bimonthly trip limits for shallow and deeper nearshore species in the LE fixed gear and OA, south of 40°10' N. latitude.
- Proposed trip limit for the limited entry and open access lingcod fishery for December 2014, south of 42° N. latitude.

Informational items:

- Research catch update
- Overfished Species Scorecard update

Appendix A: Fixed Gear Sablefish Daily Trip Limit (DTL) Forecast Assumptions and Uncertainty

The Groundfish Management Team (GMT) considered the most recent information on the status of ongoing fisheries, research, and requests from industry and provides the following recommendations for 2014 inseason adjustments.

The GMT also received guidance from the National Marine Fisheries Service (NMFS) West Coast Region (WCR) regarding timing of implementation of inseason recommendations from this meeting. NMFS anticipates implementing routine inseason adjustments to fishery management measures by August 1, 2014.

1. ACTION ITEMS

1.1. Fixed gear sablefish, daily trip limit fisheries in 2014

Here we describe inseason considerations for 2014 in the four fixed gear daily trip limit (DTL) fisheries, including both limited entry (LE) and open access (OA), north and south of 36° N. latitude. We refer to them as follows: LE North, LE South, OA North, and OA South.

Projection models have been updated with a year of new data (2013), re-specified accordingly, and new catch information about progress through the first part of 2014 is available from the Quota Species Monitoring (QSM) Best Estimate Report (BER), from the Pacific Fisheries Information Network (PacFIN).

1.1.1. Current status and alternatives

Current projections under status quo and action alternatives are shown in Table 1. Alternative trip limits are shown in Table 2.

Under the action alternatives, we maintained the same ratio of weekly to bimonthly trip limits as status quo for each fishery, since there were no industry requests to diverge from them. The exception is for Alternative 3 in the OA North, where the bimonthly limit is much higher than status quo and it may require up to three trips to attain the bimonthly trip limit.

Table 1. Forecasted landings (mt) and attainment (percent) under the alternatives, for the fixed gear sablefish DTL fisheries in 2014. Landings projections are bracketed by a range of three levels of assumed ex-vessel price curves in the LE North fishery (see Appendix A. for description).

	LE N, by price assumption						
2014 No Action	**Low**	**Med**	**High**	**OA N**	**LE S**	**OA S**	**South sum**
Landing target	**214**	**214**	**214**	352	483	392	875.0
Projected landings	182.1	187.2	192.3	156.8	516.5	104.4	620.9
Difference	31.9	26.8	21.7	195.2	-33.5	287.6	254.1
Percent attainment	85%	88%	90%	45%	107%	27%	71%
2014 Alternative 1							
Landing target	214	214	214	352	-	-	-
Projected landings	189.0	194.3	199.6	233.2	-	-	-
Difference	25.0	19.7	14.4	118.8	-	-	-
Percent attainment	88%	91%	93%	66%	-	-	-
2014 Alternative 2							
Landing target	214	214	214	352	-	-	-
Projected landings	198.7	204.4	210.1	288.1	-	-	-
Difference	15.3	9.6	3.9	63.9	-	-	-
Percent attainment	93%	96%	98%	82%	-	-	-
2014 Alternative 3							
Landing target	-	-	-	352	-	-	-
Projected landings	-	-	-	338.4	-	-	-
Difference	-	-	-	13.6	-	-	-
Percent attainment	-	-	-	96%	-	-	-

Table 2. Trip limits (pounds/vessel/unit time) under the alternatives for the fixed gear sablefish DTL fisheries in 2014. Potential action alternative trip limits are in bold font. For the OA North, the No Action Alternative, Alternative 1, and Alternative 2 are structured so that it is possible to achieve the bimonthly limit in two weeks. For Alternative 3, it would take three weeks.

Fleet/ area	period	2014 No action trip limits			2014 Alt. 1 trip limits			2014 Alt. 2 trip limits			2014 Alt. 3 trip limits		
		bimo	week	day	bimo	week	day	bimo	week	day	bimo	week	day
LE N	1-3	2,850	950	-	2,850	950	-	2,850	950	-	2,850	950	NA
	4-6				**3,000**	**1,000**	-	**3,200**	**1,075**	-	-	-	-
OA N	1-3	1,600	800	300	1,600	800	300	1,600	800	300	1,600	800	300
	4-6				**3,200**	**1,600**	**350**	**4,400**	**2,200**	**375**	**5,400**	**1,800**	**400**
LE S	1-6	-	2,000	-	-	-	-	-	-	-	-	-	-
OA S	1-6	3,200	1,600	320	-	-	-	-	-	-	-	-	-

<u>LE North</u>

Projected attainment in the LE North fishery under No Action during 2014 ranges between 85 and 90 percent of the target, depending upon assumptions of ex-vessel price (Table 1 and Table 2). Projected attainment under Alternative 1 ranges between 88 and 93 percent, and for Alternative 2, it ranges between 93 and 98 percent.

<u>OA North</u>

Projected attainment under No Action in the OA North fishery during 2014 is for 45 percent of the target. Projected attainment under the action alternatives ranges between 66 percent for Alternative 1, 82 percent for Alternative 2, and 96 percent for Alternative 3 (Table 1 and Table 2).

<u>LE South</u>

The status quo LE South projection using the best currently available information is for 107 percent attainment (Table 1), thus no alternatives trip limits are presented. This would be similar to the attainment level during 2013 of 104 percent. However, industry reports of low effort during Period 2 (March and April) due to bad weather suggest that actual attainment may turn out to be somewhat lower than projected. Accurate QSM estimates of sablefish landings in the Conception International North Pacific Fisheries Commission (INPFC) area during Period 2 are not currently available, so it is difficult to check these reports. The OA South fishery is currently projected to have low attainment, and would allow ample room for the small predicted overage in the LE South fishery, should it occur.

<u>OA South</u>

Projected attainment in the OA South fishery in 2014 is low (27 percent, Table 1), and attainment has been low in 2012 and 2013 (Appendix A.). The GMT believes there is sufficient opportunity under the current OA South trip limits (320 pounds daily, 1,600 pounds weekly, and 3,200 pounds bimonthly, Table 2), judging by comparison over the historical time series, and no requests have been made by industry for this fishery. Thus, we are not proposing action alternatives for the OA South at this time.

Appendix A. gives information on the current annual changes to model specifications, coinciding with the addition of new input data each Spring, as soon as they become final in PacFIN. Details about trending fishery behavior in the OA North fishery, and our measures to compensate for it in forecasts is also described in the appendix.

1.2. Limited entry and open access fixed gear - shallow and deeper nearshore rockfish trip limits and a December trip limit for lingcod

The GMT reviewed a request from industry asking for increased bimonthly trip limits for shallow and deeper nearshore species in the limited entry fixed gear and open access fisheries south of 40°10' N. latitude for the remainder of this year (Agenda Item F.4.c, Public Comment)). The request is to increase the current trip limit amounts from 900 pounds per two months (July-August) and 800 pounds per two months (Sept-Oct) to 1,000 pounds per two months. There was also a request for a 400 pound trip limit for the lingcod limited entry fixed gear and open access fisheries to be implemented for December for south of 42° N. latitude. Lingcod retention is currently prohibited from December – April. For the 2015-2016 cycle, the GMT provided an analysis which could provide for lingcod retention, beginning in 2015 (See Agenda Item F.7.a, Supplemental Attachment 10, June 2014).

The Council has supported trip limit increases for the nearshore fishery in the past. For example, the most recent increase took place last year when the trip limit for period 6 trip limit was increased to 1,000 pounds.

In considering these requests, the GMT evaluated the possible mortality increases to overfished species (OFS), specifically canary and yelloweye rockfish, even though no formal analysis was completed due to the lack of time. If the Council chooses, the GMT could conduct an analysis in time for the September Council meeting for the nearshore species trip limit request. However, we provide the following information to assist with this decision. The 2014 directed open access commercial nearshore fishery canary rockfish allocation is 6.4 mt with a projected mortality of 6.5 mt (Table 3). Any trip limit increase in the nearshore fishery south of 40°10' N. latitude would likely add to the existing projected mortality amount. For yelloweye rockfish, the directed open access allocation (coastwide) is 1.2 mt with a projected mortality of 1.1 mt. While the projected mortality is 0.1 mt less than the allocation amount, if one considers the additional opportunity to take lingcod in December (plus any additional take of nearshore rockfishes), it is possible that the 1.2 mt allocation may be exceeded (Table 3). This is because lingcod landings made with nearshore rockfish landings are closely associated with the constraining canary and yelloweye rockfish mortality estimates and are factored into the nearshore bycatch model that estimates OFS mortality in the nearshore fishery. Regarding the request to open the lingcod closed season in December, it is the GMT's understanding that this action is not yet considered routine and cannot be done as an inseason action after a single meeting and without a notice and comment rulemaking.

2. INFORMATIONAL ITEMS

2.1. Research

The International Pacific Halibut Commission (IPHC) is just beginning their annual set-line survey for Pacific halibut. Therefore, there are no updates to the IPHC research catches of yelloweye rockfish at this time. The GMT was informed that the NMFS trawl survey has encountered one tow of approximately 1.5 mt of canary rockfish. Through one out of five legs in the May-July period, the survey has captured a total of 2.2 mt of canary rockfish. The scorecard currently has 4.5 mt of canary rockfish set-aside for research, which was based on recent average catches. There is also currently a residual of 21.3 mt of canary rockfish in the scorecard (Table **3**). The GMT anticipates receiving further updates on these research projects at the September meeting.

2.2. Scorecard Update

The scorecard has been updated to reflect changes to the Tribal set-asides, based on the 2014 Pacific whiting total allowable catch (TAC; Table 3). Canary and darkblotched rockfish, and POP estimates are based on a 5-year weighted averaged bycatch rate applied to the whiting allocation which was recently codified in the Final Rule (79FR27198). Bycatch projections for canary rockfish went from 10.1 mt to 9.2 mt, darkblotched rockfish went from 0.4 mt to 0.2 mt, and POP went from 14.8 mt to 7.4 mt. There are no other updates to the scorecard at this time.

GMT Recommendations:

1. **Increase fixed gear sablefish DTL trip limits for limited entry north of 36° N lat. in 2014 in periods 4 through 6, according to the Council's risk tolerance.**

2. **Increase fixed gear sablefish trip limits for open access north of 36° N lat. in 2014 in periods 4 through 6, according to the Council's risk tolerance.**

Table 3 Scorecard for the beginning of 2014. Allocations[a] and projected mortality impacts (mt) of overfished groundfish species for 2014.

Fishery	Bocaccio b/		Canary		Cowcod b/		Dkbl		Petrale		POP		Yelloweye	
***Date*: 6 June 2014**	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts	Allocation a/	Projected Impacts
Off the Top Deductions	8.4	9.3	17.5	17.2	0.1	0.2	20.8	17.5	234.0	234.0	16.5	13.2	5.8	5.8
EFPc/	6.0	6.0	1.5	1.5	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Research d/	1.7	2.6	4.5	4.5	0.1	0.2	2.1	2.1	11.6	11.6	5.2	5.2	3.3	3.3
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	18.4	15.0	2.4	2.4	0.4	0.6	0.2	0.2
Tribal f/			9.5	**9.2**			0.1	**0.2**	220.0	220.0	10.9	**7.4**	2.3	2.3
Trawl Allocations	79.0	79.0	54.1	54.1	1.0	1.0	293.7	293.7	2,383.0	2,383.0	129.7	129.7	1.0	1.0
-SB Trawl	79.0	79.0	41.1	41.1	1.0	1.0	**278.4**	278.4	2,378.0	2,378.0	112.3	112.3	1.0	1.0
-At-Sea Trawl			13.0	13.0			15.4	15.4	5.0	5.0	17.4	17.4		
a) At-sea whiting MS			5.4	5.4			**6.3**	6.3			7.2	7.2		
b) At-sea whiting CP			7.6	7.6			9.0	9.0			10.2	10.2		
Non-Trawl Allocation	249.6	125.4	47.4	26.4	1.9	0.8	**15.5**	4.5	35.0	2.2	**6.8**	0.2	11.2	10.3
Non-Nearshore	76.2		3.7										1.1	
LE FG				0.8				3.6				0.2		0.4
OA FG				0.1				0.7				0.0		0.0
Directed OA: Nearshore	0.9	0.4	6.4	6.5		0.0		0.2					1.2	1.1
Recreational Groundfish														
WA			3.2	0.9				--		--		--	2.9	2.9
OR			11.1	4.7				--		--		--	2.6	2.5
CA	172.5	125.0	23.0	13.4		0.8		--		--		--	3.4	3.4
TOTAL	337.0	213.7	119.0	**97.7**	3.0	2.1	330.0	**315.7**	2,652.0	2,619.2	153.0	**143.1**	18.0	17.1
2014 Harvest Specification	**337**	**337**	**119**	**119**	**3.0**	**3.0**	**330**	**330**	**2,652**	**2,652**	**153**	**153**	**18**	18
Difference	0.0	123.3	0.0	21.3	0.0	0.9	0.0	14.3	0.0	32.8	0.0	9.9	0.0	0.9
Percent of ACL	100.0%	63.4%	100.0%	82.1%	100.0%	68.7%	100.0%	95.7%	100.0%	98.8%	100.0%	93.5%	100.0%	95.1%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(light blue)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and are specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended in the 2013-14 EIS process, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 13-14 biennial cycle, which are currently specified in regulation.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2013-2014 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

APPENDIX A. FIXED GEAR SABLEFISH DAILY TRIP LIMIT (DTL) FORECAST ASSUMPTIONS AND UNCERTAINTY

A.1. LE North

Ex-vessel price is one predictor in the current model (adjusted for inflation) and uncertainty in the landings forecasts are expressed using a range of imputed price curves during 2014 (**Figure A.1**). The current 2014 projections for the LE North fishery assume a seasonal ex-vessel price curve of the same shape as 2013, but is inflated by 7 percent throughout 2014 (the "mid" line in **Figure A.1**). This assumption is based on differences in price between 2013 and 2014 over the first four months of available data. The high curve represents double the average increase in price seen so far in 2014, compared to 2013 (seven percent higher than the "mid" curve, and 14 percent higher than 2013, the "low" curve), while the low curve represents prices instead falling by the same amount that they have risen (7 percent lower than the "mid" curve for periods 3 through 6 of 2014, and equal to 2013 levels).

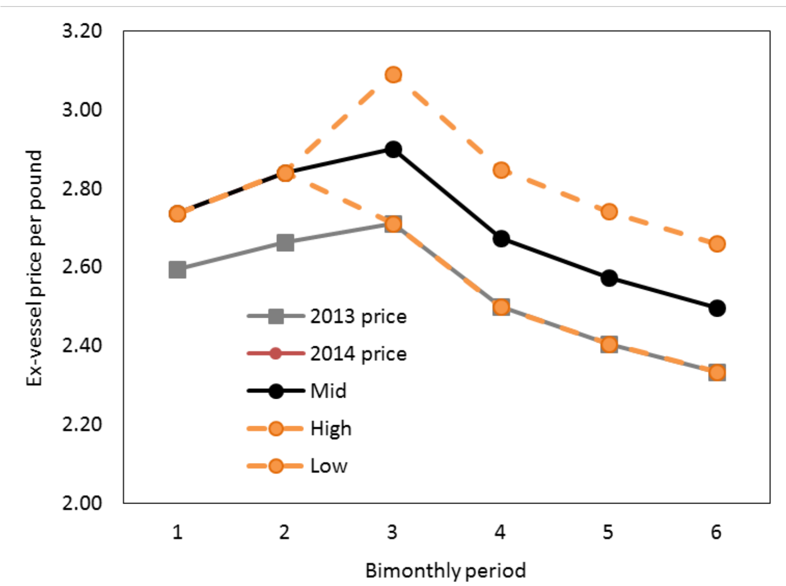

Figure A.1. Ex-vessel price structure assumed for the LE North DTL fishery inseason forecasts in 2014. The solid black line represents the middle assumed price curve for 2014. Period 1 and 2 (January-April) 2014 estimates were queried from PacFIN; estimates for periods 3 through 6 of 2014 (May through December) were derived in relation to 2013 prices and early differences between those from 2014. See text for details. Dashed orange lines are high and low assumptions. The solid grey line (square markers) represents 2013 prices, and is equal to the low price assumption for 2014.

Current fit of predicted to actual landings in the LE North fishery can be expressed as the percent of variation in actual landings explained by predicted landings, with an R^2 value of 0.94 (Figure A.2). Attainment of the landing target in the LE North over the past three years since intersector allocation has ranged from 159 percent in 2011, to 91 percent in 2012, and 97 percent in 2013 (Table A1). The overage in 2011 was due to erroneous input data in PacFIN, which has since been corrected (see Agenda Item E.5.b, Supplemental GMT Report, June 2011 PFMC meeting for description).

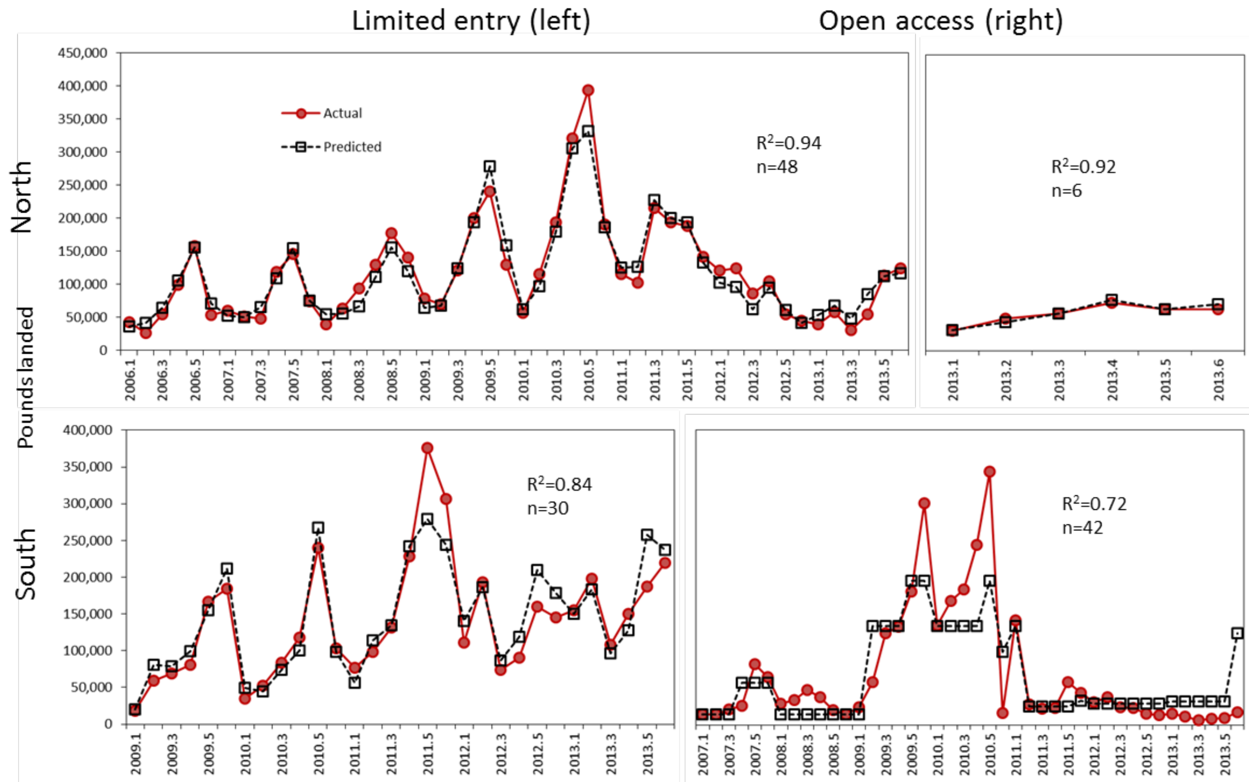

Figure A.2. Paneled time series charts showing current fits of predicted to actual landings in the four fixed gear, sablefish DTL fisheries, north and south of 36 degrees N. latitude, over the time series of model input data. The red solid line shows actual landings, and the black dashed line shows predicted landings. The R^2 value in each panel quantifies fit as the percent of variation in actual landings that is explained by predicted landings; "n" is the number of bimonthly periods used in each case. Note that including more than only the most recent year in the OA North model led to substantial landings overpredictions.

A.2. OA North

Attainment has been low in this fishery over the past two years (Table A.1., Figure A.3). With the addition of 2013 data, it appears that participation has been falling during 2012 and 2013, and a trend of upwardly biased predicted landings has emerged as a result. According to the current data, the average number of vessels landing declined to 48 percent of historical levels through 2013 (Table A.2).

Since the linear model fits to an average relationship over the time series, this model is not particularly adept at predicting participation and thus fleet catch when they are far from the average over the input time series, as in 2012 and 2013.

In order to increase accuracy of 2014 forecasts we've elected to use only the most recent year's data (2013) for the current model run (Figure A.2). Using additional years produced substantial over-predictions for the most recent year, 2013 as well as 2012 (Figure 4A). Fishery behavior in the current year tends to most closely resemble that of the previous year, so we assigned priority to fit 2013 data. Down-weighting older data was tried before removing them, but the degree of down-weighting necessary to stop over-prediction for the most recent year (2013) was enough that older data were finally removed from the model, resulting in better fit (Figure A.2).

The current version of the model predicts landings more accurately and without apparent bias, both for 2013 (R^2=0.92, predicted vs actual) and so far in 2014; within 5 percent of the QSM estimate for periods 1 and 2. Since the short range of the data in the model (six bimonthly periods from 2013) does not include the higher trip limits presented in the alternatives; we are extrapolating to produce alternative trip limits and caution should be exercised in choosing among them. Trip limits could be revisited as early as September if necessary.

Table A.1. Fishery catch and attainment in 2011, 2012 and 2013 in the four sablefish DTL fisheries, sorted by area, fleet and then year, according to current estimates in PacFIN. These data show continuing high attainment in the limited entry, and a trend of decreasing attainment in the open access DTL fisheries. Also see Figure A.3.

Year	Fleet	Area	Pounds	mt	Target	Attainment
2011	LE	North	956,547	433.9	273	159%
2012	LE	North	533,226	241.9	265	91%
2013	LE	North	422,762	191.8	198	97%
2011	OA	North	953,795	432.6	433	100%
2012	OA	North	591,381	268.2	419	64%
2013	OA	North	334,030	151.5	291	52%
2011	LE	South	1,217,466	552.2	393	141%
2012	LE	South	774,357	351.2	378	93%
2013	LE	South	1,020,894	463.1	446	104%
2011	OA	South	356,121	161.5	319	51%
2012	OA	South	161,788	73.4	309	24%
2013	OA	South	76,139	34.5	362	10%
2011	Sum	South	1,573,587	714	712	100%
2012	Sum	South	936,145	425	687	62%
2013	Sum	South	1,097,033	498	808	62%

Under the action alternatives, trip limits would need to be higher in the OA North than the LE North, to enable sufficient effort and high attainment for the rest of the year. The harvest guideline is substantially (more than 50 percent) higher in the OA North than the LE North. Substantially higher trip limits for open access may encourage some migration of effort, but since both fisheries fall under the northern annual catch limit (ACL), this does not appear to be a critical issue. The OA North fishery also has a daily limit, while the LE does not. The OA North limits have been higher than the LE North during four different bimonthly periods since 2004; two during 2005 and two during 2012. We have used similar limits to those presented in the alternatives before, at the end of the year in 2005 and 2010 to boost attainment at the end of the year.

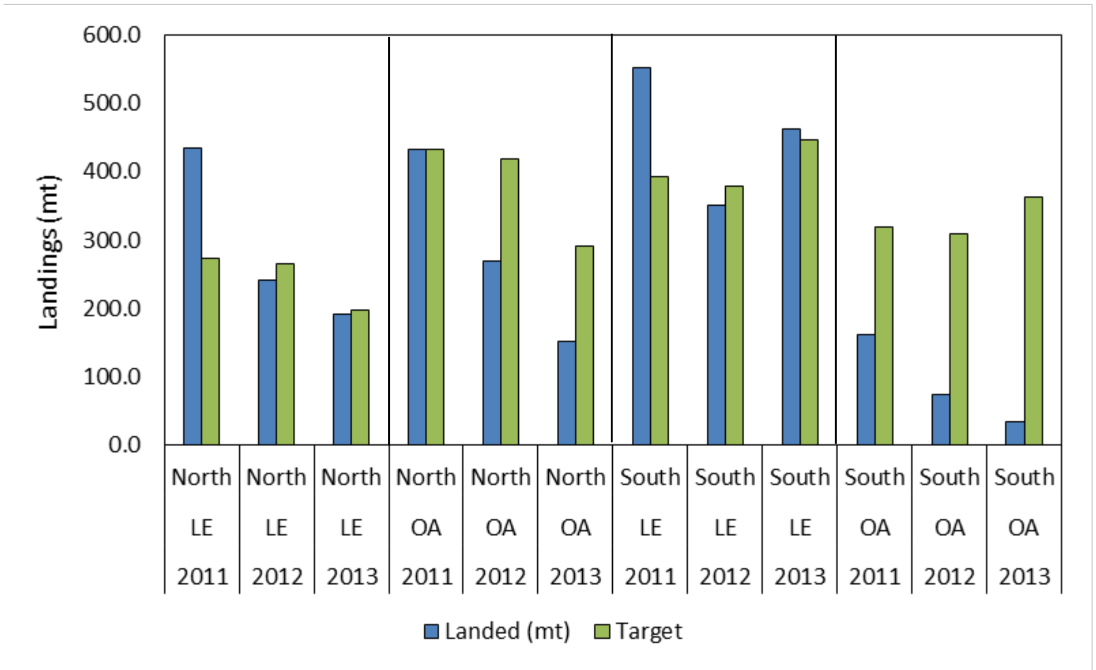

Figure A.3. Fishery landings and attainment in 2011, 2012 and 2013 in the four sablefish DTL fisheries, sorted by area, fleet and then year, according to current estimates in PacFIN. The plot illustrates continuing high attainment in the limited entry, and a trend of decreasing attainment in the open access DTL fisheries (values in Table 3).

Note that starting in 2014, sablefish catch north of 36° N. latitude in non-groundfish fisheries (e.g. the incidental open access fisheries) is no longer removed from the OA allocation pre-season. Removing this amount preseason was an error which resulted in double counting since the appropriate catch accounting rules for non-groundfish fisheries are applied inseason. That is, the inseason process debits catch by LE vessel against LE DTL allocation and catch by OA vessel against OA DTL allocation, consistent with Amendment 6 to the Groundfish Fishery Management Plan (FMP). There's no need for a preseason adjustment. We have accounted for projected incidental open access catch of sablefish within the projection for the OA North DTL values in Table 1.

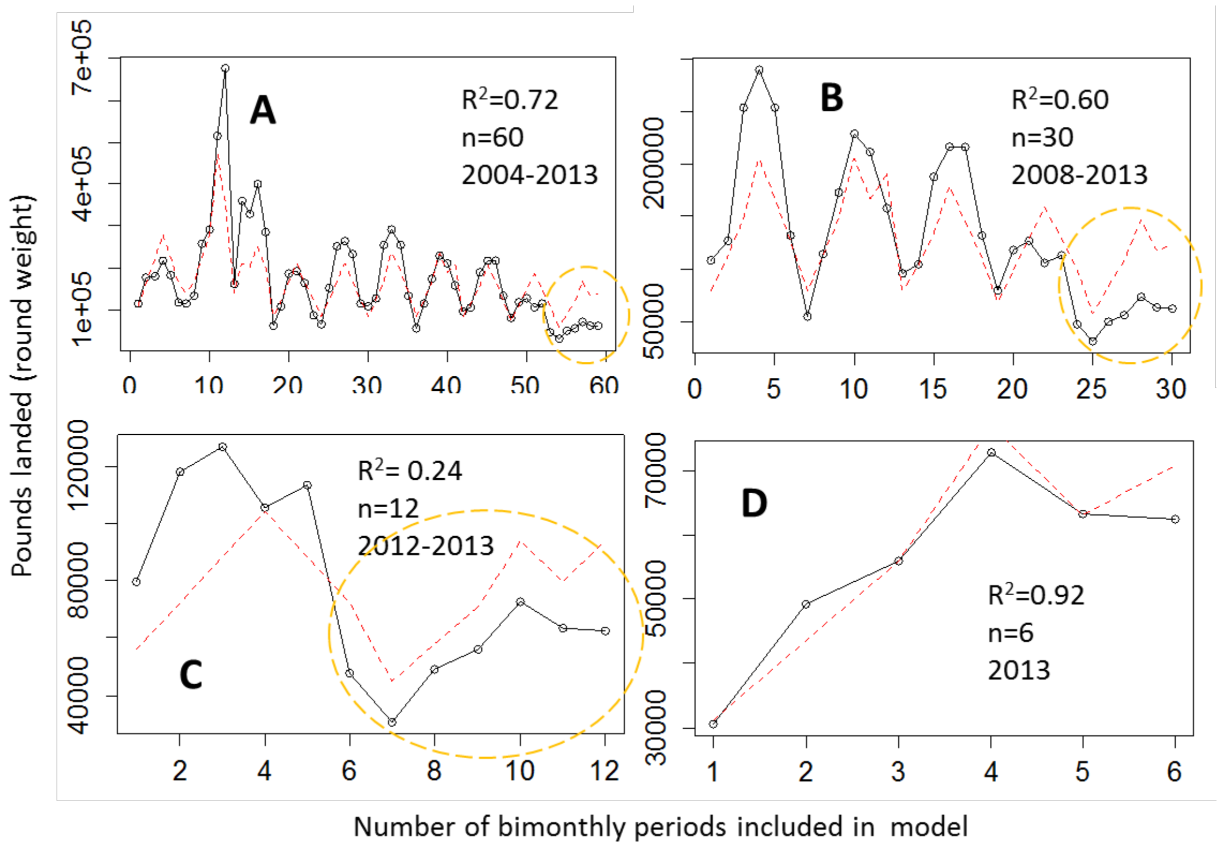

Figure A.4. Paneled fit plots for retrospective analysis of the OA North fishery showing model sensitivity to variation in number of vessels participating, and its inflating effect on predicted landings in 2012 and 2013 (enclosed by yellow dashed line circles). The red dashed line shows predicted landings, and the black solid line shows actual landings by bimonthly period (reverse color scheme from Figure A.2). In each panel, the time series progresses from the oldest year included in the model on the left, to 2013 on the right. Each point represents one bimonthly period (six per year).

Table A.2. Bimonthly counts of participating vessels in the OA North fishery from 2004 through 2014.

Bimonthly period	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1 (Jan-Feb)	59	56	80	61	60	80	57	68	69	34
2 (Mar-Apr)	78	69	151	88	100	103	80	87	88	47
3 (May-Jun)	131	140	201	162	170	169	125	138	119	74
4 (Jul-Aug)	134	146	223	142	175	166	143	151	95	70
5 (Sep-Oct)	91	141	181	109	150	143	125	147	95	55
6 (Nov-Dec)	62	166	2	60	91	77	79	94	47	42
Average	93	120	140	104	124	123	102	114	86	54

A.3. LE South

We made forecasts for the LE South using two model configurations. The one with the best fit (R^2 = 0.84, **Figure A.**1.), and produced the projections in Table 1 included ex-vessel price and weekly trip limits as predictors. We used the same method to construct the predicted price curve for 2014 used in the model as described earlier for the LE North model. An alternate LE South model configuration containing only weekly trip limit as a predictor (used in previous years) was also run, and resulted in slightly lower predicted attainment of 100 percent. The fit for this configuration was much lower at R^2 = 0.58.

A.4. OA South

An adjustment factor was applied to predicted landings for this fishery as a correction since model projections have been substantially higher than actual in 2012 and 2013, and the input data for this fishery model have low information content. Like the OA North fishery, recent participation has been lower than expected based on historical time series. Industry accounts suggest that many previous participants may be leasing and fishing under LE permits. The permits branch in the West Coast Region of NMFS confirms that there has been some new permit leasing activity which may support these accounts.

PFMC
06/21/14

Agenda Item F.4.b
Supplemental NMFS Report
June 2014

West Coast Groundfish Shorebased IFQ Program

Inseason Catch Report, June 2014

Sean E. Matson, Ph.D.
National Marine Fisheries Service
West Coast Region, Sustainable Fisheries Division

June 19, 2014

Contents

A. Figures

B. Tables

1. Summary

This report describes progress during 2014 in the Shorebased IFQ Program, for catch and related metrics, as well as select topics for 2011 through 2013. Non-whiting midwater landings, revenue, and deliveries have been increasing rapidly since 2011 through 2013, targeting yellowtail and widow rockfish. In contrast, non-trawl landings and revenue have been consistently dropping from 2011 through 2013, likely related to declining sablefish prices over those years. Bottom trawl metrics varied little over this period by comparison. Current attainment during 2014 as of June 3 is shown compared to average annual attainment for 2011-2013. Retention rates remain high, and vary little compared with average annual rates, except minor shelf rockfish which is currently lower than average in the North, and higher in the South. Monthly non-whiting effort and catch per unit effort (CPUE) are also tracking close to historical averages, except that January values were unusually high this year, coinciding with unusually high Dover sole and longspine thornyhead catch in January.

2. Narrative

2.1. Data used in this report

Data from the Pacific Fisheries Information Network (PacFIN) and the National Marine Fisheries Service Shorebased IFQ Vessel Accounts Database (VA) were used for this report. PacFIN was used to inform landings, revenue, gear type, and corresponding counts of trips, deliveries and vessels. PacFIN data were queried from the VDRFD table on June 6, 2014 (data originate from paper fish tickets). Data completeness at that time was estimated as greater than 90 percent complete through March for Washington, April for Oregon, and February for California. Only data from groundfish landings on IFQ trips are presented. Trip type is designated based on vessel-day, while deliveries are defined as landing receipts. Non-trawl landings from PacFIN cannot be divided further at this time (e.g. to longline, pot, etc.) due to confidentiality criteria based on number of vessels per stratum; 2014 data do not yet include enough vessels to show catch by gear type at finer resolution. NMFS VA data were used to show total catch, landings, discard and derived metrics by IFQ species category. VA data were queried on June 10; landings are complete through June 9, although discard may lag slightly behind.

2.2. Landings, revenue, price, deliveries, trips and participation (source = PacFIN)

Shorebased IFQ landings, revenue, ex-vessel price, deliveries trips and participation for 2011 through the present are shown divided by gear type (mid-water trawl, bottom trawl and non-trawl) and trip type (whiting or non-whiting) in Figures 1 and 2, and Table 1. Distribution of non-whiting IFQ landings by gear type is shown in Table 2. These data are from paper fish tickets, and lag behind the NMFS VA data (based on e-tickets) as described in section 2.1.

Non-whiting midwater landings, revenue, and deliveries have been increasing rapidly since 2011 through 2013, although the number of vessels has varied little (Figures 1 and 2, Table 1). Average ex-vessel prices for these landings increased from 2011 to 2012, and dropped slightly in 2013. Yellowtail rockfish has been the most obvious target species from non-whiting mid-water trips, with substantial catch of widow rockfish as well.

Non-trawl landings and revenue have been consistently dropping 2011 through 2013. Sablefish is overwhelmingly the main species caught with IFQ fixed gear, and primarily north of 36 degrees N. latitude. Ex-vessel price has also been dropping from 2011 through 2013, but has increased during the spring of 2014. The extent of the apparent 2014 price increase may reflect low sampling density in incomplete April data, particularly from California. There have been spring price increases in fixed gear IFQ sablefish prices the past three years, followed by a mid-year drop and flattening out for the rest of the year.

Bottom trawl landings, revenue, ex-vessel price, deliveries, trips and participation have all been very consistent from 2011 through 2013, in comparison with other gear types. Bottom trawl revenue, as a proportion of the sector has been increasing over 2011 to the present, mostly as a result of the decreasing proportion of IFQ sector revenue for non-trawl gear.

2.3. Total catch, attainment and retention rates (source = NMFS VA)

Current total catch and attainment rates for each IFQ species/area category in 2014 (as of June 3) are shown in Table 3 and Figure 3. Average annual attainment for 2011 through 2013 and standard deviation are also provided for reference. There were only non-whiting trips as of June 3.

Current non-whiting landed and discarded catch amounts, as well as retention rates for 2014 as of June 3 are shown in Table 4 and Figure 4. Average annual attainment for 2011 through 2013 and standard deviation are also provided for reference. Current retention rates are tracking close to their annual average rates, except shelf rockfish North, which is running below average, and shelf rockfish South, which is running above average. Retention rates are above 80 percent for all categories on non-whiting trips except shelf rockfish, Pacific whiting, and splitnose rockfish (retention of Pacific halibut IBQ is not allowed). Two thirds of the categories are consistently retained at a rate of higher than 90 percent. Aggregate non-whiting retention is currently 95 percent.

2.4. Effort and catch per unit effort (source = NMFS VA)

Monthly effort (number of trips) and catch per unit effort (total catch per trip) for 2014 compared with average values for 2011 through 2013 are shown in Figure 5, in the left and right panels respectively. January effort and CPUE were unusually high; 71 percent and 26 percent higher than average respectively, coinciding with unusually high Dover sole and longspine thornyhead catch in January. Monthly values for other species are very similar to average.

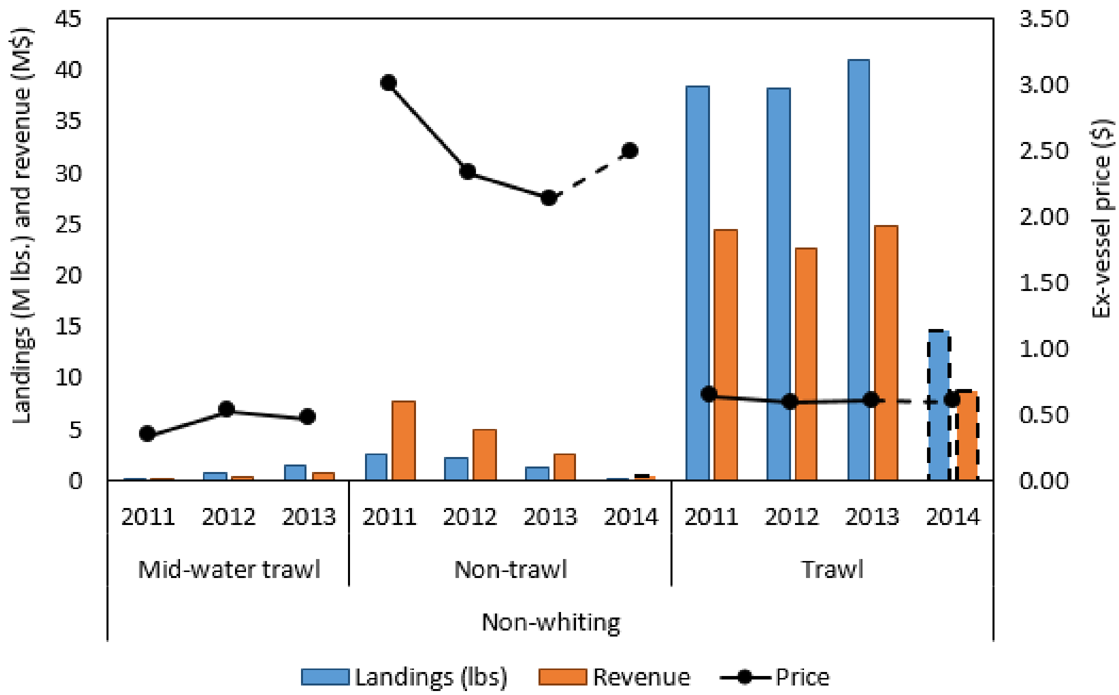

Figure 1. IFQ landings of groundfish species, ex-vessel revenue and price by gear type, trip type and year, from non-whiting trips. Trips were designated as vessel-days. See Table 1 for values. Dashed lines represent 2014 data (year in progress). See text for PacFIN 2014 data completeness as of the date of this query.

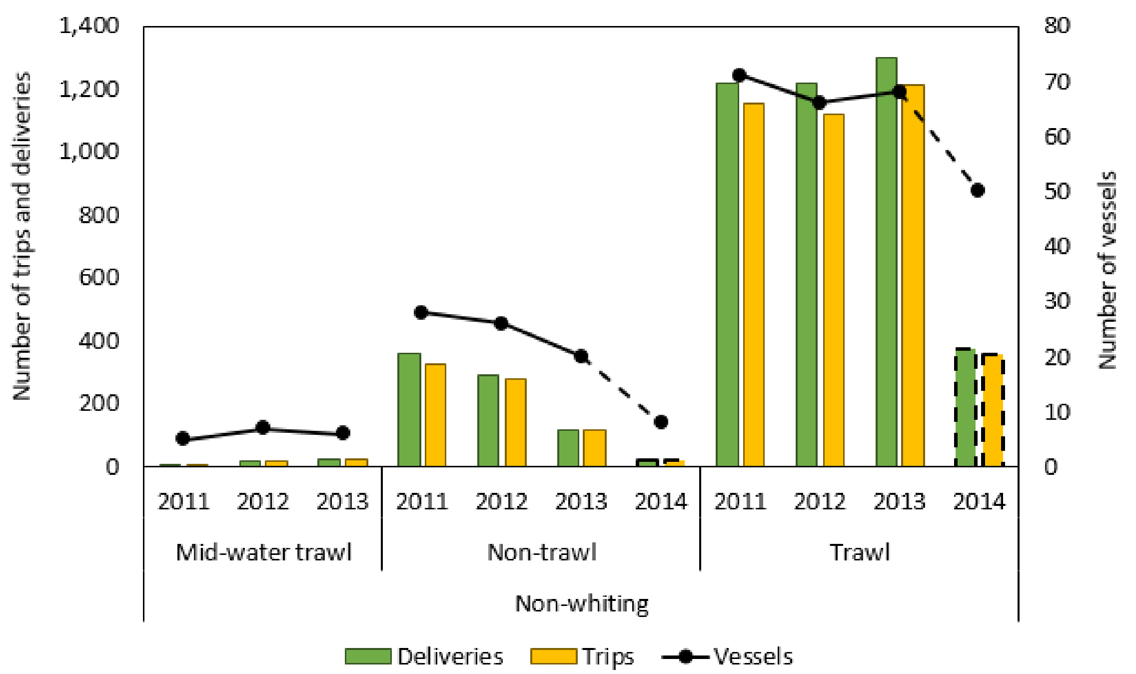

Figure 2. Counts of IFQ deliveries (landing receipts), trips (vessel days), and vessels making landings groundfish species by gear type, trip type and year. Data shown here are all from non-whiting trips. Trips were designated as vessel-days. See Table 1 for values. Dashed lines represent 2014 data (year in progress). See text for PacFIN 2014 data completeness as of the date of this query.

Table 1. IFQ landings of groundfish species, corresponding ex-vessel revenue, counts of deliveries, trips and vessels participating by trip type (whiting or non-whiting), for 2011-present. Trips were defined as vessel-days. *See text for 2014 data completeness in PacFIN as of the date of this query.

Trip type	Gear type	Year	Landings (lbs)	Revenue	Price	Deliveries	Trips	Vessels
Non-whiting	Mid-water trawl	2011	75,376	25,539	0.34	5	5	5
		2012	678,731	356,760	0.53	17	17	7
		2013	1,477,346	691,662	0.47	23	23	6
	Non-trawl	2011	2,543,609	7,639,460	3.00	359	326	28
		2012	2,166,331	5,051,327	2.33	289	279	26
		2013	1,246,969	2,663,787	2.14	119	119	20
		*2014	150,116	373,674	2.49	22	22	8
	Trawl	2011	38,370,973	24,488,020	0.64	1,216	1,156	71
		2012	38,324,474	22,634,517	0.59	1,219	1,121	66
		2013	41,070,364	24,852,911	0.61	1,297	1,210	68
		*2014	14,570,617	8,680,052	0.60	373	360	50
Whiting	Mid-water trawl	2011	200,908,989	22,527,476	0.11	1,000	899	26
		2012	145,356,364	20,832,282	0.14	705	702	24
		2013	214,370,280	26,568,537	0.12	929	916	24

Table 2. Composition of annual non-whiting IFQ groundfish landings and ex-vessel revenue by gear type for 2011 to present. *See text for 2014 data completeness in PacFIN as of the date of this query.

Year	Landings (non-whiting)			Revenue (non-whiting)		
	Mid-water trawl	Non-trawl	Bottom trawl	Mid-water trawl	Non-trawl	Bottom trawl
2011	0.2%	6.2%	93.6%	0.1%	23.8%	76.2%
2012	1.6%	5.3%	93.1%	1.3%	18.0%	80.7%
2013	3.4%	2.8%	93.8%	2.5%	9.4%	88.1%
*2014	0.0%	1.0%	99.0%	0.0%	4.1%	95.9%

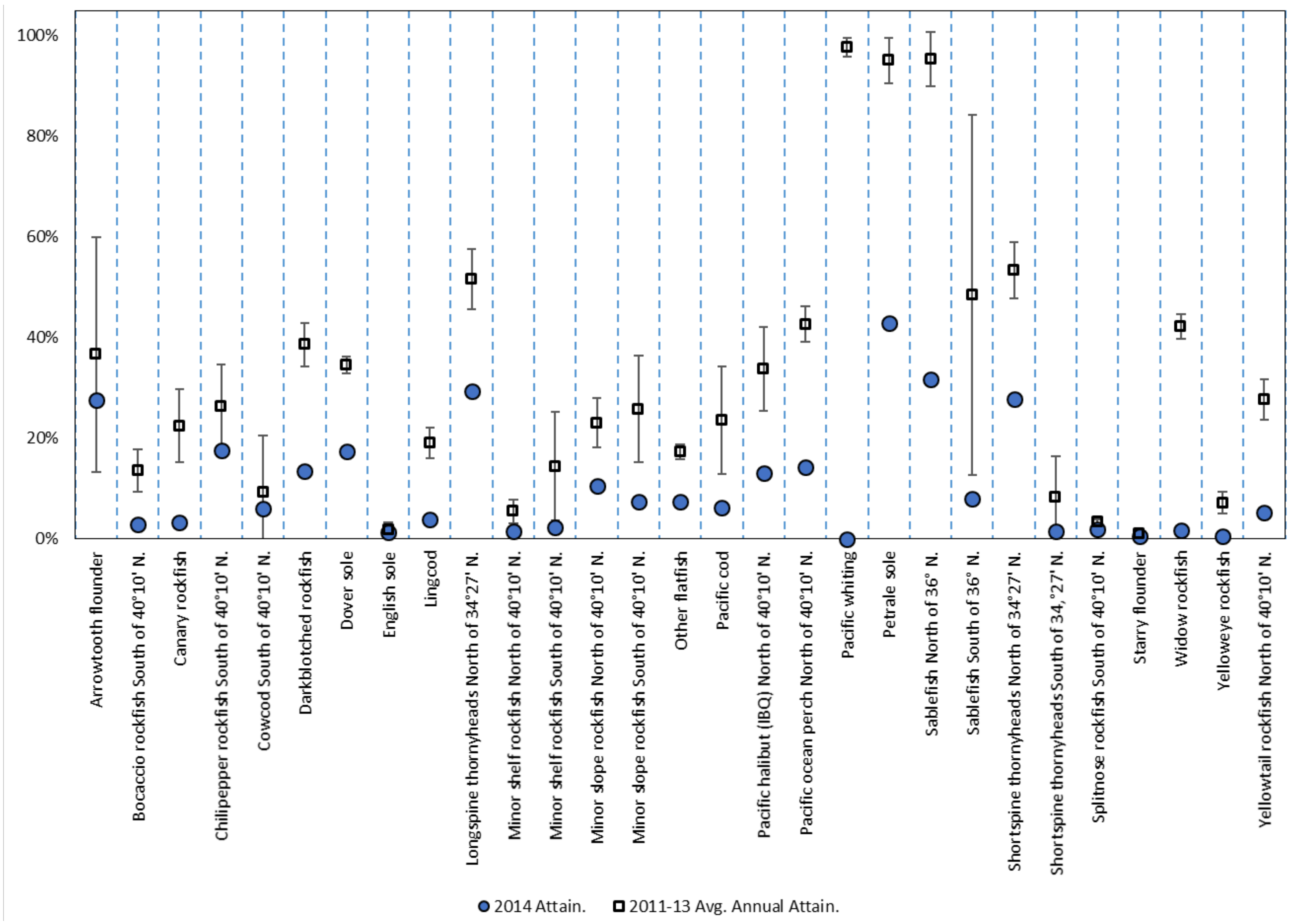

Figure 3. Shorebased IFQ attainment as of June 3, 2014 by species/area category (blue filled dots). Open squares represent the average annual attainment from 2011-2013, whiskers show plus and minus one standard deviation.

Table 3. Shorebased IFQ attainment as of June 3, 2014 by species/area category, as well as average annual attainment from 2011-2013. There were only non-whiting trips as of June 3, when these data were queried. Source: NMFS IFQ Vessel Account Database.

Species Category	2014 NW	2014 W	2014 Total	2014 Allocation	2014 Attain.	2011-13 Avg. Annual Attain.	Std. Dev. Avg. Attainment
Arrowtooth flounder	2,107,998	0	2,107,998	7,643,603	28%	37%	23%
Bocaccio rockfish South of 40°10' N.	5,164	0	5,164	174,165	3%	14%	4%
Canary rockfish	3,033	0	3,033	90,610	3%	22%	7%
Chilipepper rockfish South of 40°10' N.	415,605	0	415,605	2,352,883	18%	26%	8%
Cowcod South of 40°10' N.	133	0	133	2,205	6%	9%	11%
Darkblotched rockfish	82,840	0	82,840	613,789	13%	39%	4%
Dover sole	8,548,493	0	8,548,493	49,018,682	17%	35%	2%
English sole	167,788	0	167,788	11,598,189	1%	2%	1%
Lingcod	137,163	0	137,163	3,592,323	4%	19%	3%
Longspine thornyheads North of 34°27' N.	1,174,126	0	1,174,126	3,993,453	29%	52%	6%
Minor shelf rockfish North of 40°10' N.	16,798	0	16,798	1,119,948	1%	6%	2%
Minor shelf rockfish South of 40°10' N.	4,271	0	4,271	178,574	2%	14%	11%
Minor slope rockfish North of 40°10' N.	183,113	0	183,113	1,740,285	11%	23%	5%
Minor slope rockfish South of 40°10' N.	62,610	0	62,610	834,736	8%	26%	11%
Other flatfish	678,882	0	678,882	9,245,746	7%	17%	2%
Pacific cod	153,626	0	153,626	2,483,309	6%	24%	11%
Pacific halibut (IBQ) North of 40°10' N.	31,108	0	31,108	236,660	13%	34%	8%
Pacific ocean perch North of 40°10' N.	35,601	0	35,601	247,535	14%	43%	4%
Pacific whiting	161,857	0	161,857	240,160,565	0%	98%	2%
Petrale sole	2,249,431	0	2,249,431	5,242,593	43%	95%	5%
Sablefish North of 36° N.	1,394,249	0	1,394,249	4,382,790	32%	95%	5%
Sablefish South of 36° N.	116,381	0	116,381	1,439,839	8%	49%	36%
Shortspine thornyheads North of 34°27' N.	842,570	0	842,570	3,025,822	28%	53%	6%
Shortspine thornyheads South of 34,°27' N.	1,775	0	1,775	110,231	2%	8%	8%
Splitnose rockfish South of 40°10' N.	67,549	0	67,549	3,472,501	2%	3%	1%
Starry flounder	10,544	0	10,544	1,665,592	1%	1%	1%
Widow rockfish	37,693	0	37,693	2,191,020	2%	42%	3%
Yelloweye rockfish	14	0	14	2,205	1%	7%	2%
Yellowtail rockfish North of 40°10' N.	338,194	0	338,194	6,479,055	5%	28%	4%
Total	19,028,609	0	19,028,609	363,338,908	15%	68%	7%

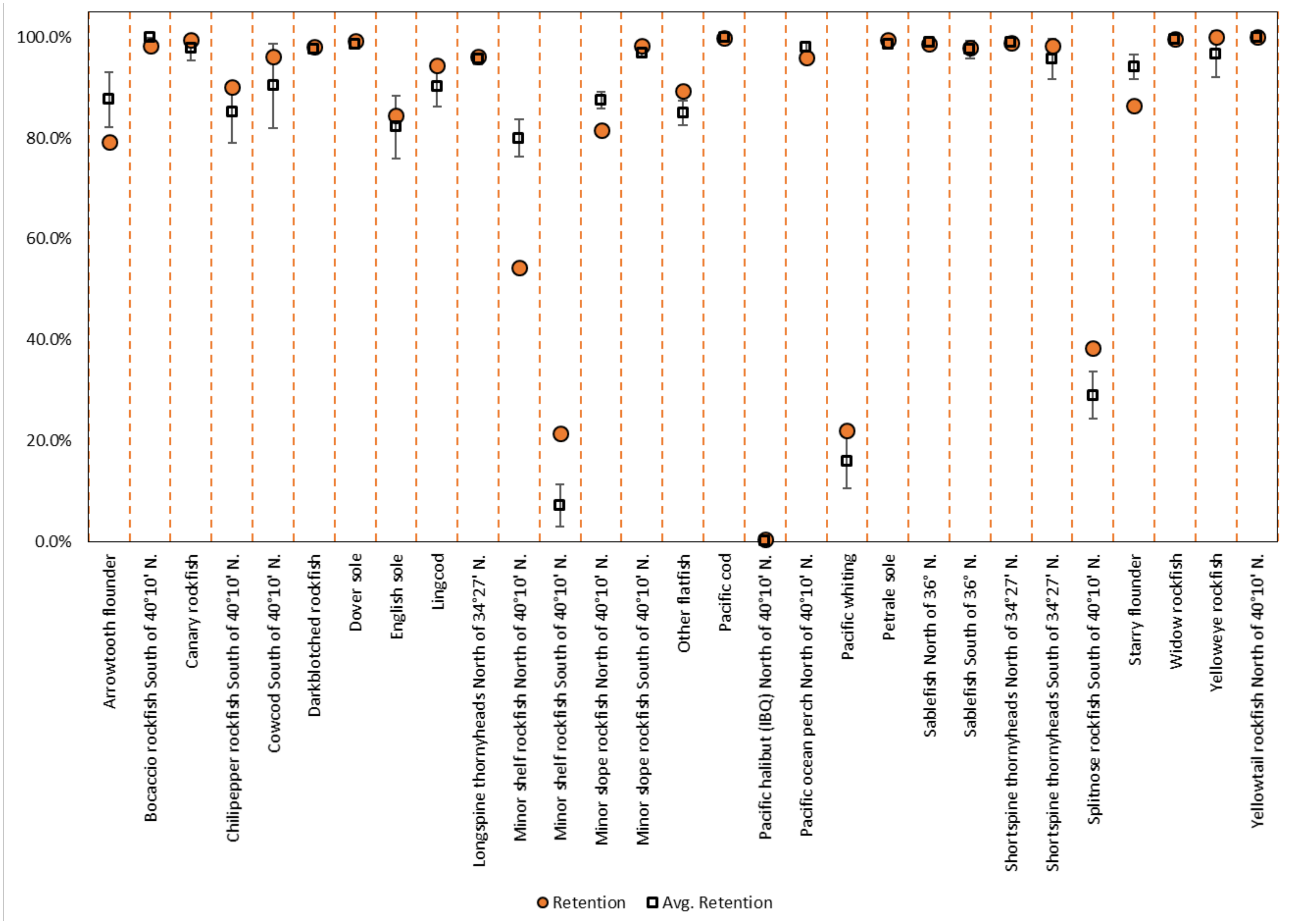

Figure 4. Shorebased IFQ non-whiting retention rates as of June 3, 2014 by species/area category (orange filled dots), and average annual retention rates from 2011-2013 (black open squares); whiskers represent plus and minus one standard deviation. Source: NMFS IFQ Vessel Account Database.

Table 4. Shorebased IFQ non-whiting retention rates as of June 3, 2014 by species/area category, and average annual retention rate and standard deviation from 2011-2013. Source: NMFS IFQ Vessel Account Database.

Species category	2014 Total catch	2014 Landed	2014 Discarded	2014 Retention	2011-13 Avg. Retn	Std. Deviation Retn
Arrowtooth flounder	2,107,998	1,669,493	438,505	79.2%	87.6%	5.5%
Bocaccio rockfish South of 40°10' N.	5,164	5,074	90	98.3%	99.9%	0.1%
Canary rockfish	3,033	3,019	14	99.5%	97.8%	2.5%
Chilipepper rockfish South of 40°10' N.	415,605	374,646	40,959	90.1%	85.1%	6.0%
Cowcod South of 40°10' N.	133	128	5	96.2%	90.3%	8.4%
Darkblotched rockfish	82,840	81,268	1,572	98.1%	97.6%	0.6%
Dover sole	8,548,493	8,487,344	61,149	99.3%	98.5%	0.5%
English sole	167,788	141,632	26,156	84.4%	82.2%	6.2%
Lingcod	137,163	129,598	7,565	94.5%	90.3%	4.0%
Longspine thornyheads North of 34°27' N.	1,174,126	1,128,449	45,677	96.1%	95.7%	1.0%
Minor shelf rockfish North of 40°10' N.	16,798	9,145	7,653	54.4%	80.0%	3.7%
Minor shelf rockfish South of 40°10' N.	4,271	917	3,354	21.5%	7.2%	4.2%
Minor slope rockfish North of 40°10' N.	183,113	149,212	33,901	81.5%	87.5%	1.7%
Minor slope rockfish South of 40°10' N.	62,610	61,504	1,106	98.2%	96.8%	0.8%
Other flatfish	678,882	605,977	72,905	89.3%	84.9%	2.4%
Pacific cod	153,626	153,329	297	99.8%	99.8%	0.1%
Pacific halibut (IBQ) North of 40°10' N.	31,108	165	30,943	0.5%	0.2%	0.2%
Pacific ocean perch North of 40°10' N.	35,601	34,134	1,467	95.9%	97.9%	1.1%
Pacific whiting	161,857	35,856	126,001	22.2%	15.9%	5.4%
Petrale sole	2,249,431	2,235,748	13,683	99.4%	98.6%	0.6%
Sablefish North of 36° N.	1,394,249	1,376,642	17,607	98.7%	98.9%	0.2%
Sablefish South of 36° N.	116,381	113,891	2,490	97.9%	97.6%	1.7%
Shortspine thornyheads North of 34°27' N.	842,570	832,252	10,318	98.8%	99.0%	0.1%
Shortspine thornyheads South of 34°27' N.	1,775	1,746	29	98.4%	95.7%	4.0%
Splitnose rockfish South of 40°10' N.	67,549	25,958	41,591	38.4%	29.1%	4.7%
Starry flounder	10,544	9,122	1,422	86.5%	94.1%	2.4%
Widow rockfish	37,693	37,572	121	99.7%	99.6%	0.5%
Yelloweye rockfish	14	14	0	100.0%	96.7%	4.6%
Yellowtail rockfish North of 40°10' N.	338,194	338,193	1	100.0%	100.0%	0.0%
Total	19,028,609	18,042,028	986,581	94.8%	94.4%	0.5%

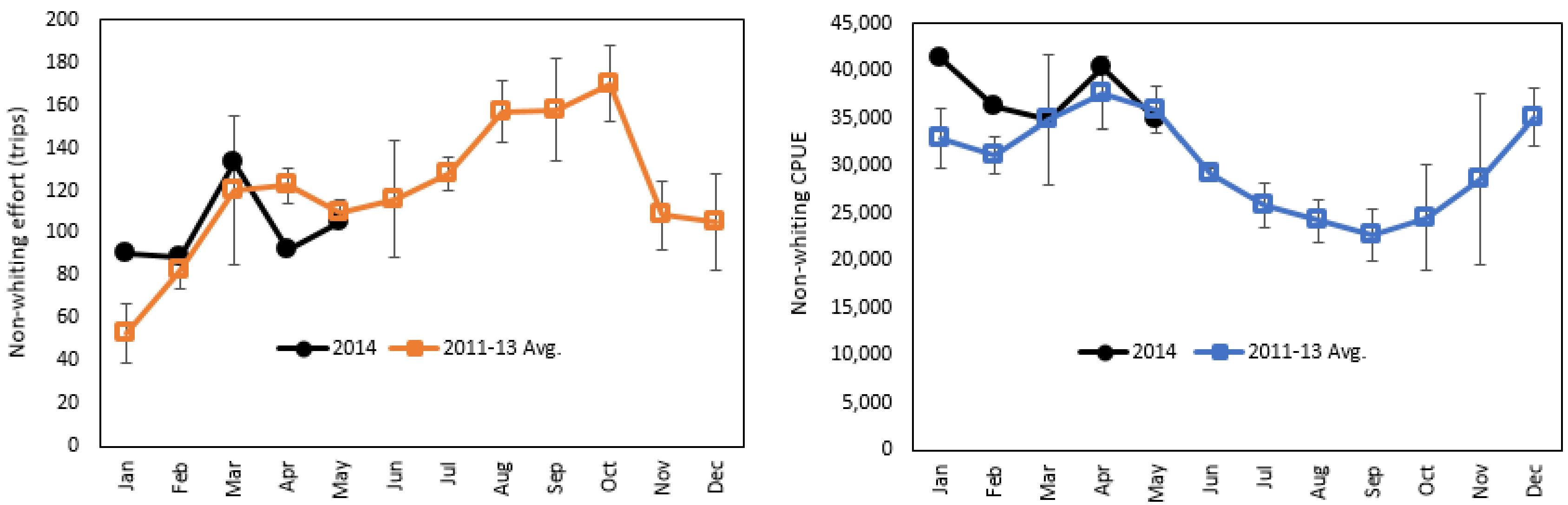

Figure 5. Monthly non-whiting effort (left panel, number of trips) and catch per unit effort (right panel, total catch per trip) through May of 2014 (black dots), compared with the annually averaged monthly values for 2011-2013 (orange or blue open squares). Whiskers represent plus and minus one standard deviation. Source: NMFS IFQ Vessel Account Database.

Agenda Item F.4.c
Public Comment
June 2014

---------- Forwarded message ----------
From: **Bill James** <Halibutbill@live.com>
Date: Thu, May 22, 2014 at 11:20 PM
Subject: F.4 Inseason Adjustments
To: "pfmc." <pfmc.comments@noaa.gov>
Cc: Bill James <Halibutbill@live.com>

Madame Chair members of the Council: My name is Bill James and I am here today representing Port San Luis Commercial Fishermen's Association.

Today I am requesting both Shallow Nearshore Species and Deeper nearshore Species bi-monthly trip limits be raised to 1000 pounds per 2 months south of 40:10 for the remainder of the year. In the last couple of years commercial nearshore landings have approached only 50 percent of the ACL for both Shallow and Deeper Nearshore species.

Please open Lingcod in December of this year with a 400 pound monthly limit for December 2014 for open access south of 42 degrees.

Sincerely, Bill James

FINAL EXEMPTED FISHING PERMIT (EFP) APPROVAL FOR 2015-2016

At the November 2013 Council meeting the Council considered three exempted fishing permit (EFP) applications and preliminarily adopted one EFP for public review, sponsored by the San Francisco Community Fishing Association. The Council recommended the same set-asides for this EFP for 2015-2016 as for the one approved for 2013-2014, with the exception of 1.0 metric tons (mt) of canary rockfish and 0.03 mt of yelloweye rockfish.

At the November 2013 meeting, the Council also scheduled consideration of special, out-of-cycle EFP proposals for electronic monitoring (EM EFPs) with maximized retention requirements, with preliminary approval at the April 2014 Council meeting and final approval at the June 2014 Council meeting. After the meeting, a letter regarding this special EFP process was provided to the fishing industry participants, including the Council Operating Procedures that describe the EFP application process.

At the April 2014 Council meeting, the Council preliminarily approved four out of five EM EFP applications for further consideration and final approval at the June 2014 Council meeting (i.e., the Leipzig, CA Risk Pool, Mann/Paine, and Eder et al. EFPs). At the meeting, the Council provided guidance to each applicant on further development of the EM EFPs and asked that applicants consider resubmitting revised applications for Council consideration at the June meeting. The following additions to the applications were requested by the Council: 1) Leipzig EFP application: limit the number of vessels and require up to 100 percent observer coverage; 2) CA Risk Pool application: limit the number of vessels and require up to 100 percent observer coverage on bottom trawl vessels; 3) Eder et al. application: limit the number of vessels. The Council also requested that the EFPs address how the halibut viability assessments could be conducted without the presence of a human observer, with the intention that halibut retention not be permitted. In addition, the Council recommended that EFP applications include a feature that requires applicants to provide the National Marine Fisheries Service (NMFS) and the States a list of vessels and processors that will be participating in the EFP a minimum of 30 days before they commence their EFP.

The NMFS West Coast Region volunteered to work with EM EFP applicants on an ad hoc basis to improve EFP applications, and since the April Council meeting has conducted conference calls with each applicant to provide guidance.

The Council received five revised EFP applications (Agenda Item F.5.a, Attachments 1 through 5). A summary of the EM EFP applications, including responses to the Council's requests is provided in Agenda Item F.5.a, Attachment 6.

Under this agenda item, the Council is to consider final approval of all EFP applications provided by the fishing industry. Those EFPs recommended at this Council meeting are forwarded to NMFS for implementation in the next biennial management cycle.

<u>Council Action</u>:

1. **Recommendations for final approval of EFPs.**
2. **Provide other guidance as necessary.**

<u>Reference Materials</u>:

1. Agenda Item F.5.a, Attachment 1: Leipzig Fishermen's Marketing Association EFP Application.
2. Agenda Item F.5.a, Attachment 2: California Risk Pool EFP Application.
3. Agenda Item F.5.a, Attachment 3: Mann/Paine Whiting EFP Application.
4. Agenda Item F.5.a, Attachment 4: Eder et al. Fixed Gear EFP Application.
5. Agenda Item F.5.a, Attachment 5: San Francisco Community Fishing Association EFP Application: Yellowtail Rockfish Jig Fishing off California.
6. Agenda Item F.5.a, Attachment 6: Table 1. Summary of EM EFP applications.

<u>Agenda Order</u>:

a. Agenda Item Overview — Brett Wiedoff and John DeVore
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action**: Adopt Final Recommendations for EFPs, Including Electronic Monitoring EFPs

PFMC
05/30/14

Maximized Retention And Monitoring For Vessels Participating In The Pacific Groundfish IFQ Trawl Fishery

May 20, 2014

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Purpose and Need for Exempted Fishing Permit

Purpose

Issuance of the EFPs would allow fishery participants to fish in the Pacific Groundfish IFQ fishery using Electronic Monitoring Equipment in lieu of an observer and to allow the National Marine Fisheries Service (NMFS) to evaluate components of an overall monitoring program before implementation of a comprehensive regulatory program.

Need

On January 1, 2011, west coast groundfish trawl fishermen began fishing under an individual fishing quota program. Under the new program, all vessels are required to have 100% at-sea observer coverage in addition to 100% shoreside monitoring of all offloads. While full accountability is critical to the success of the program, the fleet is concerned that monitoring costs will be untenable, and may cause individual fishermen or even whole ports to stop fishing.

Observer contracts vary somewhat, but most observer providers are charging between $450-500 per day. This expense disproportionately impacts smaller trawl vessels. Based on these projected costs, the observer issue has become one of the fundamental hurdles to the success of the IFQ program. It is essential to find a way for fishermen to meet NMFS' and PFMC's accountability requirements without imposing such prohibitive costs on the fleet.

At the implementation of the program, NMFS announced that they had funding to subsidies the cost of observers, but would need to reduce this subsidy over several years, until 100% of the cost was being paid by the industry. During 2014 this subsidy will be $216, so fishermen are currently paying a little more than one half of the cost of observers. It is anticipated that in the future this cost to fishermen will increase as the subsidy declines and the cost of placing observers increases.

It is important to remember that the cost of observers although significant it is not the only cost which trawl fishermen are paying to participate in this fishery. Trawlers are now paying 5% of gross revenue for the buy-back loan repayment, 3% of gross revenue for cost recovery in the IFQ program, State landing taxes, and industry organization dues. The cost of observers is a fixed cost per day, rather than a percentage of gross revenue, so the calculation of percentage of gross is dependent upon the gross revenue. For higher grossing boats the percent is lower, for lower grossing boats the percentage is higher. A fair estimate of the cost of observers is between 10% and 15% of gross revenue, with a combined total cost to participate in the fishery of 18% to 23% of gross revenue.

Lastly, a compelling argument can be made for the use of cameras when examining the availability of observers. Not all ports have a large fleet of boats which are making back to back fishing trips. Most ports have a few vessels, which out of need will also participate in the Pink shrimp fishery and the Dungeness crab fishery during those seasons. The work as an observer is not steady in those ports and therefore the ability to provide observer coverage in a number of locations has proved to be difficult. The use of cameras is a logical alternative in these situations.

Species to be harvested and their disposition:

This EFP is not requesting any additional allocation of groundfish species for participants. The participant will cover all species harvested under this EFP with Quota Pounds or Bycatch Quota in the same manner that all participants in the groundfish IFQ fishery cover their landings. All species caught will be retained and unloaded at the completion of each fishing trip at a first receiver site and monitored by a shoreside monitor, with the exception of Pacific halibut which will be discarded at sea. All Pacific halibut caught will be measured for length and recorded in a discard log.

Mortality estimates for Pacific halibut may be determined either by using each vessel’s past average halibut mortality rate, the fleet average mortality rate, or an estimate based upon tow duration, time on deck, and ambient air temperature.

Broader Significance:

It is hoped that this EFP will allow participants to lower their cost of observation. But additionally, the issuance of this EFP will provide experience to better develop procedures involving the installation of cameras, the retrieval of video data, and the analysis of that data. Overall this EFP will provide the NMFS greater insights into how best to structure and write regulations which will allow the use of cameras on a broader basis.

Looking more into the future, this EFP will provide researchers a great deal of additional data which can then be used to improve the development of image recognition software. This type of software has enormous potential to greatly reduce the cost of video review.

Lastly, the lessons learned from this EFP will benefit other sectors of the groundfish fishery, as well as other fisheries both regionally as well as nationally that are wrestling with the cost of observers.

Duration:

It is requested that this be an annual permit and to be continually renewed until comprehensive permanent regulations can be implemented.

Number of Vessels Covered:

The total number of vessels involved with this EFP will be limited to six. The selection of the six boats will be made so that all of the boats are based out of ports with close proximity to each other. For example, all of the boats could be from Astoria, or all of the boats could be from Brooking, Crescent City, and Eureka. The need to have the boats in close proximity is to reduce travel cost associated with the service provider.

Thirty days prior to any fishing under this permit and list of each participating vessel, their home port, and fish companies to which they will be selling their catch will be provided to NMFS and each of the three States.

Scope:

This EFP would apply to all fishing activities by the permitted vessel while fishing with trawl gear in the Pacific Groundfish IFQ program.

This EFP authorizes, for limited purposes as described in this permit, the following activities which would otherwise be prohibited by federal regulation:

1. Under 50 CFR § 660.12 (a)(1) it is unlawful for any person to retain any prohibited species, which must be returned to the sea as soon as practicable with a minimum of injury when caught and brought on board. This EFP allows the permitted vessel to retain prohibited species until offloading and requires the vessel to deliver all catch, with the exception of Pacific halibut.

2. Under 50 CFR 660.140 (h)(1)(i)(A) any vessel participating in the Pacific Groundfish IFQ fishery is required to carry an observer. This EFP allows participants to utilize EM in lieu of the requirement to carry observers, beginning on the third fishing trip following the installation and testing of the camera system.

All other provisions of 50 CFR Part 660 would apply to fishing conducted under this EFP.

Reporting Requirements

Trawl logbooks must be maintained as required by the applicable state law. Additionally, a discard logbook will be maintained, in which the discarding of all Pacific halibut will be recorded.

Fishing Restrictions

A vessel fishing under this EFP must bring all catch on board the vessel and retain that catch (including prohibited species) until offloading, with the following exceptions:

1. Operational discards. For the purposes of this permit, any fish that pass through the webbing of the net while the net is being retrieved or any fish that cannot be completely removed from the net prior to the net being reset or at the termination of fishing, shall be considered operational discards and need not be estimated or recorded.

2. Pacific halibut. All Pacific halibut must be discarded at sea. The vessel operator will be required to measure and record in a discard logbook all halibut discarded.

3. Large marine organisms. Large individual marine organisms, such as marine mammals or fish species longer than 6 ft (1.8 m) in length, may be discarded. If a large marine organism is discarded, the species and the reason for discarding must be recorded and labeled as "discard" in the required logbook.

4. Debris. It is perfectly acceptable for the crew of a permitted vessel to discard any and all debris items which may be encountered while fishing.

Monitoring Requirements

Each vessel must have properly installed and functioning Electronic Monitoring System (EMS) equipment. Owners of vessels must arrange for EMS services from a (NMFS approved) EMS service provider.

The EMS must be installed, tested, the system initialized and the EMS computer box sealed with tamper evident seals before the vessel leaves port on the first EFP fishing trip. Fishing without installing and testing the EMS equipment is a violation of this EFP.

Each vessel will carry an observer during the first two fishing trips. This will ensure monitoring during the period with the greatest chance for malfunctioning of the EM equipment.

As specified by the EMS provider, the vessel operator must schedule maintenance of EMS equipment and data removal by the NMFS-specified EMS provider by scheduling periodic appointments during the term of this EFP.

On each trip prior to leaving port, the vessel operator must conduct an EMS system status check as specified by the EMS provider to confirm that all components of the EMS are functioning properly. The EMS will record the results of this check. If the EMS check identifies a malfunction, the vessel must contact the NMFS-specified EMS provider immediately. When requested by the EMS service provider, the vessel would be required to carry EMS units that transmit system performance data while a vessel is at sea. Any such requirement would be in addition to the operator initiated system check which is to occur on each trip.

Each vessel operating under this EFP must provide continuous lighting to the following vessel areas such that the manipulation of trawl nets and fish handling can be clearly recorded by the EMS cameras: fish hold openings, deck spaces, and the trawl ramp.

The vessel is obligated to monitor the EMS performance. When aware that the EMS is not functioning properly or that the power has been interrupted, the vessel must contact the EMS service provider immediately. The EMS provider is required to provide technical service within 24 hours of notification at the vessels expense.

Other Restrictions

It is unlawful and in violation of this EFP for any person to tamper with, disconnect, damage, destroy, alter, or in any way distort, render useless, inoperative, ineffective, or inaccurate any component of the EMS unit required by this EFP.

EXEMPTED FISHING PERMIT APPLICATION

ELECTRONIC MONITORING FOR GROUNDFISH IFQ VESSELS IN 2015 AND 2016

1. Date of Application: 5/23/14

2. Applicant

California Risk Pool
Fort Bragg Groundfish Association: Michelle Norvell
Half Moon Bay Groundfish Marketing Association: Lisa Damrosch
Central California Seafood Marketing Association: Bill Blue

3. Project Partners

Environmental Defense Fund: Shems Jud, Sarah McTee, Alexa Fredston-Hermann, Huff McGonigal
The Nature Conservancy: Melissa Stevens, Michael Bell, Kate Labrum

4. Summary

This EFP application seeks exemption from the requirements at 50 CFR 660.140 (h)(1)(i)(A), requiring observers on board trawl and fixed gear IFQ fishing trips during the 2015 and 2016 fishing seasons. In place of observers, we propose to use the electronic accountability and reporting mechanisms described below as well as any additional measures the Council may require. The EFP includes approaches for both trawl and fixed gear vessels under one application. However, if for any reason the provisions applying to one of these sectors are not approved, it is our hope that the Council may view the trawl and fixed gear components as severable.

Details are provided in Sections 10 and 11, but the primary components of this application are as follows:

- EFP participants will provide all quota needed to conduct the EFP.
- All fixed gear vessels in this EFP will operate under maximized retention.
- Two shoreside bottom trawl vessels will also operate under a maximized retention plan, while two others will operate under optimized retention. Testing both approaches to retention requirements will allow for a comparison of respective costs and operational feasibility. The bottom trawl vessels operating under optimized retention may discard arrowtooth flounder, Dover sole, and English sole. Individual vessel monitoring plans will be used to outline appropriate catch handling and discard methods for those species.
- Field testing will begin with 100% observer coverage, *before* the permit that exempts EFP vessels from the 100% observer coverage requirement is issued. This initial phase will use both observers and electronic monitoring (EM) to establish a baseline for comparison once observers are removed, and will allow more fishing trips and sea-days overall to be included in the project. Observers are proposed to be retained on 20% of all trips even after the permit

is issued, to ensure that biological information is collected as needed for the West Coast Observer Program, and for other reasons discussed in Section 11.

- All Pacific halibut will be measured on a length board in view of an EM camera, and then discarded. Quota will be deducted from the vessel's quota account by calculating the weight of the halibut from its length, and then applying a vessel-specific average halibut mortality rate from 2011-2014 using Observer Program data (providing the vessel caught halibut after 2011). For vessels using hook and line gear, the mortality rate established by the Groundfish Observer Program will be applied, consistent with existing Observer Program protocol. If the Council concludes that it cannot authorize exemptions to rules relating to halibut discard and mortality estimates, this EFP can be conducted with the conservative assumption of 100% mortality of discarded halibut. We are also interested in collaborating with PSMFC on their research evaluating proxy factors to estimate halibut mortality.
- An electronic logbook will serve as the primary source of data for documenting and accounting for discards. To confirm that discard data in the e-logbook is correct, 100% of video from the discard control point on bottom trawl vessels will be reviewed. In addition, video from 10% of fishing events (i.e. hauls) on all vessels will be reviewed. Retained catch data from the e-logbook will be confirmed using shoreside catch monitor data.

5. Statement of Purpose and Goals

Purpose

The purpose of this EFP is to help identify a pathway towards a viable and more cost effective means of ensuring accountability in the Pacific groundfish catch share grogram by testing the operational and cost implications of using EM to monitor compliance with retention requirements.

Goals

1. Identify individual and overall cost components of implementing EM on fixed gear and bottom trawl vessels.
2. Establish best practices for discard control points on bottom trawl vessels using optimized retention.
3. Compare the relative benefits and drawbacks of optimized and maximized retention fishing plans.
4. Determine whether human observers and EM have different effects on fishing behavior.
5. Identify improvements to EM systems and protocols that can be made to inform a broader regulatory approach that encompasses all segments of the groundfish fleet.
6. Build comfort with EM within the industry, law enforcement, and management communities
7. Operationalize the lessons learned through national EM pilot studies.
8. Determine how to implement electronic monitoring and accountability in a way that will provide economic relief and operational flexibility to the groundfish IFQ program while maintaining individual accountability and the integrity of the catch share program.

Definition of Terms

This EFP will use a definition of "retained catch" and "discarded catch" (i.e. will describe what fish are to be counted against the vessel's quota) based on the pending GEM Committee recommended definitions and subsequent NMFS guidance on this topic. We ask for NMFS/GEM Committee guidance on definitions to be consistently applied to all EFP applicants.

6. Justification and Broader Significance

The transition of the Pacific groundfish fishery to catch share management has brought considerable conservation and management benefits including significantly reduced discards and bycatch of overfished species. Fleetwide revenues under the program have also increased. A critical component of the catch share's success is 100% accountability through at-sea observers; however, the costs associated with these monitoring requirements also pose the greatest risk to the program. As the fleet begins to bear more of the financial burden of monitoring, smaller businesses that are already at the margin of profitability may no longer be viable, resulting in socioeconomic impacts to the fishermen and their port communities. Beyond direct costs, the deployment of human observers also poses logistical and operational challenges to the fleet that prevent the program from reaching its full potential. These types of impacts will have serious negative consequences for the durability and scalability of this catch share program. This is therefore not only an economic issue, but a significant conservation and management issue as well.

While the EFP would be limited in scope and number of participating vessels (approx. 7), it has much broader significance through its potential to inform an eventual regulatory package that applies across the fleet. Beyond West Coast groundfish, national EM programs are struggling to operationalize. This EFP represents an important opportunity to move EM forward in a vital fishery and in a manner that is well controlled.

This EFP will provide a detailed cost breakdown for monitoring vessels in this fishery using EM, and the contribution of individual EM components to the overall cost will be identified. This project will provide detail on the optimal design of discard areas and demonstrate the ability of EM trained analysts to accurately speciate and estimate weights for certain flatfish (see Section 9). By providing a cost and logistics comparison of optimized and maximized retention for trawl, this EFP may also help to guide the Council's decision-making process with regards to EM for these sectors. The authors of this EFP plan to work closely with the SSC and the GMT to ensure data collection and analysis is done in a thoughtful and predetermined fashion so that it contributes the most value to EM research in general.

7. Duration

Given the amount of resources required to approve and issue an EFP, we request the permit be issued for 2 years (2015, and 2016). However, if the Council wishes to limit the EFP to a single year we request that it be for 2015.

8. Number of Vessels

We anticipate that approximately 7 vessels will participate in this EFP: 3 from the fixed gear fleet and 4 trawlers.

9. Description and Amount of Harvested Species

Target Species: Sablefish, Dover Sole, Chilipepper rockfish, Lingcod, minor shelf rockfish, minor slope rockfish, Splitnose rockfish, Yellowtail rockfish, English sole, Petrale sole, other flatfish

Rebuilding Species: Cowcod, Canary rockfish, Yelloweye rockfish, Darkblotched rockfish, Bocaccio

The amount of these species that will be taken is difficult to estimate, however, the participating vessels will be providing all quota required and no request for quota pounds is being made.

10. Accountability Mechanism

In an effort to mitigate accountability concerns, the vessels participating in this EFP will be required to sign a collective contractual agreement. The EFP manager will hold all fishermen accountable to the terms of the contract. This structure will help ensure that compliance incentives are in place and that minor issues are dealt with by the EFP applicant.

This contract will be developed in partnership with, and to the satisfaction of, NOAA OLE, and will include the following features:

- i. An acknowledgement by signatories that violations by one vessel may result in penalties for all participants, and that potential violations will be reviewed by an EFP manager (selected by the participants) and notified to NMFS OLE.
- ii. An acceptance by participants of the possibility of the EFP being revoked in the case of a serious violation by a single fishing vessel.
- iii. Incentives to report accurately and to cooperate with EM protocols.
- iv. This contract will *not* involve any quota pooling or mandatory spatial fishing plans.
- v. A description of possible violations and the associated monetary, quota, and participation penalties. This penalty schedule will be developed in partnership with, and to the satisfaction of, NOAA OLE.

Finding electronic means of maintaining the accountability that human observers provide is a challenge, particularly for the trawl segment of the fleet. Adoption of EM creates genuine accountability and enforcement risks. However, there are ways to mitigate these risks, and they need to be compared to the broader programmatic and policy risks associated with failing to address the issue of observer costs, particularly for the non-whiting fleet. Any risk also needs to be evaluated in the context of those risks inherent in the management of other sectors of the groundfish fleet, including the recreational and open access sectors. The insurance of accountability, in terms of identifying instances of non-compliance and determining penalties, is described in Section 11. On balance, we believe that given the measures proposed in this application, the benefits of moving forward with this EFP far outweigh any perceived risks.

The following retention plans were drawn from the range of Alternatives for Groundfish Electronic Monitoring Policy adopted by the Council in November 2013.

<u>Maximized Retention Plan</u>

This plan will apply to *all fixed gear vessels* and *two bottom trawl vessels.* Vessels fishing under maximized retention will retain *all groundfish species*, both IFQ species and non-IFQ species. This retention plan reflects Alternative 2: Maximize Retention of the discard alternatives from the November 2013 PFMC meeting, with provisions intended for other gear types (i.e. midwater trawl) removed:

- i. Discards **required** for:
  - a. ESA species, MMPA species, and other protected species.
  - b. Prohibited species, when applicable.
  - c. Halibut, after a length measurement is obtained; see below for details.

ii. Discards **permitted** for:
   a. Non-IFQ, non-groundfish species that can be clearly recognized as such and will not be confused with IFQ groundfish in EM video review (e.g. elasmobranchs or finfish not listed in groundfish FMP).
   b. Trash, mud, wood, and other inorganic debris.
   c. Crabs, starfish, coral, sponges and other invertebrates.
   d. Situations where human life or safety is threatened.

iii. Discards **prohibited** for:
   a. IFQ groundfish species.
   b. Non-IFQ groundfish species.
   c. Prohibited species, when applicable.

<u>Optimized Retention Plan</u>

After consulting with fishery participants, we concluded that a maximized retention plan may not be economically viable for some shoreside bottom trawl vessels (Alternative 2). Shoreside bottom trawl vessels often discard low-value fish at-sea, typically flatfish. Retaining these species could significantly impact the profitability of a vessel's fishing trip by filling the hold with low-value or unmarketable catch. Additionally, even if vessels were to land these fish (which are typically undersized, unmarketable, or both), processors and/or buyers likely may accept them. Ultimately, these undesirable fish could need to be discarded on land or at sea, resulting in additional disposal costs to the fishing vessel.

Industry members identified three low-risk species that represent much of the discards in this fishery. These high-quota, low-attainment species are Dover sole, English sole and arrowtooth flounder. It is worth noting here that some of the trawl vessels that will participate in this EFP are also experimenting with modified trawl gear that significantly reduces their bycatch of small flatfish, often from thousands of pounds down to hundreds of pounds. We anticipate that the catch accounting system proposed for bottom trawl discards will be used for no more than several hundred pounds of discarded fish per trip. In 2012, California Risk Pool vessels discarded an average of 50 pounds or less each of Dover sole, English sole, and arrowtooth flounder per trawl tow. More detail on how discards will be identified is given under Section 11.

Consequently, we propose to explore under this EFP a limited discard or "optimized retention" option that better reflects fishing operations and needs, thereby providing a realistic model for how EM could operate in this fishery in the future. We anticipate that two bottom trawl vessels in this EFP will operate under optimized retention and two under maximized retention (using the retention plan described above), allowing a comparison of both retention plans.

This proposal is a modified version of Alternative 3, Retention of Catch Share Species with Options:

i. Discards **required** for:
   a. ESA species, MMPA species, and other protected species.
   b. Prohibited species, when applicable.
   c. Halibut, after a length measurement is obtained; see below for details.

ii. Discards **permitted** for:
   a. Non-IFQ, non-groundfish species that can be clearly recognized as such and will not be confused with IFQ groundfish in EM video review (e.g. elasmobranchs or finfish not listed in groundfish FMP).

b. Dover sole, provided they can be identified and assigned weight estimates using EM.
c. English sole, provided they can be identified and assigned weight estimates using EM.
d. Arrowtooth flounder, provided they can be identified and assigned weight estimates using EM.
e. Trash, mud, wood, and other inorganic debris.
f. Crabs, starfish, coral, sponges and other invertebrates.
g. Situations where human life or safety is threatened.

iii. Discards **prohibited** for:
a. All IFQ groundfish, excluding Dover sole, English sole, and arrowtooth flounder.
b. IFQ groundfish that cannot be adequately identified by the skipper or crew and/or assigned weight estimates using EM.
c. Non-IFQ groundfish species.
d. Prohibited species, when applicable.

<u>Halibut</u>

This EFP is intended to test an operational model of EM that could be scaled to the entire fleet; consequently some estimate of halibut mortality is necessary. Understanding that this application is open to vessels that are not part of the California Risk Pool (whose members have not caught Pacific halibut since implementation of the IFQ), we propose the following method for assessing halibut mortality for any vessels in this EFP *with halibut history since 2011, except* those using hook and line gear:

> A quota deduction will be generated by obtaining a length measurement visible to the camera using a measuring board, which will then be used to calculate weight. A mortality estimate will be applied based on the vessel's individual 2011-2014 average halibut mortality rate, as determined by the Observer Program.

For hook and line gear, the mortality rate established by the Observer Program will be applied instead of the vessel-specific average. The halibut handling protocol on-board will be the same as other gear types. This is consistent with current Observer Program protocols for this gear type.

California Risk Pool vessels, and many other vessels in California, have not caught Pacific halibut since the implementation of the catch share program in 2011. However, if halibut are encountered, we propose the following method for assessing halibut mortality for all vessels in this EFP *without halibut history since 2011, except* those using hook and line gear:

> A quota deduction will be generated by obtaining a length measurement visible to the camera using a measuring board, which will then be used to calculate weight. A mortality estimate will be applied based on the fleet-wide 2011-2014 average halibut mortality rate, as determined by the West Coast Observer Program.

If the Council concludes that it cannot authorize exemptions to the rules relating to halibut discard and mortality estimates, we request that the EFP be approved with the conservative assumption of 100% halibut mortality.

If 2014 Observer Program data is not available when this project begins, halibut mortality estimates will be derived from 2011-2013 data until and unless 2014 data becomes available during the project.

11. Proposed Data Collection

EM Services

Three components exist in the data collection process for EM: the technical system (the EMS itself), the field services (hard drive retrieval and maintenance), and the video review. This EFP intends to use hardware (camera systems, sensors, hard drives, etc.) and video analysis software from Archipelago Marine Research Ltd. We are currently exploring options for video review, including Pacific States Marine Fisheries Commission (PSMFC) and Tenera Environmental. PSMFC has been conducting EM research since 2012 and has experience reviewing EM footage from the Archipelago systems. Tenera Environmental is currently contracted to conduct field services for PSMFC's Pacific groundfish EM study, and was certified to review Archipelago EM footage under the 2010 EM EFP conducted by The Nature Conservancy. Regardless of which agency performs video review services, it is expected that Tenera Environmental or another private vendor will be contracted to perform field service responsibilities under this EFP.

The EMS will include the following:

i. Secure, watertight control box for data storage.
ii. Digital cameras that include or are connected to a date and time stamp and counter.
iii. A minimum camera resolution and frame capture rate (to be determined).
iv. A minimum amount of on-board data storage (to be determined).
v. Tamper-evident hardware.
vi. A monitor showing a live feed from all EMS cameras, so that the skipper can ensure the EMS is functioning correctly.
vii. An electronic reporting system consisting of a device (smartphone, tablet, or computer) and software that, at a minimum, contains data entry fields and units that conform to the existing state logbooks.

The installation and operation of the EMS will be governed by the Individual Vessel Monitoring Plan (IVMP) drafted by the EMS provider in collaboration with the vessel skipper. The IVMP will address the following:

i. Hardware, including but not limited to the control box, removable hard drive, camera specifications, GPS receiver, and pressure and motion sensors.
ii. Software for data collection.
iii. Protocols for EMS malfunction.
iv. Back-up equipment use protocols.
v. Catch handling protocols.
vi. Vessel layout and camera coverage, including screen shots of camera views.
vii. Number and placement of cameras.
viii. Lighting requirements.
ix. Required/necessary power supply for EMS.
x. Instructions for care and maintenance of the EMS.
xi. Schedule for EMS maintenance and data transfer.
xii. Instructions for filling out and submitting electronic logbooks.

EM data capture and analysis

For the purpose of assessing compliance with individual quotas, EM data analysis will draw on a variety of data sources, including pressure and motion sensors, electronic logbooks, VMS, and GPS devices, shoreside catch monitors, as well as the camera footage itself.

The EMS service provider and any 3rd party contractors selected by the EFP participants will:

i. Describe and adhere to a clear chain of custody for hard drives with EM data.
ii. Ensure the timely retrieval of hard drives from EFP vessels.
iii. Maintain confidentiality of EM data at all times.

In this EFP, quota accounting will be accomplished by cross-checking the electronic logbook against two main data sources: EM, which provides data on discards, and shoreside catch monitors, which provide data on landings. In other words, the total catch and discards of a vessel will be determined using the shoreside monitor data plus any discard events witnessed using EM to verify the e-logbook.

A designated discard control point will be established and all discards are required to occur at that location on the vessel. A camera will be focused on the discard control point and 100% of discard events will be reviewed. Some examples of discard control points include discard chutes, or specific areas on deck where fish are passed individually through a camera view and then discarded. For each of the discard events, the EM reviewer will identify each IFQ fish to species and record a weight estimate, likely based on length-weight relationships for the species or known volumes of storage containers on deck. This discard data will be compared to the vessel e-logbook.

Based on PSMFC research presented at the April Council meeting and conversations with service providers, discard control points with designated cameras greatly improve the quality of EM video and the accuracy of quantifying discards. Using high-quality video where fish are viewed individually, and attempting to differentiate only three IFQ groundfish species, video reviewers should be able to confidently speciate all IFQ fish discarded under the optimized retention plan. In addition, as described in Section 10, the volume of small flatfish discarded by participating vessels is likely to be relatively small.

As an additional layer of accountability, 10% of the fishing events identified in the vessel's EM video data (at least one per trip) will be randomly selected for review. This review will ensure that no discards occurred outside of the discard area. Sensor data will be used to confirm all fishing events and trips were recorded in the electronic logbook.

<u>Concurrent observer coverage</u>

This EFP is requesting an exemption from regulations mandating 100% observer coverage. However, we anticipate deploying EM before NMFS issues the EFP and while observers are present on every trip. This initial 100% observer coverage with EM will serve multiple purposes. It will ensure that no lapses in full accountability occur while the skipper and crew are adjusting to EM. It will also allow the project to determine if an observer effect is occurring.

Once each vessel operator has stated their readiness in operating with EM, and the EFP has been issued, we intend to reduce observer coverage to 20% – representing the approximate level necessary for the Groundfish Observer Program to collect biological data. The design of this component will be developed with input from the GMT and SSC, and in collaboration with the Observer Program, to ensure that the resulting data is informative. It is imperative to conduct a substantial number of fishing trips during this EFP *without* an observer present, for a number of reasons:

- Maintaining both 100% observer coverage and full EM deployment represents redundant expenditures, undermines the incentive to participate, and fails to achieve the goal of cost-effective monitoring for this fishery.
- The percentage of fish discarded vs. retained, and the overall catch composition, may be compared from vessels fishing with and without an observer to determine if fishing behavior

changes. This analysis will help determine whether an “EM effect” exists similar to the “observer effect”.

- This approach will allow the Groundfish Observer Program to test out protocols for biological data collection as well as catch sampling under partial observer coverage.
- Members of the Pacific Council have expressed concern during the EM regulatory process about abruptly transitioning from 100% observer coverage to a much lower percentage in the fixed gear and bottom trawl fleets. This EFP will provide proof-of-concept that full accountability can be maintained using only EM in those sectors.
- Valuable lessons will be learned from the deployment of EM and subsequent data collection and analysis that will inform the EM regulatory alternatives currently being developed by the Council and NMFS.
- Recent reports by Pacific States Marine Fisheries Commission commented that the presence of an observer during their EM study may have had a deleterious effect on their results, because the observer may have prevented crew members from utilizing all available deck space or handling catch clearly.

Quota accounting

Catch accounting will use three sources of data: e-logbooks, shoreside catch monitor landing data, and data from the EM video review. This accounting system relies on the assumption that all discards are reported in logbooks and captured by the EMS (and any behavior violating this assumption would be treated as a violation, as described below).

For discarded fish, the vessel’s quota account will be debited whichever is greater: the estimated weight by species from the EM video reviewer, or the recorded weight by species from the e-logbook. For retained fish, the vessel’s quota account will be debited the weight by species from the shoreside catch monitor, consistent with the status quo under 100% observer coverage.

Discrepancies identified during video review may include, but are not limited to, the following:

i. Unauthorized discards: discarding species required to be retained (e.g. rockfish).
ii. Discard events occurring outside of the predetermined discard area.
iii. Crew behavior or fish handling preventing accurate fish identification or weight estimation.
iv. Discard event was not recorded in e-logbook.
v. Fishing trip or event not recorded in e-logbook
vi. The e-logbook underestimates discards by more than 10% for any species.

If the discrepancy between the e-logbooks and the EM video reviewer is greater than 10%, then a video reviewer will watch 100% of the video from all fishing events in the trip. The vessel will be responsible for the cost of additional video review.

Compliance and penalty structure

We define an EMS failure as one or more cameras malfunctioning, and/or any loss of sufficient quality video footage during a fishing event. In every case of EM malfunction, the camera provider will examine the EMS for signs of tampering. In the event of EMS malfunction, vessels may return to traditional monitoring using on-board observers in order to begin another fishing trip if desired.
The consequences of an EMS failure hinge on the tamper-evident nature of the EM equipment, the crew adhering to the care and maintenance protocols, as well as any disruption in video feeds to the monitor available to the skipper and crew:

i. If the EMS fails and the skipper's EM video feed shows some malfunction, the skipper must alert the service provider and immediately suspend fishing activities and return to port. The skipper may not begin another fishing trip without carrying an observer or ensuring the EMS is repaired.
ii. If an EMS failure is noted during data retrieval and analysis, but the EM video feed had not been affected (i.e. the skipper was unaware), the vessel's quota account will be settled using the e-logbook as confirmed with fish ticket data. The quota account will also be debited an additional 5% of the fishing trip's landed pounds (of each species) to compensate for the EMS failure. The skipper may not begin another fishing trip without carrying an observer or ensuring the EMS is repaired.
iii. *In any EMS failure*, if the service provider determines the system has been tampered with, the vessel will be penalized according to NMFS and OLE determination.

These measures and others will be codified in the collective contract among EFP participants, described in Section 10.

12. Vessel Selection Process

Up to 7 vessels will be selected to participate in the EFP that meet the following criteria.

The *vessel* must:
i. Have sufficient space and ventilation for EMS hard drive.
ii. Have sufficient power to run EMS uninterrupted.
iii. Have or establish a designated discard area that can be monitored with an unobstructed view.
iv. Create an Individual Vessel Monitoring Plan (IVMP).
v. If possible, have participated in a previous EM pilot project or EFP.

The *skipper/owner* must:
i. Be engaged in and responsible for EMS deployment, troubleshooting, and implementation on their vessel.
ii. Be willing to retrofit the vessel and catch handling operations necessary for EM deployment.
iii. Participate in or designate a representative to participate in PFMC meetings and related workshops, representing this EFP.
iv. Be able to re-train crew in appropriate behavior for EM.
v. Sign a collective contract indicating acceptance of appropriate protocols in the case of EM malfunctions and penalties in the case of violations.
vi. Fill out and submit electronic logbooks, in addition to the currently required State logbooks.
vii. Must be in "good standing" with NMFS and Risk Pool (i.e. no outstanding violations).
viii. Share vessel-specific 2011-2014 halibut mortality estimates as determined by the Observer Program (if any halibut were caught), as well as all discard and catch data from fishing that occurs under this EFP.

The table below includes all 10 vessels currently participating in the California Risk Pool, up to 7 of which may participate in this EFP. Inclusion in this list does not imply any commitment at this stage on the part of these fishermen to participate in the EFP. Other vessels that are not members of the California Risk Pool may also participate in this EFP; the total number of vessels will not exceed 7.

The first receivers that may receive landings from EFP fish include, but are not limited to, the following:

- Caito Fisheries, Ft. Bragg, CA

- Deyerle Brothers Seafood Inc., Monterey, CA
- Alber Seafoods Inc., San Francisco, CA
- North Coast Fisheries Inc., Santa Rosa, CA
- Bettencourt and Son, Half Moon Bay, CA
- Central Coast Seafood, Atascadero, CA
- Mr. Morgan Fisheries Inc., Moss Beach, CA

Owner/Skipper	Vessel	Gear
Geoff Bettencourt	Moriah Lee	Traps
Steve Fitz	Mr. Morgan	Scottish seine
Bernie Norvell	Donna J	Trawl
Brian Jourdain	Blue Pacific	Traps
Tom Estes	Tara Dawn	Trawl
Vince Doyle	Verna Jean	Trawl
Bill Blue, John Blue	Brita Michele	Traps
David Rose	Nikki J	Longline
Rob Seitz	South Bay	Trawl
Keith Marshall	Captain John	Trawl

13. Times and Places of Fishing, Type of Gear

Exact fishing locations and times will depend on the vessels that are selected, their home ports and fishing plans. The gears used will be groundfish bottom trawl gear and groundfish fixed gear. For trawl vessels, it is anticipated that fishing will occur both seaward and shoreward of the trawl Rockfish Conservation Area and with both large and small footropes. All fishing will be conducted south of Cape Mendocino.

14. Signatures

Lisa Damrosch
Executive Director
Half Moon Bay Groundfish Marketing Association

Bill Blue
President
Central California Seafood Marketing Association

Michelle Norvell
Executive Director
Fort Bragg Groundfish Association

Project Title: Exempted Fishing Permit Proposal for Utilizing Electronic Monitoring Systems in Lieu of Human Observers in the At-sea and Shoreside West Coast Whiting Fishery.

Date: May 27, 2014

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Purpose and Need for Exempted Fishing Permit:

Purpose
Ballooning monitoring costs and operational considerations form a well-defined need and justification to move forward with issuing an Exempted Fishing Permit (EF) for the at-sea and shoreside whiting fisheries. The purpose of the EFP is to determine whether utilizing cameras in lieu of human observers proves both cost effective and operationally effective while still providing 100% monitoring of catch and discards that adequately comply with the personal accountability requirements of Amendment 20.

Need
Amendment 20 was implemented in January 2011. The Trawl rationalization program includes individual transferable quotas for the shoreside whiting fleet and a cooperative system for the at-sea whiting fleet. A majority of west coast whiting fishermen participates in both sectors. Both programs require 100% monitoring of catch and discards as a fundamental component of the catch accounting system. Currently the monitoring mandate is accomplished using human observers provided by two National Marine Fisheries Service (NMFS) approved providers with the majority of the cost borne by the industry and a subset of the cost covered by a government reimbursement. While NMFS recently published a rule detailing a certification process for additional observer providers, it is our understanding that there are no observer providers immediately wanting to become providers for the west coast groundfish trawl fishery.

For 2014 the government reimbursement is $216 of the total $450-$500 per day cost of a human observer. The cost of monitoring is only one piece of a larger financial burden that fishermen participating in the trawl groundfish fishery are facing. In addition to the normal operating costs associated with running a fishing vessel, there are several other government-imposed fees including state landings taxes (set to increase in Oregon), a 5% annual Buyback Loan payment and an annual Cost Recovery fee totaling 3% for the shoreside whiting fishery participants and 2.4% for mothership fishery participants. All of these costs are based on ex-vessel value – so they come out of a business's gross earnings, which can equate to upwards of 15-18% of a vessel's gross *before* paying out all the other costs associated with running the business. Human observer costs are expected to continue to increase in the coming years. Cost relief is the primary reason we are seeking to experiment with using electronic monitoring versus human observers in the whiting fishery. It is expected that monitoring costs will decrease with the use of cameras versus human observers. This expectation is based on previous experience and information gathered from a pilot program utilizing cameras in the west coast shoreside whiting fishery from 2004-2010. This expectation is further bolstered by data provided by the Pacific States Marine Fisheries Commission resulting from their most recent study.

Another primary reason we are seeking to utilize electronic monitoring in lieu of human observers is related to logistical and operational considerations. Human observers are just that – human. There are times when observers are unable to conduct their required sampling duties or they are unavailable to deploy when a vessel is ready to depart to go fishing. Comparatively, cameras are always on, they do not eat, sleep or get sea sick and once installed they are always ready to head out on a fishing trip, regardless of time or location.

Species Disposition:
All species harvested under this EFP must be covered by quota share or cooperative species allocation as currently detailed in the existing Amendment 20 regulations. This EFP mirrors fishing strategies that are currently employed in the whiting fisheries and the only difference is the use of a camera for monitoring versus a human observer. This EFP does not request a special allowance to harvest any additional species (species of concern or otherwise) and the disposition of all species should mirror current fishing operations and strategies. There is no set aside of any species – target or otherwise – with this EFP and impacts on rebuilding species are already considered and included in annual scorecard accounting and monitoring based on Amendment 21 allocations.

Broader Significance:
The proposed activity under this EFP will have broader significance than simply achieving certain goals for the applicants. There are other sectors and fisheries on the west coast that are interested in utilizing EM – the bottom trawl and fixed gear sectors of the trawl ITQ fishery as well as other Pacific fisheries in need of monitoring but unable to carry observers due to small vessel size or even safety

concerns. In addition, there is a national push to explore and implement electronic monitoring in a variety of fisheries utilizing an assortment of gears. The information garnered through this EFP will be very informative in helping to design and implement EM systems both on the west coast and around the country in other regions as well.

Duration:
The EFP would be issued for two years and cover two entire whiting seasons, which begins in May and continue through the remainder of any given year. We are seeking a 2-year EFP for the shoreside and whiting fisheries covering 2015 and 2016 fisheries.

Number of Vessels Covered:
Any catcher vessel which participates in the primary mothership or shoreside whiting fishery would be eligible to participate under this EFP as long as they meet all criteria and requirements as outlined in this application – this could be as many as 37 vessels. Midwater Trawlers Cooperative represents 23 catcher-vessels of which 18 participate in the at-sea and/or shoreside whiting fishery. Out of these 18 vessels, 16 have indicated a desire to utilize electronic monitoring if the opportunity is available and if the technology is cost-effective. United Catcher Boats represents 72 catcher-vessels of which 16 participate in the at-sea and/or shoreside whiting fishery. Out of these 16 vessels, we estimate 10 to 14 would utilize electronic monitoring beginning in 2015.

Whiting Fishery Description:
The West Coast whiting fishery is divided up into three distinct sectors: the shoreside fishery where vessels deliver to seafood processors onshore; the mothership sector where vessels catch and deliver the fish to at-sea seafood processors; and the catcher processor sector where vessels catch and process whiting on the same vessel. This EFP applies to the shoreside and mothership sectors. Currently the at-sea season begins May 15 and the full shoreside sector begins June 15 (there is a small shoreside fishery in California which begins in May). In 2015 both sectors are expected to begin May 15 following the implementation of an amendment to the program that changes the shoreside start date to effectively match the start date of the at-sea fishery.

Fishermen target Pacific whiting (also known as hake) with midwater trawl gear. There is no sorting of the catch at-sea and the crew works to get the catch into the fish holds and refrigerated seawater systems (RSW) as quickly as possible to ensure the high quality fish required by the market. Pacific whiting contain an enzyme that causes the flesh to deteriorate and break down rapidly unless the fish is significantly chilled down immediately after capture. All sorting of pacific Whiting is done at the processing level. For the shoreside fishery the catch is sorted at the shoreside seafood processor during the offload. In the at-sea fishery the catch is delivered directly to the mothership processor (the fish is never brought onboard the catcher vessel) and it is sorted during the offload period. Bycatch species typically associated with both the at-sea and shoreside whiting fisheries includes rockfish and sometimes salmon.

Fishing activity is not expected to change under this EFP. There may be more flexibility for fishermen who are not bound by the scheduling restraints of human observers – but once on the water the strategies and fishing behavior should be consistent with recent years since implementation of the rationalization program.

History:
From 2004 through 2010 the shoreside whiting fishery operated under an EFP and cameras were required to monitor maximized retention on the catcher-vessels. The EFP was granted in order to exempt vessels from the onboard catch shorting required under the regulations. As noted above, the need to get the catch into the RSW systems as quickly as possible necessitated the exemption to sorting out prohibited or other species at-sea. The program was discontinued in 2011 when Amendment 20 was implemented, not because of shortcomings with the EM program, but rather to have a consistent monitoring program across all trawl groundfish vessels that provides 100% monitoring to support the personal accountability component of the program.

Scope:
This EFP application is to use an EM system in the whiting fishery for compliance with monitoring requirements only. Biological information collection is not part of this EFP but it is assumed that biological sampling will continue at the processing level for both the at-sea and shoreside fisheries similar to current practices. Currently human observers are not actively doing biological or other sampling on whiting vessels since the vessels are not sorting their catch at-sea. Observers do log any operational discards and under this EFP the vessel's captain will log any operational discards in the required logbook.

Eligible Vessels
Midwater vessels that are targeting non-whiting are not eligible for this particular EFP. Any whiting vessel that wants to take advantage of this opportunity must be a member of either MTC or UCB. MTC and/or UCB will be the applicant(s) for the EFP and the EFP will be administered through these organizations which will act as umbrellas for their member vessels that participate.

Maximized Retention
The participants will fish under a maximized retention scenario like the one that is used in the fishery now and described above. Participants in the shoreside fishery are required to dump unsorted catch directly below deck and would be allowed to land unsorted catch providing an electronic monitoring system is used on all fishing trips to verify retention of catch at-sea. Catcher vessels participating in the at-sea mothership fishery will continue to deliver full, unsorted cod-ends to a mothership processor. The mothership catcher vessels will not bring any filled cod-ends

onboard the catcher vessel but will deliver it directly to the mothership, as is the current practice.

Disposition of Prohibited Species
Disposition of prohibited species such as salmon or halibut will be the same as the procedures that are in place currently. In the shoreside fishery any prohibited species are sorted out at the plant, enumerated by the catch monitor, and turned over to the state of landing for donations to food banks. In the mothership fishery any prohibited species are sorted out by the mothership processor, recorded (enumerated) by the mothership's observer, and discarded at sea.

Video Review
We would like to test two approaches to the video review and see which one meets the requirements for 100% accountability and is most cost-effective. In the first approach, the vessel captain will self-report their catch and any operational discards in their logbook. The video from the cameras will be used as an "audit" to ensure correct reporting of discard events. After the reviewers watch the video for any reported discards (noted from logbook) the reviewers will then follow-up with a 10% random review of the remaining video seeking any unreported discard events. The additional 10% random review is patterned after the system that is currently utilized in the British Columbia groundfish fishery. The second approach is patterned after the recent Pacific States Marine Fisheries Commission study and involves 100% review of the video to ensure no discards are taking place.

This EFP seeks to have the EM provider also complete the logbook audit and video review – not NMFS personnel.

EFP Compliance
Any blatant unreported discard events that are discovered during the review will result in the immediate loss of EFP privileges for the remainder of the EFP. Any vessel that loses its EFP privileges will be required to carry a human observer for the remainder of the EFP. We are exploring whether or not the whiting at-sea and shoreside cooperatives would be appropriate for management of the EFPs or whether the applicant organizations would be more appropriate. We do not, however, envision individual EFPs for every participating vessel but rather an umbrella organization that will manage the EFPs.

Required Data Collection and Vessel Monitoring Plans
Fishermen will be required to complete a logbook that includes the following information:

- Date
- Set time
- Depth
- Time of net retrieval
- Latitude & Longitude

- Depth of head rope
- Estimated amount of catch
- Estimated amount of any operational discard

Applicants will work with a 3rd party provider to develop an electronic logbook – if an electronic logbook cannot be developed in time for when the EFP is implemented, than a paper logbook that captures the same information will be utilized (as is currently done in both the at-sea and shoreside whiting fisheries).

The vessel will work together with the EM provider to develop a Vessel Monitoring Plan (VMP) that will be approved by NMFS. The VMP will layout the placement of all cameras on the vessel and detail the criteria that the camera system must meet. It is assumed that the set-up that will be utilized will be similar or the same as that system used in the 2004-2010 pilot program. This system is comprised of a system control center, up to 4 cameras, a GPS receiver, a hydraulic pressure sensor, and a winch rotation sensor. Image and sensor data are stored digitally on a removable hard drive that can be exchanged at intervals (to be determined) during the fishery.

It is the responsibility of the vessel captain to ensure that all systems are operational before leaving port. Consultation between the EM service provider and the vessel is expected to be thorough and the captain is responsible for several aspects of the system including: keeping the system continuously powered while the vessel is at-sea, regularly cleaning camera dome surfaces to ensure sharp image resolution; conducting periodic inspections of system components and conducting regular system checks to ensure the EM system is performing properly; ensuring that camera view areas are adequately lit during night operations; immediately contacting program staff and NMFS if the EM system stops performing; and maintaining regular contact with service provider for data retrieval and service scheduling.

For the shoreside fishery the camera will be turned on once the first set is made and remain on until the vessel returns to port to offload. A shoreside trip averages 1-3 hauls and can last 1-2 days. The camera will not be required to be on while the vessel is initially transiting to the fishing grounds and a geofence will be established around the ports the vessel is utilizing. For the at-sea fishery a trip is defined differently – vessels stay on the fishing grounds delivering to the mothership over a period of several weeks. The camera will be on during the entire trip or less if the EM provider determines the camera can be turned off without impacting the integrity of the program.

For the shoreside fishery video and logbook information will be transmitted once the vessel returns to shore via the already existing shoreside catch monitor. During the at-sea fishery video and logbook information will be stored on board the vessel until it returns to port after finishing the at-sea portion of the fishery. Alternatively, the video and logbook information could be transmitted to one of the observers stationed on the mothership.

A 3rd party organization (approved by NMFS) will be responsible for review of the logbook and associated video. We propose the EM provider will provide this service, not NMFS personnel.

Specific Regulations from Which an Exemption is Being Requested:

a. Under 50 CFR § 660.12 (a)(1) it is unlawful for any person to retain any prohibited species, which must be returned to the sea as soon as practicable with a minimum of injury when caught and brought on board. This EFP allows the permitted vessel to retain prohibited species until offloading and requires the vessel to deliver all catch.

b. Under 50 CFR 660.140 (h)(1)(i)(A) any vessel participating in the Pacific Groundfish IFQ fishery is required to carry an observer. This EFP allows participants to utilize EM in lieu of the requirement to carry observers

Reporting Requirements

- Trawl logbooks must be maintained as required by the applicable state law and include the information detailed above

Maximized Retention Requirements

- All catch must be brought on board the vessel and retained until offloading, with some exceptions:
  - Pacific whiting removed from the deck and fishing gear during cleaning may be discarded, provided that the total does not exceed one based from any single haul, with the maximum dimensions of the basket being 24 inches by 16 inches by 16 inches. All catch in excess of the one basket would need to be placed into the fish hold. Discarding species other than pacific whiting would be prohibited.
  - Large individual marine organisms, such as marine mammals or fish species longer than 6 feet in length, could be discarded provided the species and the reason for discarding were properly recorded in the required logbook
  - All incidentally caught marine mammals would need to be documented in the vessel logbook and reported to the NMFS Office of Protected Resources by submitting a completed Marine Mammal Authorization Program mortality/injury report form.
  - Unavoidable discard of catch would be the result of an event that is beyond the control of the vessel operator or crew. The quantity and all species discarded as a result of an unavoidable discard event would need to be estimated, and the location of the tow, and reason for discarding recorded in the logbook.

    - Discard that results when more catch is taken than is necessary to fill the hold is within the control of the vessel operator and would continue to be prohibited.
- All prohibited species incidentally caught in a midwater trawl, and required to be retained under this section, would be abandoned to the State of landing immediately upon offloading.

EMS Requirements

- Owners of participating vessel would be required to arrange from EMS services from a NMFS-approved provider and pay all associated costs
- Vessels required to procure EMS services may also be required to carry an NMFS West Coast Groundfish Observer Program observer (for the purposes of capturing biological information)
- The vessel operator would be required to schedule maintenance of EMS equipment
- Before each haul is retrieved, the vessel operator would be required to check status of EMS control box to confirm that the EMS is functioning properly
- From 30 minutes before official sunset until 30 minutes after official dawn, each vessel covered under this EFP would be required to provide adequate lighting to areas where the trawl nets and fish are handled and fish hold openings, deck spaces, and the trawl ramp so the activities could be clearly recorded by the EMS cameras.

Application for Exempted Fisheries Permit

Use of Electronic Monitoring in West Coast Trawl Fishery on Vessels Utilizing Fixed Gear.

Date: May 25, 2014

Applicants: "Fixed Gear"

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Background:

In 2011, NMFS implemented a Council-developed catch share program for the West Coast limited entry groundfish trawl fishery. The program requires that each vessel acquire quota pounds (QP) to cover its catch (including discards) of nearly all groundfish species. Proper functioning of the program requires some form of at-sea monitoring to ensure that discards are enumerated for each vessel. The catch share program specified that this monitoring function be achieved through 100% at-sea observer coverage. In conjunction with vessel logbooks, electronic monitoring (EM) is being explored as a potential technically and economically viable substitute for the use of human observers in the function of compliance monitoring for the catch share program.

In 2012 and 2013, Pacific States Marine Fisheries Commission (PSMFC) expanded its initial pilot project to test the feasibility of using electronic monitoring for catch accounting in the trawl catch share program in the west coast groundfish fishery. Included in expansion of the project were trawl-permitted vessels utilizing both pot and longline gear. Vessels were outfitted by EM service providers. In addition to the installation of EM systems, permitted vessel owners were also required to continue to contract for and carry a federal fisheries observer. This pilot project is continuing in 2014.

On May 3, 2013, National Marine Fisheries Services issued policy directive 30-133, setting forth the following objective:

It is the policy of the National Oceanic & Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NOAA Fisheries) to encourage the consideration of electronic technologies to complement and/or improve existing fishery-dependent data collection programs to achieve the most cost-effective and sustainable approach that ensures alignment of management goals, data needs, funding sources and regulations.

Purpose and Goals:

For this exempted fishery permit (EFP), applicants propose to monitor catch and discard aboard a trawl-permitted vessel, utilizing fixed gear, via an electronic monitoring system, without 100% observer coverage as currently required by regulation. Comparison of the logbook recording of discard events by the skipper and the subsequent review of the video of the fishing activity for accuracy and compliance is the primary focus of this application. The use of fisheries observers onboard the vessel as an adjunct to the project is included in this application and further described below.

While industry is interested in finding less costly and more flexible methods to monitor catch and discards at sea, this application is also meant to begin to address some key management issues:

1) Can video monitoring be used on board a trawl-permitted vessel using fixed gear to accurately track and correctly identify a vessel's fish catch, including discards, to be debited from a quota account?

2) Can this be done without the presence of a federal fisheries observer?

3) Are fishermen able to accurately identify and record in logbooks the species caught, including both retained catch and discard?

4) What percentage of monitoring of the video from EM is required to verify catch and discard recorded in the logbooks?

Applicants seek the issuance of an EFP to show whether a sufficiently high confidence level in the accounting of catch and discard aboard a vessel can be demonstrated through the use of logbooks, verified by random monitoring of video from EM, and without the presence of a human observer.

Broader Significance of EFP:

In the event that there is a very high correlation of EM video review and logbook data of the catch and discard of species aboard the vessel pursuant to this EFP, it is anticipated that the requirement for 100% human observer coverage on trawl-permitted vessels using fixed gear for compliance-monitoring purposes may be significantly reduced, if not entirely eliminated, across the fleet. In fact, it may be demonstrated that observers on board trawl-permitted vessels using fixed gear may only be needed for the purpose of scientific data gathering.

A. Duration of EFP and Number of Vessels Participating:

Applicants request that this EFP be for a duration of two years, beginning January 1, 2015 and ending December 31, 2016. Four (4) vessels will participate in the first year, using pot gear, and two of these same vessels may also use longline gear.

Applicants envision the successful outcome of this EFP will be demonstrated within the first year, and anticipate Council action and NMFS future approval of a regulatory amendment to allow the use of EM without 100% observer coverage on board a vessel.

Past experience with the regulatory process leads applicants to believe that the amendment process for a fleet-wide EM program may be quite lengthy, possibly exceeding two years. With the implementation of a two year EFP on January 1, 2015: 1) additional vessels might be able to join for the second year, providing additional data; 2) the EFP can continue without interruption, pending the full regulatory amendment; and 3) the EFP may be modified.

If the EFP is issued for two years as requested, applicants propose that NMFS review the applicant's performance under the EFP before the end of the first year. NMFS would have the option to approve the EFP for a second year "as is", require or allow modifications to any aspect of the permit, and/or any vessel's operational plan, allow additional vessels to participate in this EFP, and/ or terminate the EFP in its entirety at any time.

B. Qualifications of Applicants:

John Corbin has longlined for sablefish off the West Coast and Alaska for more than 30 years. The F/V Buck and Ann is 56 ft. long and the F/V Southeast is 66 ft. long. Both vessels have trawl permits with sablefish and other groundfish quota in their respective vessel accounts, and have fished the trawl permits with pot gear for the last 3 years. During 2013, the F/V Buck and Ann participated in the PSFMC project, deploying an EM system while also carrying a federal fishery observer, and will continue to do so in 2014.

For purposes of this application, the F/V Buck and Ann will be using pot gear as will the F/V Southeast. The F/V Buck and Ann and the F/V Southeast may also utilize longline gear.

Bob Eder has fished for sablefish with pots off the coasts of Oregon and Washington for 35 years. The F/V Timmy Boy is a 60 ft. vessel, and has a trawl permit, sablefish and other groundfish quota in its vessel account, and fished its trawl permit with pot gear in 2011 and 2013. During 2013, the F/V Timmy Boy also participated in the PSFMC project, deploying an EM system while also carrying a federal fisheries observer. The vessel will continue to participate in this program in 2014.

Burton Parker has fished numerous pot and trawl fisheries and owned commercial vessels off the West Coast and Alaska for 40 years. He has previous experience with the installation and operation of EM in the whiting fishery. Alyssa Ann LLC is the owner of the F/V Alyssa Ann, a 44 ft. vessel that fishes for sablefish out of Newport and Astoria OR. Burton Parker is the sole member of the LLC. The vessel has a trawl permit, quota in the account, and uses pots to fish for sablefish. The vessel's skipper is Jake Erickson, who has commercially fished for 10 years, and has 3 years' experience operating the F/V Alyssa Ann, fishing for sablefish with pots.

All of the applicants have successfully participated in at least one, if not multiple years, in an EM program aboard vessels they own. All have experience working with EM contractors, having vessels outfitted with gear and cameras, making system modifications suited to the individual vessel to ensure operational success, using customized logbooks, and facilitating data storage, retrieval, and delivery to EM contractors.

C. Target Species, Areas Fished, Gear Used, Time Frame, Declaration:

Applicants will target sablefish, both North and South of 36 degrees, off the coast of WA, OR, CA. The F/V Alyssa Ann and the F/V Timmy Boy will be fishing pot gear North of 36 degrees; the F/V Buck and Ann and the F/V Southeast may use both longline and/or pot gear, and fish both North and South of 36 degrees. Vessels will make an annual declaration of their intent to participate in the EM EFP, but will also be required each year to notify NMFS 30 days in advance of the start of their fishing for the year which months they will be operating in the fishery and utilizing EM.

D. Electronic Monitoring Plan

1. The EM Plan will include the following:

   a. Secure, watertight control box for data storage.
   b. Digital cameras that include or are connected to a date and time stamp and counter.
   c. A minimum camera resolution and frame capture rate (to be determined).
   d. A minimum amount of on-board data storage (to be determined).
   e. Tamper-evident hardware.
   f. A monitor showing a live feed from all EMS cameras, so that the skipper can ensure the EMS is functioning correctly.

2. Individual Vessel Monitoring Plan:

The installation and operation of the EMS will be governed by an Individual Vessel Monitoring Plan (IVMP) drafted by the service provider with collaboration from the vessel skipper/owner. The IVMP will also include a schematic of the operational system for each vessel, to be approved by NMFS.

The IVMP will address the following:

a. Hardware, including but not limited to the control box, removable hard drive, camera specifications, GPS receiver, pressure and motion sensors, and power supply.
b. Software for data collection.
c. Protocols for EMS malfunction.
d. Back-up equipment use protocols.
e. Retained catch and discard handling protocols.
f. Vessel layout and camera coverage.
g. Number and placement of cameras.
h. Lighting requirements.
i Design of measuring board
j. Instructions for care and maintenance of the EMS.
k. Schedule for EMS maintenance and data transfer.

3. Agreements by Applicants:

Generally, for purposes of this EFP, the skipper/owner must:

a. Be engaged in and responsible for EMS deployment, troubleshooting, and implementation on their vessel.

b. Be willing to retrofit the vessel and catch handling operations necessary for EM deployment.

c. Participate in or designate a representative to participate in PFMC meetings and related workshops, representing this EFP.

d. Be able to train crew in appropriate procedures for EM.

e. Fill out and submit logbooks timely to state and federal agencies as required and to EM video reviewer.

f. Not have outstanding civil violations relating to fishing activity of the vessel exceeding $5000.00 in the last three years, or have any criminal matters pending, as per COP 19.

g. Enter into a "Self-Governing Plan" with each other vessel in this application that will include procedures in the event of an EM system breakdown, a fisheries violation or intentional EM system breach. The "Plan" is to be approved by NMFS. Part of the "Plan" will include a provision that the applicants agree that in the event of a wilful violation of the EFP by an individual applicant, the EFP for that individual applicant may, without due process, be summarily revoked by NMFS.

h. To be eligible for a second year under this EFP, the vessel must be in compliance with its IVMP, demonstrate proper documentation of their discards in logbooks as verified by video; and not have civil or criminal penalties referenced above.

4. Logbooks:

For purposes of this EFP, vessel captains will utilize what is known as an "Oregon Fixed Gear Logbook," as modified per instructions from PSMFC and utilized in 2013 in the EM protocols. Vessels shall also maintain any other logbooks as required by state and federal agencies. At the end of each trip, Captains may photograph and email photos of logbook pages to PSMFC for their review. If an option is available to use electronic logbooks, applicants may utilize these instead.

E. Fishing Requirements:

1. Gear.

   Only legal pot or longline gear may be used for fishing under this EFP.

2. Permits.

   Each participating vessel must have a limited entry trawl permit registered to the vessel, and have a vessel account with quota pounds registered to the account before beginning fishing. A copy of this EFP must be carried on board the vessel while EFP fishing and when fish caught while fishing under the EFP are on board the vessel.

3. Total Catch, Retention Requirements and Discards:

Total catch is defined as any fish hooked or in a pot as the gear is being landed, as well as any visually discernable catch lost during the retrieval process that can be reasonably attributed to the vessel.

Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait on onboard consumption are considered discard. For gear that is lost, discard rates will be applied based on similar sets and or hauls.

All catch of IQ species must be accounted for, to be debited against quota accounts, regardless of whether it is categorized as retained catch or discard.

A vessel fishing trawl quota share with fixed gear under this EFP shall comply with the policy of "Maximized Retention" defined as follows:

All IFQ species, non-IFQ groundfish and non–IFQ species must be retained until offloading, with the following exceptions:

a) Discards required for:

1) ESA species, MMPA species, and other protected species
2) Prohibited species
3) Large marine organisms
4) Halibut
5) Regulatory discards, i.e. Ling cod smaller than 22 inches N of 42 degrees

b) Except as enumerated and defined below, discards are prohibited for:

1) IFQ groundfish species
2) Non-IFQ groundfish species
3) Non-groundfish finfish species

c) Discards permitted for:

1) Trash, mud, wood, and other debris
2) Deepwater crab, coral, starfish, grenadier, urchins, sponges and other invertebrates
3) Predated fish:

Predated fish are defined as any of the above IFQ, Non-IFQ and non-groundfish finfish species that are:

a) otherwise required to be retained, but
b) have been eaten or destroyed by another species or event,
c) while in or on the gear, and
d) subsequently brought on board the vessel.

Current practice on observed and EM monitored vessels is to measure the fish on camera, estimate its weight by length, count the number of predated fish and use the average weight of the fish in that string or pot, times the number of fish, to determine the discard weight. The discard weight and numbers of fish are recorded in the logbook. The fish are discarded. The weights are counted against the vessel's quota for that species.

4. Halibut Accounting:

Discussions are ongoing with NMFS regarding accounting for halibut discard and rate to be applied for mortality. Applicants will continue to work with NMFS and others to finalize an acceptable option. Options include but are not limited to:

a) A mortality estimate will be applied based on the individual's vessel's 2011-2013 average halibut mortality rate, as determined by the West Coast Groundfish Observer Program.(WCGOP).

b) A mortality rate established by the WCGOP or the IPHC for the gear type will be applied.

c) IPHC exemption to allow full retention.

d) Captain and crew trained to provide actual mortality assessment on camera.

F. Observers: Extent and Type of Coverage and Costs:

Discussions are ongoing with NMFS regarding presence of WCGOP observers aboard vessels utilizing EM under an EFP. It appears there may be several functions for observers that are currently being examined:

1) to serve as an observer pursuant to the current regulatory requirements, i.e. compliance; and/or

2) to serve as an observer solely for the gathering of scientific data.

3) Some combination of the two functions

In either event, there remain issues of extent of coverage on board the vessel and the percentage of trips on which an observer may be required. Applicants propose that, similar to the observer coverage in the fixed gear limited entry fleet, which deploys observers for the purposes of gathering scientific data, that coverage by observers not exceed 30% of the trips fished under the EM EFP.

In addition, the question of who pays for the observers under an EFP is still to be determined by NMFS. Applicants propose (also similar to the fixed gear limited entry program) that NMFS pay for the observer coverage under this EFP.

G. Delivery/Offloading of Catch:

No less than 30 days prior to the start of fishing, Applicants will provide to NMFS a list of all fish processors to whom Applicants may unload fish to during their fishing activity each season. All catch must be offloaded at a designated processing plant and the offloading of catch from one trip cannot be split between two or more processing plants. Once offloading has begun at a designated processing plant, all fish on board the vessel must be continuously offloaded at that plant. The processing plant must be one qualified to receive trawl quota fish under the limited entry trawl IFQ program.

H. Catch Accounting of Species

Catch accounting will be accomplished through three sources of data: fish tickets documenting retained catch, logbook data of discard events and species weights, and data verifying the discard events and weights of species discarded by EM video review.

1) For retained IFQ fish, the vessel's quota account will be debited the weight by species by the dockside monitor/fish ticket.

2) For discarded fish, the vessel's quota account will be debited the recorded weight by species from the logbook.

3) In the event there are video events of discards and the reviewer's estimate of pounds of fish discarded is greater than that recorded in the logbook, the reviewer's larger weight estimates will be used against the vessel's quota.

I. Compliance:

1) Each applicant will enter into an IVMP as described above, as well as a contractual agreement regarding participation in this EFP. Conditions of the agreement are to include NMFS right to remove any individual vessel from participation in this EFP for any intentional violation of any agreement pertaining to the EFP, including, but not limited to: violation of federal fishery regulations, intentional damage or tampering with EM equipment, and/or intentional failure to accurately report catch or discard.

2) In the event of an EM malfunction, (i.e. equipment fails to operate such that all sensors are inoperable and/or video recordings do not start upon fishing events and record and store data), if the vessel is dockside, the applicant with notify NMFS, PSMFC and the EM provider and make arrangements for repairs.

3) The vessel will not be allowed to fish without a fully operational EM system, defined as capable of recording and storing the data relating to all fishing and discard events on board the vessel. In the event the vessel intends to fish without a fully operational EM system, vessel owner must make arrangements to carry a federal fisheries observer for 100% of its fishing, until the EM system is again operable.

4) In the event that the EM system fails while vessel is at sea, (generally defined as failure of EM system to record and store viewable video of all fishing activities of the vessel), the vessel must terminate its fishing, return to port for EM repairs, unless, during that same trip, the vessel is carrying a fisheries observer trained in species identification and accounting of retained catch and discard. The vessel may not again leave port without either a) an operable EM system or b) a federal fisheries observer.

J. <u>Data Retrieval and Analysis:</u>

Applicants will work in partnership with NMFS, PSMFC and EM service providers to insure the integrity of and timely delivery of data from the vessel to the service provider for analysis. Options discussed include:

1) Removal of the hard drive from the computer and delivery by the Captain to the monitoring site (PSMFC) by secure delivery

2) Removal of the hard drive from the computer by the Catch Monitor at the processing plant, who will then send it via secure delivery to the monitoring site (PSMFC).

3) Once the data is obtained from the vessel, the following is a general description of the options for analysis that may be undertaken by the service provider.

    a) Evaluate data set completeness and identify fishing events.

    b) Confirm fishing events, and examine catch stowage operations to examine compliance with "maximized retention" of species as defined above, with the enumerated exceptions

    c) Document discard events.

    d) Examine vessel logbooks to verify trips and fishing events align with sensor data.

    e) Compare vessel operator logbook records of landed catch and discard as compared with EM data and with fish tickets.

4) Discussions are ongoing with NMFS and PSMFC as to the extent of the video to be reviewed for comparison to the vessel's logbook. Options include, but are not limited to :

    a) up to 100% review of the hauls recorded on the video

    b) up to 50% review of the hauls recorded on the video

    c) up to 25% review of the hauls recorded on the video

    d) % of video reviewed to be determined, and made specific to the individual vessel, as determined by NMFS/PSMFC

    e) % of video to be reviewed to be determined and made specific to the gear type, as determined by NMFS/PSMFC

K. <u>Final Reporting Requirements:</u>

1. Preliminary: Pursuant to Council Operating Procedures, applicants, in conjunction with the EM service provider, will present a preliminary report on the results of the EFP at the November Council meeting in 2015. The report will indicate the applicants' intent to continue the EFP activity for the second year of the management cycle.
2. Final: A final written report of the results of the EFP will be presented by the applicants to the GMT, GAP, SSC and the Council at the September Council meeting of the year following the management cycle for which the EFP activity is conducted. The final report will include a summary of the work completed, an analysis of the data collected, a conclusion and recommendations.

Submitted by Applicants:

s/ John Corbin

s/ Bob Eder

s/ Burton Parker

Prepared by:

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On Behalf of Applicants

Agenda Item F.5.a
Attachment 5
June 2014

William W. Stelle, Jr.

Regional Administrator

Attn: Gretchen Hanshew

7600 Sand Point Way NE

Seattle WA 98115-0070

This is intended to inform you of our request that the enclosed EFP be issued and that the desired start date is January 1, 2015. This application is the same as the one that was recommended by the Council in June.

Thank you very much for your work on this permit.

Sincerely,

Barbara Emley

Dan Platt

Groundfish EFP Proposal:
Yellowtail Rockfish Jig Fishing off California

Date of Application: May 23, 2014

Applicants	Mailing address	Telephone #	Email
San Francisco Community Fishing Association Contact: Barbara Emley	535 Ramsell St. San Francisco, CA 94132	(415) 585-5711	barbaraemley@gmail.com
Dan Platt Open Access Representative Groundfish Advisory Panel **PFMC**	PO Box 1912 Ft. Bragg, CA 95437	(707) 813-7221	morefish@mcn.org
NMFS Technical Advisor	Mailing address	Telephone #	Email
Charles Villafana Fisheries Biologist NMFS West Coast Region	501 W. Ocean Blvd Ste. 4200 Long Beach, CA 90802	(562)980-4033	Charles.villafana@noaa.gov

Changes from 2013-2014

Change allocation to 0.03mt of Yelloweye
Change Other fish to Spiny Dogfish
Revise Lingcod from S of 42° to N and S of 40.10°
Change the limit of lines allowed to be fished at one time from 2 to 4. (hook number remains 100 total)
Change the depth limit to 150 fm, instead of 100 fm to allow for the possibility to target chilipepper as well as yellowtail rockfish.

Purpose and Goals

Purpose

To continue the 2013-2014 EFP for two more years (2015-2016)

West Coast fisheries have been increasingly restricted in state and federal waters over the last decade to reduce impacts from fishing. Yet, demand remains for fresh, local seafood. To harvest healthy and abundant fish stocks with less impact, conservation engineering and gear experimentation is needed. The purpose of this EFP is to test the potential for a new commercial jig gear configuration to harvest currently underutilized rockfish species (yellowtail) while avoiding overfished stocks to enhance optimum yield in the mixed stock West Coast groundfish fishery.

Goals

This EFP seeks to fulfill and comply with national mandates and goals of the Magnuson-Stevens Act (MSA) for fisheries, fisheries resources, and fishing communities by addressing specific conservation and management issues in the mixed stock groundfish fishery off of California.

1. Consistent with MSA National Standard 1 (optimum yield) and National Standard 9 (minimize bycatch), harvest abundant stocks while minimizing bycatch and providing for rebuilding of overfished stocks.
2. Consistent with the purpose of MSA to conserve and manage U.S. fishery resources to realize their full potential (i.e., by providing employment, food, and revenue to the nation) and consistent with MSA National Standard 8 (fishing communities), seek to develop and utilize gear technology that contributes to sustained participation of fishing communities while also preventing overfishing and ensuring rebuilding of overfished stocks.
3. Provide additional opportunity in the groundfish fishery off California that has been greatly constrained since rockfish conservation areas (RCAs) and lowered quotas were implemented to rebuild overfished species.
4. Test the success of this experimental commercial jig gear configuration at: 1) avoiding deep dwelling overfished rockfish stocks (canary and yelloweye) while selectively harvesting an abundant mid-water rockfish stock (yellowtail), and 2) providing enough harvest of abundant rockfish species to support, or at least contribute to, a commercial fishery off the West Coast in the long-term.

Disposition of Catch

Target species (yellowtail rockfish) and legal incidental catch, such as chilipepper rockfish, will be retained for sale. Fish not authorized for sale would be released alive if possible. If desired, incidental catch of certain species (e.g., canary and yelloweye) that cannot be released alive could be retained by the observer and provided to NMFS, CDFG, or other researchers.

Justification

The fishing grounds which have been historically accessible to portfolio fishermen in California's coastal communities are geographically identified as "shelf", and because of this, the gear used by these fishermen isn't useful for catching fish on the "slope" (depths greater than 100 fathoms-see Figure 5). The creation of the non-trawl rockfish conservation area (RCA) over the shelf (between 30 and 150 fathoms) has pushed fishermen outside their historical fishing grounds into deeper waters where fishing is no longer feasible with their current gear (see Appendix E).

In order to protect and rebuild overfished yelloweye and canary rockfish off California, depth and area closures were implemented off of California. Unfortunately, these closures have also prevented harvest of more abundant yellowtail rockfish that live higher in the water column. Combined with lower quotas, these measures caused many fishermen in California's coastal communities to switch fisheries and/or supplement their incomes in non-fishery jobs because they could no longer harvest the abundant groundfish stocks. If a gear could be developed capable of harvesting the more abundant mid-water species while avoiding catch of the overfished bottom dwellers, then the optimum yield of the fishery could be enhanced. There are currently no conservation concerns with yellowtail rockfish which is an under-utilized species.

In 2009, the Oregon Recreational Yellowtail Rockfish EFP, approved by the Council, was permitted to the Southern Oregon Sport Fishermen and Recreational Fishing Alliance (Oregon Chapter) for fishing in 2010 and 2011. Although not identical, this OR EFP is based on the same concept (i.e., placing hooks near the target species in mid-water and away from non-targets on the bottom). Therefore, it offers interesting insights of some relevance to this EFP application, particularly its catch composition and success at avoiding the non-target species. Under this EFP, 29 trips were made with an average of 11 anglers and 33 hooks per vessel (3 per line) were deployed on average. Reported catch of 4.3 mt (as of Aug. 1, 2011) was composed of roughly 62% Yellowtail, 23% Widow, 12% Canary and 3% other rockfish and 4kg of Yelloweye (2 fish) (see Appendix B). This catch is well below the 1 mt of Canary and 100 kg Yelloweye authorized for year two alone.

A similar design will be tested under this EFP with some modifications for use in a commercial fishery (e.g., number of hooks, size of weight). An EFP is necessary to test this gear because it is not currently authorized under the Groundfish FMP regulations and because fishing conducted under this EFP is proposed for areas that are currently closed to fishing. If the proposed modified vertical hook and line fishing technique is successful, this exempted fishing permit (EFP) would allow commercial fishermen to access historical fishing grounds targeting healthy rockfish stocks and would promote ecologically and economically sustainable fisheries in Central and Northern California.

Broader Significance

The long-term goal, if experiments prove successful, is to allow commercial jig fishing with this gear off the entire West Coast, including in the RCAs, by the Open Access and Limited Entry participants. If successful, this gear could also be used by the Nearshore fleet to avoid species of concern and could create a fishery that would fill out the portfolios of those who make up the bulk of the fishermen in the West Coast's coastal communities. The recreational fleet might also benefit from using a similar gear with fewer hooks, similar to the Oregon Yellowtail EFP previously mentioned. Thus, the benefits of this EFP would extend beyond the initial EFP participants.

Despite the generally depressed condition of many west coast groundfish stocks, there are some stocks that remain healthy. These healthier stocks could safely sustain increased harvest levels if they could be fished more cleanly and without bycatch of more depleted stocks. If stronger stocks could be targeted without increasing fishing mortality on depressed stocks, the West Coast commercial fishing fleet would have alternative fishing opportunities that would provide some economic relief to the industry while providing the public with highly desirable sustainably harvested local seafood.

Details

In determining the proposed specifications for this experiment, several factors have been considered.

- **Creating a statistically valid sample size –** allowing for a sufficient number of hooks, lines, days, vessels, and locations that can provide valid conclusions as to the success of this gear at avoiding overfished non-target species and harvesting the target yellowtail in sufficient quantity to allow for potential expansion of this gear to support future commercial fishing.
- **Feasibility and efficiency –** whether participants can at least cover the costs involved to perform these experiments (including observer costs, fuel, gear, and bait), even if no profit is made under the EFP.
- **Safety-at-sea –** ensuring participants can fish on days with safe weather conditions.

- **Precaution and minimizing risk –** Knowing that overfished rockfish could be encountered and because at least some of the fishing would take place in the RCA, several precautionary measures are proposed.

With consideration of these factors, applicants are open to discussing modifications to this proposal with the GMT and GAP (e.g., # hooks, depth range, etc.).

Total Duration of the EFP

This EFP proposal is for a total of 2 years (2014-2015)

Location of Fishing under the EFP

The fishing will occur between Point San Pedro and the Oregon/California border (37°35'N and 42°N), between 35 and 150 fathoms. Fishing will take place deeper than 35 fms to avoid hydrocorals (primarily *Stylaster spp.*) found mainly shallower than 30 fathoms. Locations for the EFP fishing have been chosen based on known yellowtail habitat, rather than lines of latitude or fathom lines and it is known that there is appropriate yellow-tail habitat in this area, i.e., high relief rocky reef deeper than 30 fathoms (see Appendix D).

Yellowtail rockfish is the target in this experiment because they are underutilized and because they are a mid-water species, whereas the overfished rockfish species of greatest concern tend to be more bottom associated. (i.e., canary and yelloweye). The hooks would be located only in the mid-water column based on the hypothesis that this will be in the range of yellowtail but out of range for canary and yelloweye rockfish, making it less likely that they would encounter the hooks.

Fishing under this EFP is proposed to occur within the RCAs making this a sensitive and delicate experiment that would be undertaken with precautionary steps, such as having 100% observer coverage and daily limits (see section on **Precautionary Measures**). Unfortunately, it is thought that yellowtail rock fish live primarily inside the RCAs and it would be useful to verify this assertion by reviewing fish ticket information from years prior to implementation of the RCAs. Recently, the Superintendent of the Cordell Bank National Marine Sanctuary reports seeing very large numbers ("clouds") of yellowtail rockfish on the "high spots" while in a submersible and saw no adult yelloweye and very few canary rockfish in this same area.

If the project proves successful in avoiding stocks of concern, then fishermen in other West Coast harbors may want to explore other appropriate habitat in their area. Much of the area proposed for this EFP is within the boundaries of the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries. These sanctuaries are in support of this experiment. It has been 10 years since any fishing has taken place in this area, and the Sanctuaries' superintendents are very interested in learning the results of this experiment.

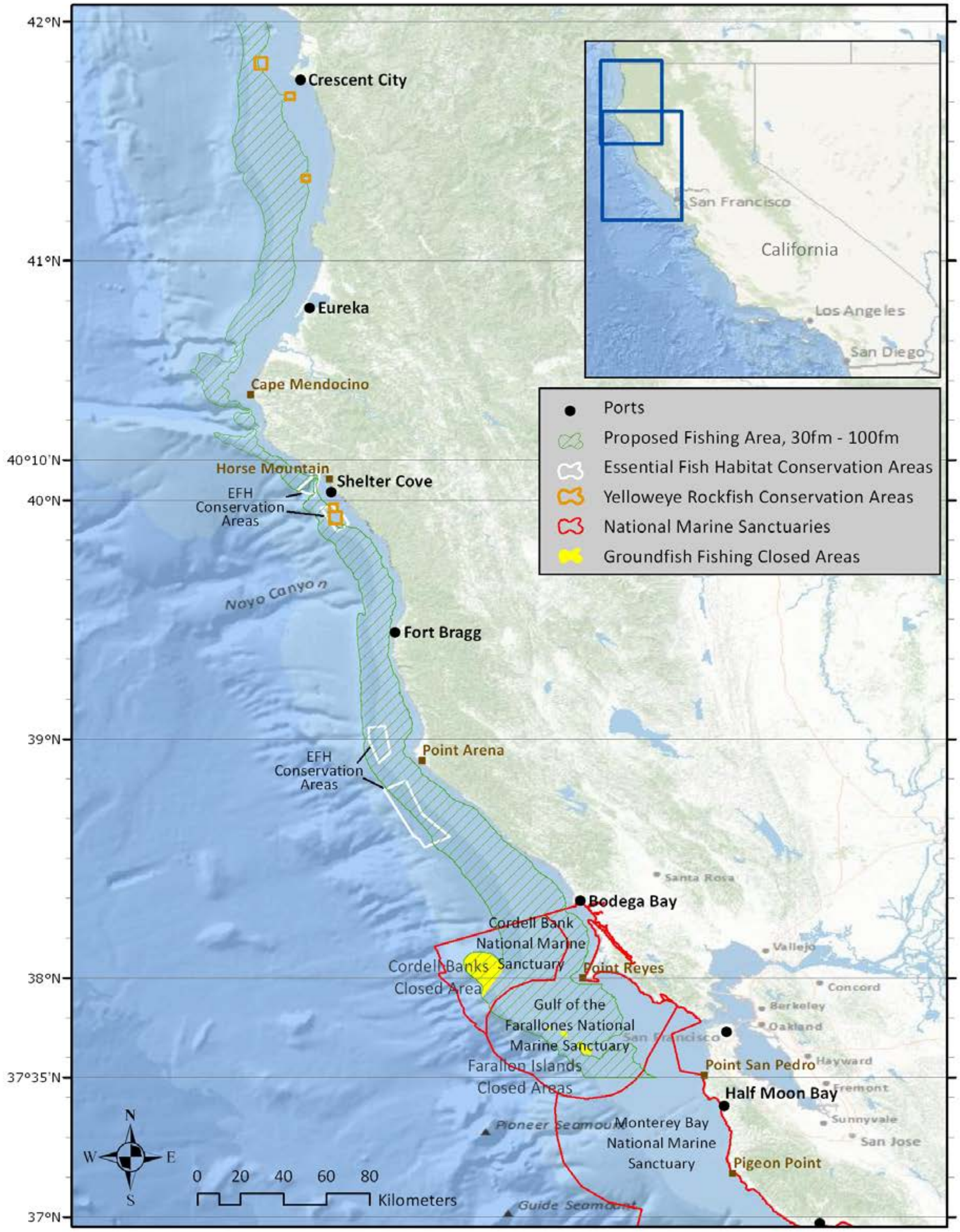

Figure 1. Chart of proposed EFP fishing area – Pigeon Point, CA, to CA/OR border.

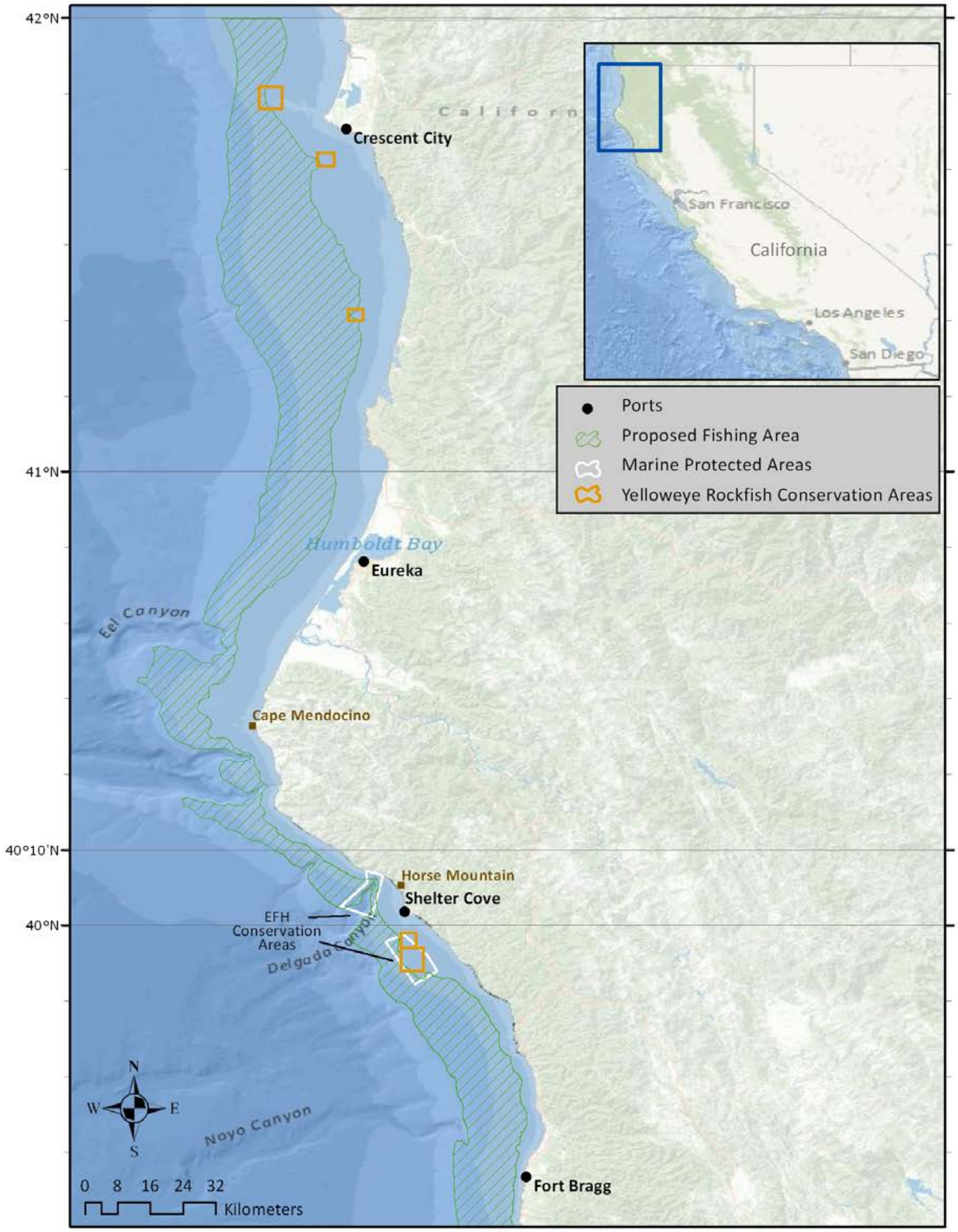

Figure 2. Chart of proposed EFP fishing area – Ft. Bragg, CA, to CA/OR border.

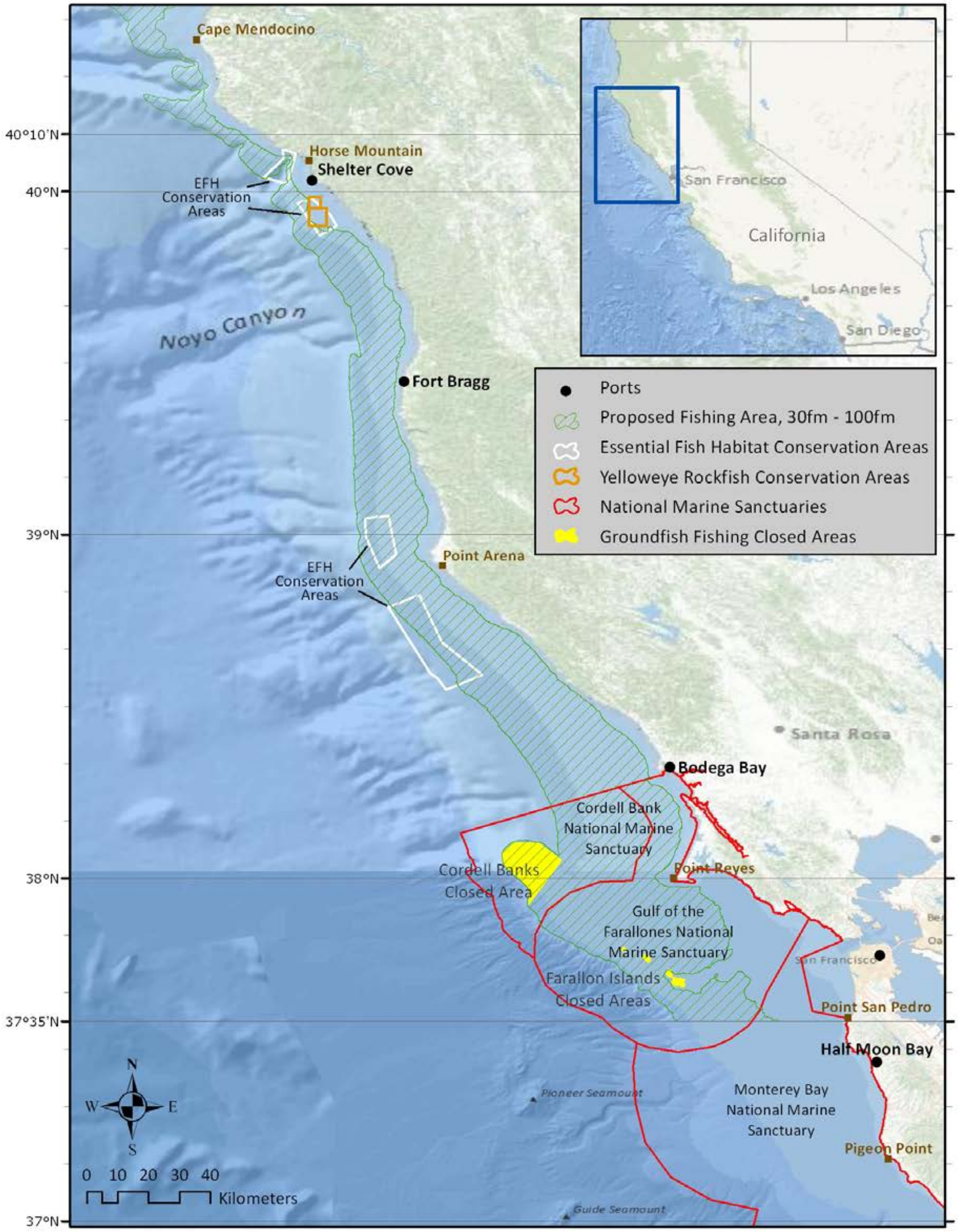

Figure 3: Chart of proposed EFP fishing area – Pigeon Point, CA, to Cape Mendocino, CA.

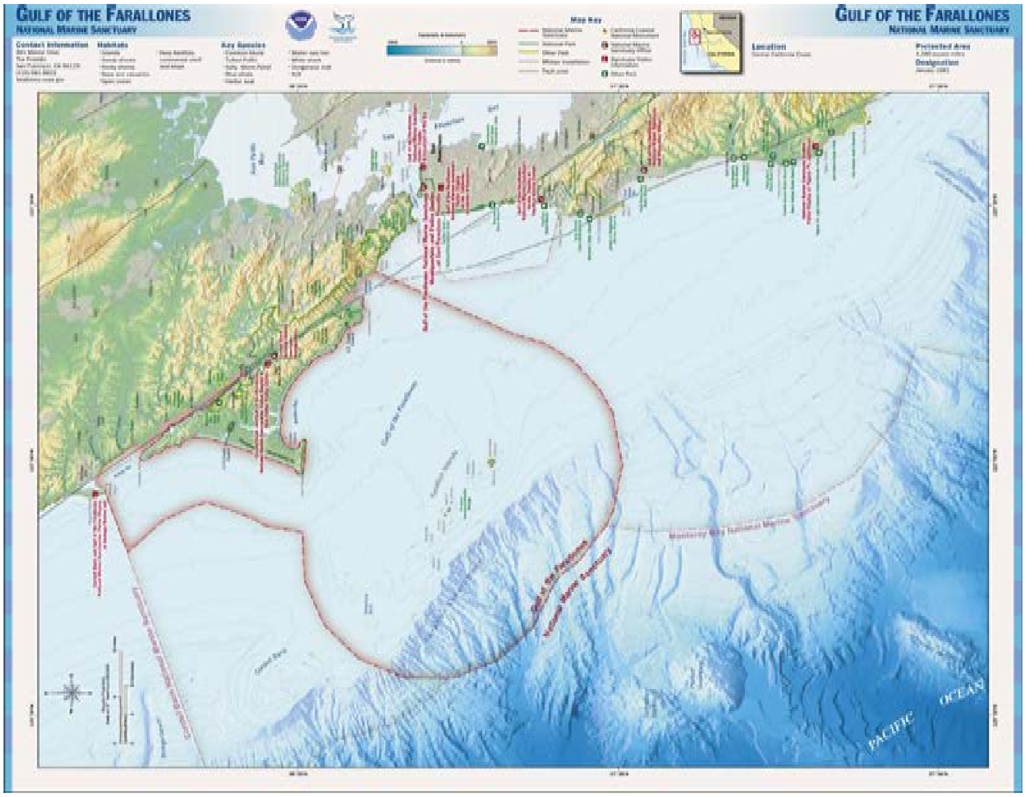

Figure 4: Detailed Chart of the Southern end of proposed fishing area

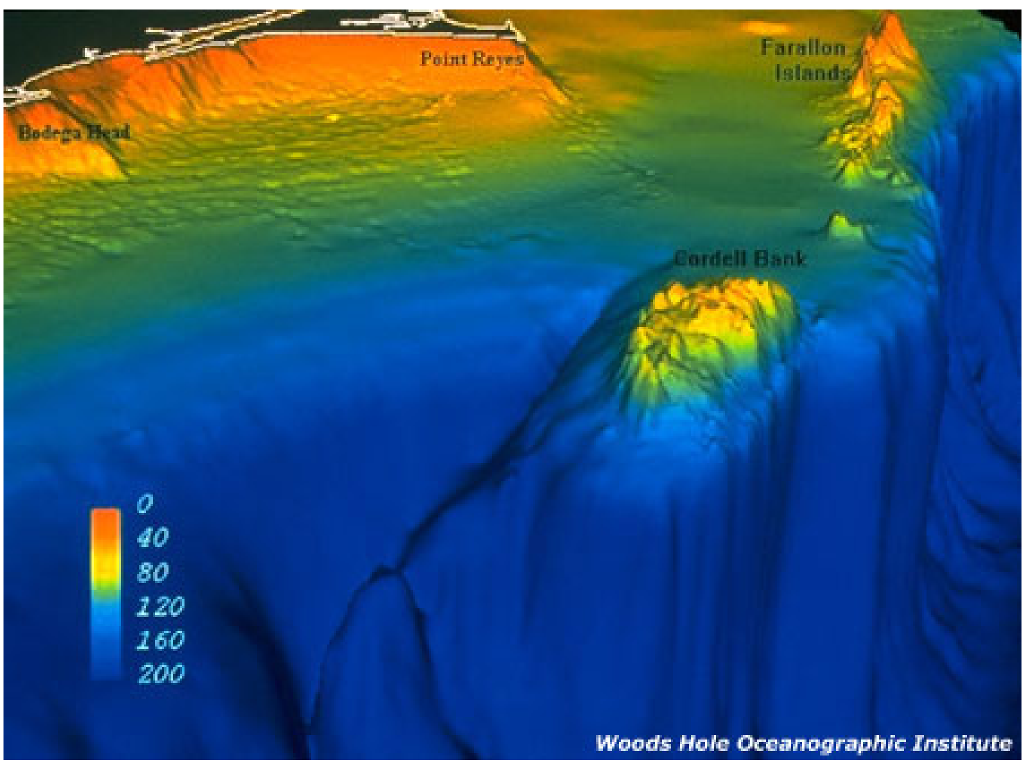

Figure 5: Depth of proposed fishing area

Description of the Gear to be Used

Specifications

- A vessel will fish up to four lines.
- Each line will consist of all of the following:
    1. a tuna cord mainline
    2. a float at least 3.5 inches in diameter, above the top hook to keep the gear from contacting the bottom, as suggested by the GMT in 2009; a monofilament ganion with 25 to 50 hooks (shrimp flies) each for a total of no more than 100 hooks, spaced 1-3 feet apart
    3. a weight of no more than 15 lbs
    4. a breakaway (lower test line) that is a minimum of 30 feet (5 fathoms) located between the lowest hook and the weight
    5. When two or more lines are used they may be deployed with different lengths of breakaway line.
- Still to be determined: weight, , and strength of the breakaway line.

Storage and Deployment

- The mainline can be coiled in a basket, wound on the reel of a fishing pole, or spooled on the boat's gurdies.
- The hooks can be placed on a "pinning rail" (usually a long piece of rubber with slots for the hooks) followed by the breakaway and the weight.
- After the weight is thrown overboard followed by the breakaway, the hooks will peel off the pinning rail.
- The float will be attached above the hooks as the gear is deployed.
- Once the fisherman feels the weight hit bottom, he immediately pulls the line up so that it does not drag on the bottom and to avoid tangling in the rocks.

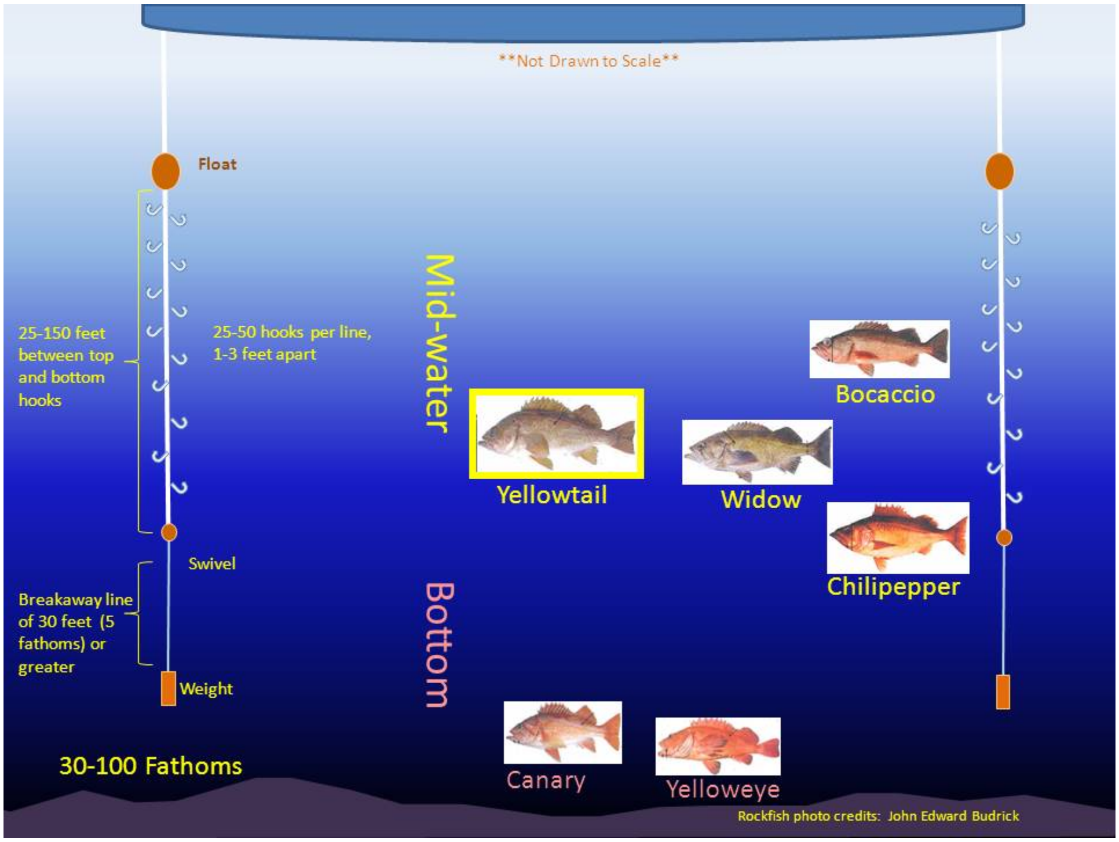

Figure 6. Conceptual drawing of the proposed gear

Effort

- *Trip length*:
  - Vessels out of Ft. Bragg and south – 4 to 5 days (2 day travel time, 2-3 fishing days);
  - Vessels out of Crescent City – 1 day
- *Drops per day*: TBD (depends on conditions), possibly 5 hours total drop time
- *Length of drop*: possibly 5 min to 30 minutes

Number of vessels covered under the EFP

A total of 4 vessels would participate in the study the first year (potential vessels: 2 out of San Francisco, 1 out of Ft. Bragg, 1 out of Crescent City). While the area is very large for 4 vessels to cover, we want the first year simply to explore whether the gear will be able to catch Yellowtail and successfully avoid overfished bottom-dwelling species. If successful and with PFMC approval, in the second year, the experiment could expand with more vessels to cover more area and locate additional suitable habitat (applicants are open to GMT/GAP feedback to determine an appropriate level of expansion if a specific proposal is necessary at this time or leaving it at 4 for both years). Applying for a second two-year EFP for the 2015-2016 cycle might be appropriate to discover more suitable habitat in a larger West Coast area and add more vessels.

Species to be Harvested (target and incidental)

Table 1 provides an overview of the species that will be caught under the EFP, their status, and estimated catch amounts.

Table 1. Overview of Target and Incidental Species Caught under the EFP

Species	Target or Incidental?	Overfished? Y/N	Depth Range	Requested Amount of EFP Harvest (mt)
Bocaccio *Sebastes paucispinis*	Incidental	Yes	0-1050 ft (0-175 fms)	3
Canary Rockfish *Sebastes pinniger*	Incidental	Yes	0-900 ft (0-150 fms)	1
Cowcod *Sebastes levis*	Incidental	Yes	132-1620ft (22-270fms)	0.015
Darkblotched Rockfish *Sebastes crameri*	Incidental	Yes	240-1200ft (40-200fms)	0.1
Widow Rockfish *Sebastes entomales*	Incidental	No	0-1050 ft (0-175 fms)	9
Yelloweye Rockfish *Sebastes ruberrimus*	Incidental	Yes	150-1200 ft (25-200 fms)	0.03
Lingcod N of 40.10°	Incidental	No		0.5
Lingcod S of 40.10°	Incidental	No		1.0
Sablefish N of 36°	Incidental	No		1
Chilipepper S of 40.10° *Sebastes goodei*	Incidental	No	0-1080 ft (0-180 fms)	10
Splitnose Rockfish S of 40.10°	Incidental	No		1.5
Yellowtail Rockfish *Sebastes flavidus* N. of 40.10°	Target	Yes		10
Minor Slope N of 40.10°	Incidental	Yes		1
Minor Slope S of 40.10°	Incidental	No		1
Minor Shelf N of 40.10°	Incidental	No		3
Minor Shelf S of 40.10° (includes Yellowtail rockfish)	Target	No		30
Black Rockfish S of 46.16°	Incidental	No		1
Pacific Whiting	Incidental	No		1
Spiny Dogfish	Incidental	No		1

a. Species Descriptions

Descriptions of the **species life histories** can be found in Appendix B2 of the Pacific Coast Groundfish Fishery Management Plan.
http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/NEPA-Documents/upload/FMP-Appendix-B2.pdf

Updated information on **species abundance** can be found in Chapter 3 of the Proposed Harvest Specifications and Management Measures for the 2011-2012 Pacific Coast Groundfish Fishery and Amendment 16-5 to the Pacific Coast Groundfish Fishery Management Plan to Update Existing Rebuilding Plans and Adopt a Rebuilding Plan for Petrale Sole; Final Environmental Impact Statement. http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/NEPA-Documents/upload/1112GF_SpexFEIS_100806-FINAL_feb21_.pdf

b. Estimated Harvest Amounts
Requested allocation is found in Table 1.. To assist in determining potential harvest amounts, provided for consideration is an estimated range of CPUE and potential catch composition. Appendix A includes CPUE estimates, which was derived in order to consider the landings likely needed to cover costs of fishing under this EFP.

No prior data exists from which to pull an exact catch composition estimate from this gear. However, some data may be informative and could possibly be considered as the best available proxies. A possible proxy may potentially be derived from the mix of species caught during the first two years of the Oregon Recreational Yellowtail Rockfish EFP. If considered appropriate and desirable to use, an attempt to analyze this data can be found in Appendix C. Under that EFP, the reported catch of 4.3 mt (as of Aug. 1, 2011) was composed of roughly 62% Yellowtail, 23% Widow, 12% Canary and 3% other rockfish and 4kg of Yelloweye (2 fish) (see Appendix B). Also, analysis of PacFIN data to look at block data from groundfish landings from relevant ports could be another potential source. However, limitations with this data include: the landings would encompass trawl and hook & line gear together, past landings data could reflect abundance issues (i.e., lower abundance because of overfished stocks), and concerns with the accuracy of block reporting. Landing data from 1992-1998 for all California Ports North of 37° were summed by DFG Block. The data show that most blocks within the proposed area have some yellowtail catch during the years prior to the RCA (See Appendix F).

Catch Accounting and Compliance

This EFP will incorporate a standardized data collection and reporting format. Under the terms of this EFP there will be 100% observer coverage. Fisheries Observers will collect data on fishing gear, location, catch, and disposition of catch.

Precautionary Measures

Given the potential to catch overfished species and by fishing in the RCA, the utmost caution will be taken with this experiment. The following measures are proposed and applicants are open to working with the PFMC, NMFS, and CDFG to implement others deemed necessary.

1. **Observers –** 100% observer coverage (a standard measure for EFPs, but worth noting here).
2. **Caps –** Based on input from the PFMC and NMFS, each boat will have either a ***daily*** or ***trip*** limit/cap of canary and yelloweye. If this cap is reached, based on catch accounting reports verified by the observer, fishing will cease for that day or trip.
3. **Trip reports and catch accounting –** On a timeline agreeable to NMFS and CDFG, trip and cumulative catch reports will be provided after each trip (e.g., within 48 hours).
4. **Status and evaluation call before each trip –** Before each vessel departs on a trip, a cumulative catch accounting report (i.e., running total for the season) and evaluation of the

trips taken thus far will be reviewed to determine if another trip can be made and to discuss lessons learned (e.g., float sizes, bait, etc.). If it is likely that the allocated harvest cap would be exceeded in the upcoming trip, then all fishing under the EFP will cease for the season. Participants on each call would include the EFP participants and could include NMFS (SF & OLE), CDFG (Marine Region & Enforcement) and National Marine Sanctuaries Service.

5. **VMS and Vessel Marking –** Before each trip a vessel will call the West Coast Groundfish Declaration Line to report the trip. (This procedure should work for both the EFP and for future use of this gear type). Vessels participating in this EFP will also display a banner with "EFP Fishing" written in 2 foot high letters.

Data Collection and Analysis Methodology

Data Collection

The following data will be collected by observer for all fishing under this EFP:

Gear Configuration

- Number of hooks and type
- Weight size
- Float size
- Breakaway line length
- Distance between hooks

Set and Haul Data:

- Position (GPS coordinates)
- Time
- Bottom Depth

Catch

- Species
- Disposition (landings and discards)
- Total weight
- Count
- Length
- Biological Sampling (if applicable)
- Species
- position on line (e.g., hook #)

Attachment of depth recorders may be used, as available.

If desired, incidental catch of certain species (e.g., canary and yelloweye) that cannot be released alive could be retained by the observer and provided to NMFS, CDFG, or other researchers for biological sampling.

Data Analysis

Catch per unit effort will be calculated based on hooks per hour fished. This will allow comparison between short and long drops and different gear configurations. The data will be reported on a trip by trip level. The catch data will be analyzed for CPUE of all species and each species individually.

We have received a grant to engage an undergraduate student to provide data analysis and to ensure statistically valid data. We have begun to make arrangements with Cal Poly for that student and his/her supervisor,

Participation

Choosing Participants

Vessels participating in this EFP will be chosen on their ability to accommodate an observer, which means having bunk space for overnight trips; a life raft for enough people and a coast guard decal and their willingness to maintain detailed catch data. Vessels will also be required to have VMS as required by the open access and limited entry groundfish regulations.

Planned EFP Fishing by Participants

Fishing will take place in appropriate habitats within the latitudes and fathom curves mentioned earlier. Finding these habitats is important to the success of the EFP. Weather conditions are critical for this type of fishing, which involves drifting (not too much wind or current), so times will be left to the discretion of the captains. It is likely that October will be the best time of year, but fishing would not be limited to October. The gear is as described earlier except that a vessel may choose to use less gear than authorized to check species composition prior to setting all gear.

Signatures

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Barbara Emley

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Dan Platt

Appendix A- CPUE Estimates

Catch per unit effort is calculated below using 1 hook per hour as a unit of effort. The assumed effort per day is 5 hours of actual fishing time (gear in the water). Therefore, total catch is calculated for various numbers of hooks and CPUE of either 1 fish (2kg) or 2 fish (4kg) per hook per hour five hours a day. These numbers are expanded for 30 and 45 fishing days (3 vessels) and 40 and 60 fishing days(4 vessels). The green highlighted fields represent the estimated catch required to meet expenses of $800/day.

Estimated effort for 3-6 vessels

One day of effort is approximately 5 hours of wet gear time

# of vessels	Days per vessel		Total Days	
	4 trips / vessel	6 trips / vessel	10 days/ vessel	15 days/ vessel
3	10	15	30	45
4	10	15	40	60
5	10	15	50	75
6	10	15	60	90

Assessment of estimated harvest for Year 1 of the EFP

Preferred Gear Configuration | $800 a day needed to cover expenses (Including Observer Coverage, Fuel, Bait, and Gear) | fish = all fish caught, not species specific | Amount that would cover expenses

Comparision of gear configuration by day and CPUE

			Possible CPUE Values in # of fish / hour		Possible CPUE Values in kg of fish / hour	
# of hooks/line (2 lines / boat)	Total # of hooks per boat	spacing between top hook and bottom hook (1-3 ft btwn hooks)	CPUE = 1 fish per hook per hour x 5 hours	CPUE = 2 fish per hook per hour x 5 hours	CPUE =l kg per hook per hour x 5 hours	CPUE = 2 kg per hook per hour x 5 hours
10	20	9-27ft	100	200	100	200
20	40	19-57ft	200	400	200	400
25	50	24-72ft	250	500	250	500
30	60	29-87ft	300	600	300	600
40	80	39-117ft	400	800	400	800
45	90	44-132ft	450	900	450	900
50	100	49-147ft	500	1000	500	1000
100	200	99-297ft	1000	2000	1000	2000

Conclusion: At least 50 hooks would be needed to meet expenses if CPUE was between 1 and 2 fish per hook per hour with 5 hours of wet gear time.

Comparision of number of hooks for 30 days of fishing

			Possible CPUE Values in # of fish / hour		Possible CPUE Values in kg of fish / hour	
# of hooks/line (2 lines / boat)	Total # of hooks per boat	total days	CPUE = 1 fish per hook per hour x 5 hours	CPUE = 2 fish per hook per hour x 5 hours	CPUE =l kg per hook per hour x 5 hours	CPUE = 2 kg per hook per hour x 5 hours
10	20	30	3000	6000	3000	6000
20	40	30	6000	12000	6000	12000
25	50	30	7500	15000	7500	15000
30	60	30	9000	18000	9000	18000
40	80	30	12000	24000	12000	24000
45	90	30	13500	27000	13500	27000
50	100	30	15000	30000	15000	30000
100	200	30	30000	60000	30000	60000

Conclusion: With 30 days of fishing, between 12 and 24 MT of fish would be harvested

Comparision of number of hooks for 45 days of fishing

			Possible CPUE Values in # of fish / hour		Possible CPUE Values in kg of fish / hour	
# of hooks/line (2 lines / boat)	Total # of hooks per boat	total days	CPUE = 1 fish per hook per hour x 5 hours	CPUE = 2 fish per hook per hour x 5 hours	CPUE =l kg per hook per hour x 5 hours	CPUE = 2 kg per hook per hour x 5 hours
10	20	45	4500	9000	4500	9000
20	40	45	9000	18000	9000	18000
25	50	45	11250	22500	11250	22500
30	60	45	13500	27000	13500	27000
40	80	45	18000	36000	18000	36000
45	90	45	20250	40500	20250	40500
50	100	45	22500	45000	22500	45000
100	200	45	45000	90000	45000	90000

Conclusion: With 45 days of fishing, between 18 and 36 MT of fish would be harvested

Comparision of number of hooks for 40 days of fishing

			Possible CPUE Values in # of fish / hour		Possible CPUE Values in kg of fish / hour	
# of hooks/line (2 lines / boat)	Total # of hooks per boat	total days	CPUE = 1 fish per hook per hour x 5 hours	CPUE = 2 fish per hook per hour x 5 hours	CPUE =l kg per hook per hour x 5 hours	CPUE = 2 kg per hook per hour x 5 hours
10	20	40	4000	8000	4000	8000
20	40	40	8000	16000	8000	16000
25	50	40	10000	20000	10000	20000
30	60	40	12000	24000	12000	24000
40	80	40	16000	32000	16000	32000
45	90	40	18000	36000	18000	36000
50	100	40	20000	40000	20000	40000
100	200	40	40000	80000	40000	80000

Conclusion: With 40 days of fishing, between 16 and 32 MT of fish would be harvested

Comparision of number of hooks for 60 days of fishing

			Possible CPUE Values in # of fish / hour		Possible CPUE Values in kg of fish / hour	
# of hooks/line (2 lines / boat)	Total # of hooks per boat	total days	CPUE = 1 fish per hook per hour x 5 hours	CPUE = 2 fish per hook per hour x 5 hours	CPUE =l kg per hook per hour x 5 hours	CPUE = 2 kg per hook per hour x 5 hours
10	20	60	6000	12000	6000	12000
20	40	60	12000	24000	12000	24000
25	50	60	15000	30000	15000	30000
30	60	60	18000	36000	18000	36000
40	80	60	24000	48000	24000	48000
45	90	60	27000	54000	27000	54000
50	100	60	30000	60000	30000	60000
100	200	60	60000	120000	60000	120000

Conclusion: With 60 days of fishing, between 24 and 48 MT of fish would be harvested

Appendix B- Oregon EFP Catch

In 2009, the Oregon Recreational Yellowtail Rockfish EFP, approved by the Council, was permitted by NMFS to the Southern Oregon Sport Fishermen and Recreational Fishing Alliance (Oregon Chapter) for fishing in 2010 and 2011. Although not identical, this OR EFP is based on the same concept (i.e., placing hooks near the target species in mid-water and away from non-targets on the bottom), and, therefore, offers interesting insights of relevance to this EFP application, particularly the catch composition and success at avoiding non-target species. Under this EFP, 29 trips were made with an average of 11 anglers and 33 hooks per vessel (3 per line) were deployed on average.

Oregon Recreational Yellowtail Rockfish EFP Catch

Year 1	kg	% of total	anglers	catch per angler day
Total	**2083**	**100**	**137**	**15.20437956**
Yellowtail	1657	79.54873	137	12.09489051
Widow	266	12.77004	137	1.941605839
Canary	129	6.192991	137	0.941605839
Yelloweye	0	0	137	0
Other (approx kg)	31	1.488238	137	0.226277372
Year 2	**kg**	**% of total**	**anglers**	**catch per angler day**
Total	**2283**	**100**	**169**	**13.50887574**
Yellowtail	1062	46.51774	169	6.284023669
Widow	722	31.62505	169	4.272189349
Canary	380	16.64477	169	2.24852071
Yelloweye	4	0.175208	169	0.023668639
Other (approx kg)	115	5.037232	169	0.680473373
Both	**kg**	**% of total**	**anglers**	**catch per angler day**
Total	**4366**	**100**	**306**	**14.26797386**
Yellowtail	2719	62.27668	306	8.885620915
Widow	988	22.62941	306	3.22875817
Canary	509	11.65827	306	1.663398693
Yelloweye	4	0.091617	306	0.013071895
Other (approx kg)	146	3.344022	306	0.477124183

Appendix C- Potential Harvest Estimates

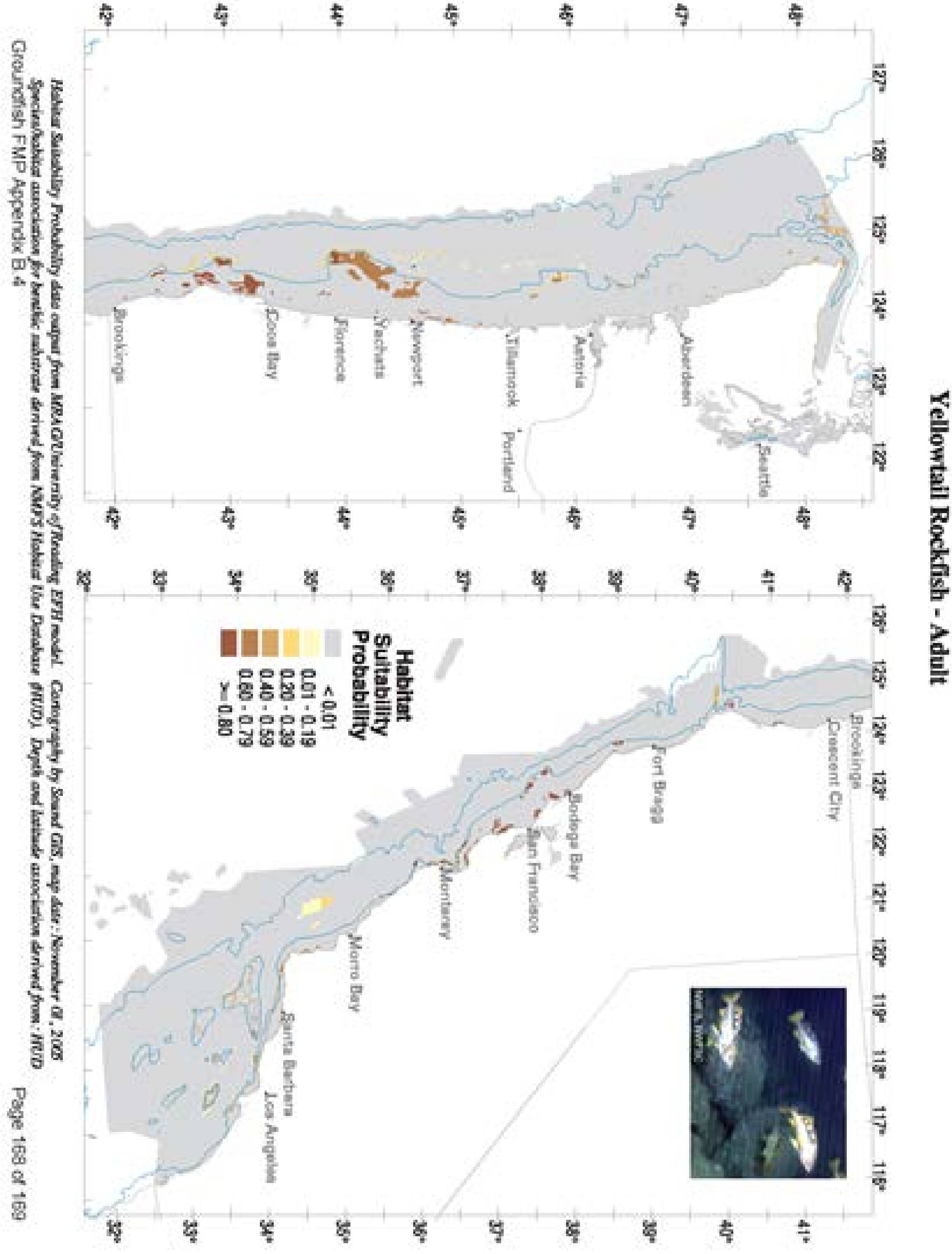
The estimates below are based on the catch composition from the Oregon Recreational Yellowtail Rockfish EFP (see Appendix B) and the estimated CPUE (see Appendix A).

Estimated Harvest		30 Days		45 Days		40 Days		60 Days	
Hooks	Species	CPUE = 1	CPUE = 2	CPUE = 1	CPUE = 2	CPUE = 1	CPUE = 2	CPUE = 1	CPUE = 2
50	Yellowtail	4670	9341	7006	14012	6227	12455	9340	18682
	Widow	1697	3394	2546	5092	2263	4525	3394	6788
	Canary	874	1748	1312	2623	1165	2331	1748	3496
	Yelloweye	7	13	10	21	9	17	14	26
	Other Rockfish	250	501	376	752	333	668	500	1002
80	Yellowtail	7473	14946	11209	22419	9964	19928	14946	29892
	Widow	2715	5431	4073	8146	3620	7241	5430	10862
	Canary	1398	2797	2098	4197	1864	3729	2796	5594
	Yelloweye	11	22	16	33	15	29	22	44
	Other Rockfish	401	802	601	1203	535	1069	802	1604
100	Yellowtail	9341	18683	14012	28024	12455	24911	18682	37366
	Widow	3394	6788	5092	10183	4525	9051	6788	13576
	Canary	1748	3497	2623	5246	2331	4663	3496	6994
	Yelloweye	13	27	21	41	17	36	26	54
	Other Rockfish	501	1003	752	1504	668	1337	1002	2006

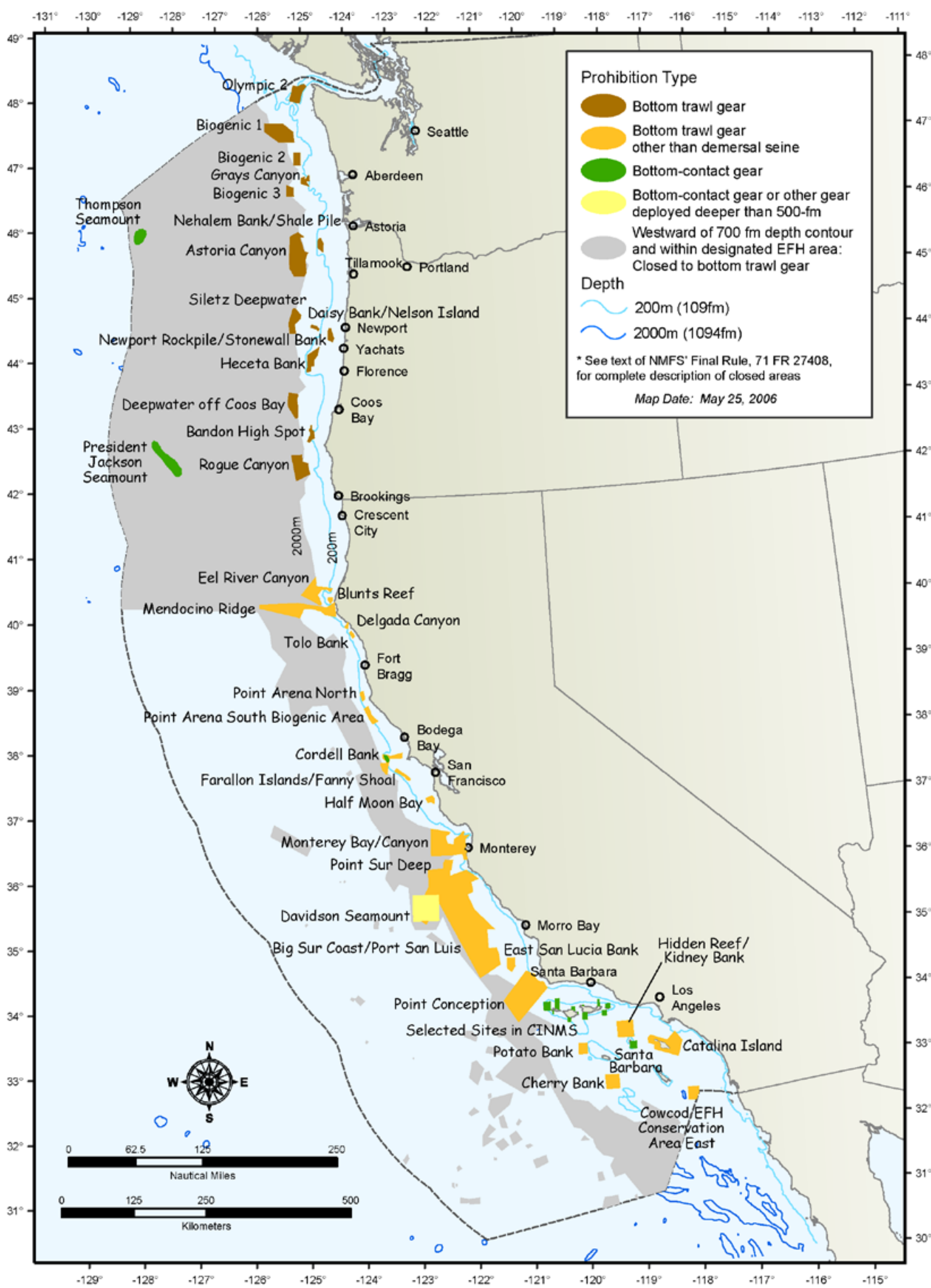
One day of effort is approximately 5 hours of wet gear time
All weights are in kg
CPUE = 1 (1 fish (2kg) per hook per hour five hours a day)
CPUE =2 (2 fish (4kg) per hook per hour five hours a day)

Appendix D- Adult Yellowtail Rockfish Habitat Suitability

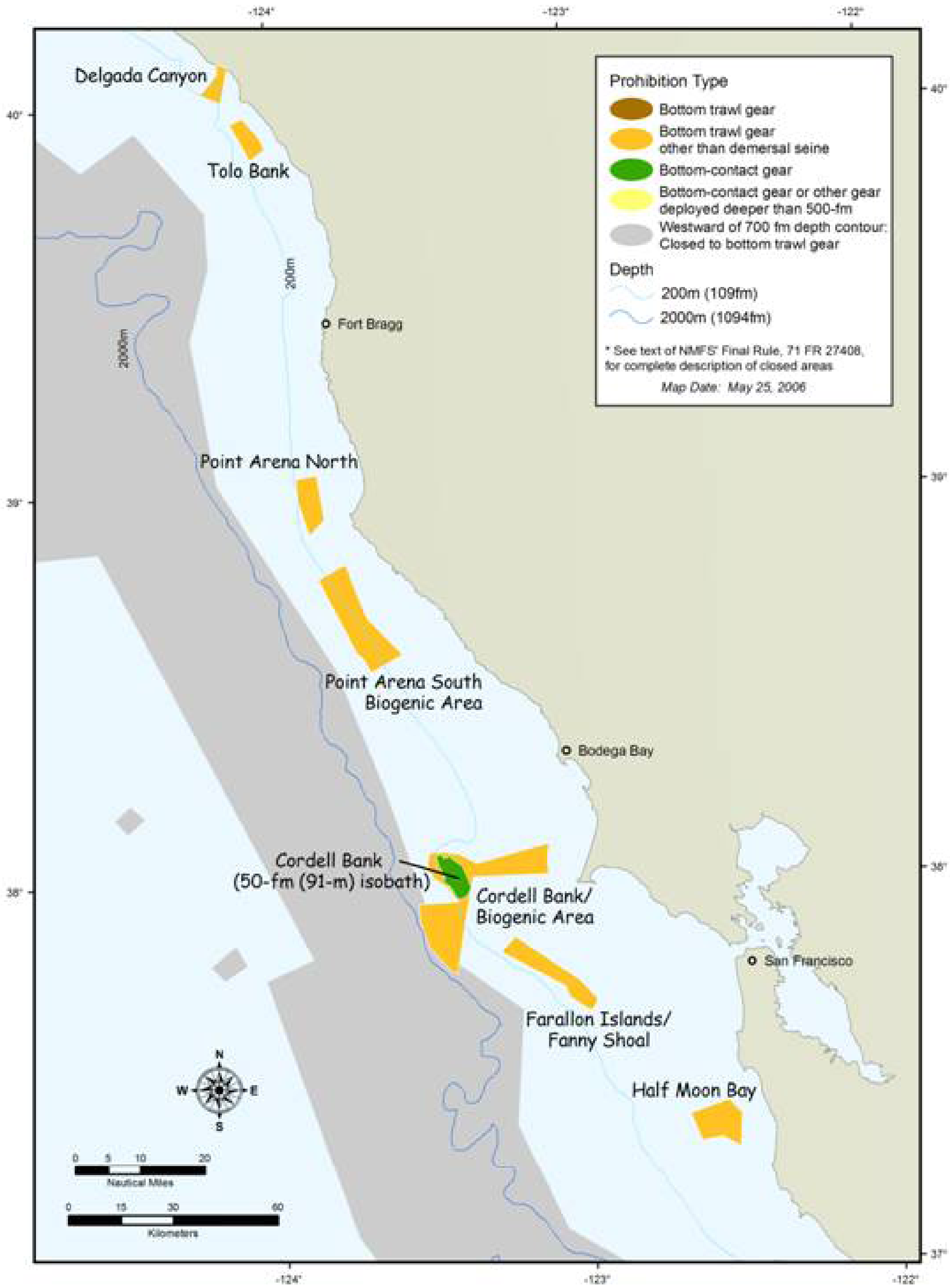
There is a high probability of suitable habitat for adult yellowtail rockfish within the proposed fishing area.



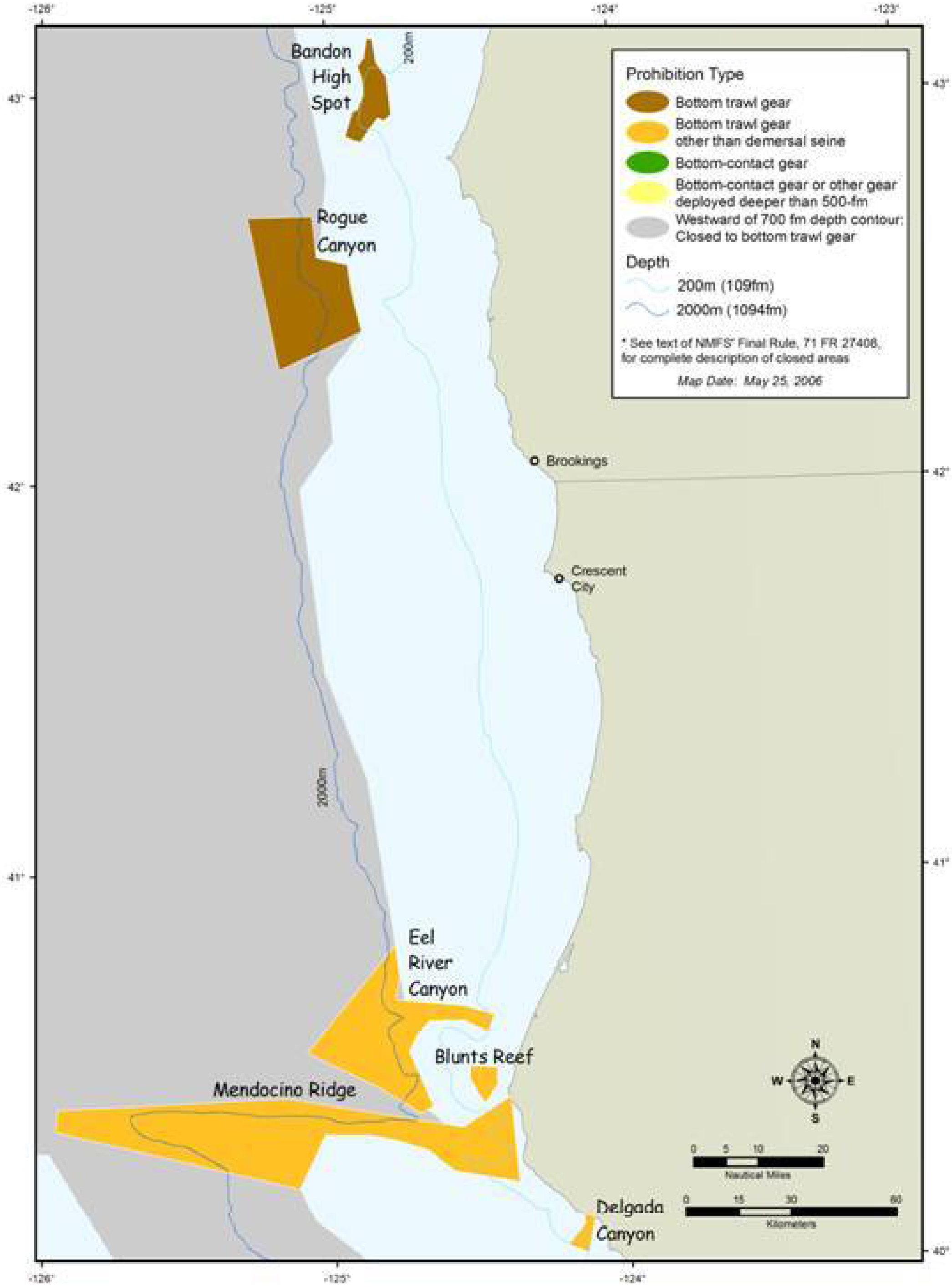
Appendix E- Essential Fish Habitat and Rockfish Conservation Areas



EFH area closures to protect Pacific Coast groundfish habitat - Coastwide.



EFH area closures to protect Pacific Coast groundfish habitat – Northern California.



EFH area closures to protect Pacific Coast groundfish habitat – Oregon and Northern California.

Appendix F- Yellowtail Rockfish Landings by DFG block for 1992-1998 all California Ports North of 37°

Pounds of Yellowtail Rockfish Landed By DFG Block from 1992-1998 for Ports within the propsed fishing area and with more than 1000 lbs per block.

Block Code	Total Pounds		Block Code	Total Pounds
102	3032		441	118333.6
108	3093.8		442	69438
109	2935		445	1066
114	2063		446	1008
205	1757		447	8990
208	2988		448	2522
211	5313.7		449	5467
213	1399		450	4141
217	1306		451	21376.8
218	131434.7		452	10018.4
222	11897		455	13947.9
223	12739		456	5615.7
224	2517		457	6927.55
228	84802		458	63786.23
229	14048		459	16027.3
233	5210		464	2347.4
234	3614		465	1477
243	7352		466	5025.7
249	2674.25		468	1180
253	2885		471	157773
257	13998		472	3184.9
262	1493.95		473	2350.74
263	2723		475	6618.6
268	1674.35		476	1251
274	11594		477	7118
402	1080		485	11097
403	2335		486	12307
415	1837.25		488	4564
422	8965.9		514	7705
425	5133		532	1247.35
431	6787.9		546	10037
432	2388.05		1035	1399
435	2396		1037	2253.75
436	1132		1038	845366.95
438	2211		1040	305230.45
439	2862		1041	435281.23
440	4017		1042	679553

Table 1. Summary of proposed electronic monitoring exempted fishing permit applications. Table continues on page 2.

EFP Applicant (Name, Attachment)	Maximized or Optimized Retention	Number of Vessels and Gear	Proposed Observer Coverage	Halibut Retention	Duration
Leipzig Fisherman's Marketing Assoc., Attachment 1	Maximized retention; bring all catch on board the vessel and retain that catch (including prohibited species) until offloading, with some discard exceptions (i.e., operational discard[1], halibut, 6 ft or larger organisms, debris).	6 trawl vessels; based out of one port or ports in close proximity	carry an observer only during the first two fishing trips	Length measurement then discarded at sea; mortality estimation: use vessel's past average halibut mortality rate, the fleet average mortality rate, or an estimate based upon tow duration, time on deck, and ambient air temperature	"…annual permit and to be continually renewed until comprehensive permanent regulations can be implemented."
California Risk Pool Attachment 2	**Maximized retention** for all (3) fixed gear vessels and 2 bottom trawl vessels; retain all IFQ and non-IFQ groundfish species with some discard exceptions (i.e., prohibited, ESA, marine mammals, and other protected species, halibut, Non-IFQ/non-groundfish species that can be clearly recognized as such and will not be confused with IFQ groundfish in EM video review (e.g. elasmobranchs or finfish not listed in groundfish FMP), trash, mud, wood, and other inorganic debris, crabs, starfish, coral, sponges and other invertebrates, and in situations where human life or safety is threatened). **Optimized retention** for 2 bottom trawl vessels; retain all IFQ and non-IFQ groundfish species with discard exceptions (i.e., allow discard of prohibited, ESA, marine mammals, and other protected species, halibut, Non-IFQ/non-groundfish species that can be clearly recognized as such and will not be confused with IFQ groundfish in EM video review, Dover sole, English sole, and arrowtooth flounder).	3 fixed gear hook and line; 4 bottom trawl	100% prior to issuance of EFP then 20% of all trips after EFP is issued.	All vessels measure fish on a length board in view of an EM camera, and then discard. For vessels using longline and pot gear, the mortality rate established by the NMFS Observer Program will be applied: 16% mort rate for longline, 18% mort rate for pot. For vessels that caught halibut after 2011 (excluding longline and pot gear vessels), calculate weight of halibut from length, and then apply a vessel-specific average halibut mortality rate from 2011-2014 using NMFS Observer Program data. For vessels without halibut catch history after 2011use fleet-wide 2011-2014 average halibut mortality rate. If no exemptions can be made for discard mortality estimates, this EFP can be conducted using 100% mortality rate for discarded halibut.	2015 – 2016 (2 yrs)

[1] For the purposes of this permit, any fish that pass through the webbing of the net while the net is being retrieved or any fish that cannot be completely removed from the net prior to the net being reset or at the termination of fishing, shall be considered operational discards and need not be estimated or recorded.

EFP Applicant (Name, Attachment)	Maximized or Optimized Retention	Number of Vessels and Gear	Proposed Observer Coverage	Halibut Retention	Duration
Mann/Paine, At-sea and Shoreside West Coast Whiting Fishery, Attachment 4	Maximized retention; retain all fish caught with some discard exceptions (i.e., operational discard[2], 6 ft or larger organisms, unavoidable discard beyond the control of the crew or captain).	16 from Midwater Trawlers Assoc. and 10 to 14 from United Catcher Boats, total up to 37 midwater trawlers targeting whiting	None	Retain all halibut according to current regulations; 100% mortality.	2015 – 2016 (2 yrs)
Eder et al. Fixed Gear, Attachment 3	Maximized retention; retain all IFQ and Non-IFQ groundfish and Non-groundfish finfish species with some discard exceptions (i.e., prohibited species, debris, deepwater crab, coral, starfish, grenadier, urchins, sponges and other invertebrates, predated fish).	4 vessels will participate in the first year, using pot gear, and two of these same vessels may also use longline gear.	not to exceed 30% of the trips	Applicants will continue to work with NMFS and others to finalize an acceptable option. Options include but are not limited to: a) A mortality estimate will be applied based on the individual's vessel's 2011-2013 average halibut mortality rate, as determined by the West Coast Groundfish Observer Program.(WCGOP). b) A mortality rate established by the WCGOP or the IPHC for the gear type will be applied. c) IPHC exemption to allow full retention. d) Captain and crew trained to provide actual mortality assessment on camera.	2015 – 2016 (2 yrs)

[2] No definition provided.

ENFORCEMENT CONSULTANTS REPORT ON FINAL EXEMPTED FISHING PERMIT (EFP) APPROVAL FOR 2015-2016

The Enforcement Consultants (EC) has reviewed the documents and attachments pertaining to Agenda Item F.5 and has the following comments.

Leipzig/Fisherman's Marketing Association, Attachment 1:
This maximized retention exempted fishing permit (EFP) proposal has been significantly modified since it was first presented to the Council at their April meeting, and appears to incorporate much of the guidance received by the Council at that time to include:

- Limiting the number of participants to six vessels.
- Giving 30 days' notice of participants' home port and fish companies to which the participants will deliver their catch.
- Inclusion of a discard trawl logbook for recording the discard of all halibut.
- A definition of operational discards and clarification for discarding Pacific halibut, large marine organisms, and debris.
- Carrying an observer on the first two trips made with electronic monitoring (EM) equipment.
- Vessel will provide continuous lighting for clarity in video.

The applicant does not intend to serve as an EFP sponsor.

The EFP proposal lacks the detail found in a number of other EFP proposals being considered by the Council, including:

- Accountability Mechanisms
    - Self-Regulating /Self-Governing Plan
    - Compliance and Penalty Structure
- EM Services/ EM Systems
    - Provider Not Identified
    - Reviewer Not Identified
    - Individual Vessel Monitoring Plans
    - EM Data Capture and Analysis
- Actual List of Participating Vessels
- Log Book
    - Not clear if the discard log will be used for all discards, not just halibut

Due to the lack of detail in this application and because the applicant does not intend to serve as the EFP sponsor, this EFP, in comparison to the other EFPs under consideration by the Council, represents the greatest amount of workload for National Marine Fisheries Service (NMFS) and its partners in terms of issuance, monitoring, and enforcement.

California Risk Pool, Attachment 2:
This EFP application is sponsored by the California Risk Pool which includes the Fort Bragg Groundfish Association, the Half Moon Bay Groundfish Marketing Association, and the Central

California Seafood Marketing Association. The EFP applicant seeks approval for up to seven vessels including both trawl and fixed gear. The fixed gear vessels will be operating under a maximized retention fishing regime, and the trawl vessels will be operating under a modified optimized retention plan, with discards of arrowtooth flounder, English sole, and Dover sole allowed.

Provisions for halibut accounting and discard and use of an electronic logbook are also detailed in the allocation summary. All elements of the application seem to be adequately described and addressed.

The EC especially appreciates the accountability mechanism described under Item 10, the proposed data collection explanations under Item 11, and the vessel selection process described under Item 12. We believe any EM EFP application could benefit from inclusion of this level of detail and suggest the Council may want to provide direction regarding inclusion of detail before considering EFPs for final approval at this meeting.

Eder et al. Fixed Gear, Attachment 3:
This application is for four fixed gear vessels using an EM maximized retention strategy. The EFP application has no sponsor, but rather presents a description of the three vessel owners and their vessels.

Like the California Risk Pool application, this application discusses in detail a number of important design elements including:

- EM Planning
- Individual Vessel Monitoring Plans
- Agreement by Applicants inclusive of a Self-Governing Plan
- Second Year Eligibility
- Logbooks
- Total Catch, Retention Requirements and Discards
- Halibut Accounting
- Delivery and Offload of Catch
- Catch Accounting of Species
- Compliance Requirements
- Data Retrieval and Analysis
- Final Reporting

The applicant is open to using observers in conjunction with EM, not to exceed 30 percent of the trips fished under the EM EFP.

As we found with the California Risk Pool application, we believe any EM EFP application could benefit from inclusion of this level of detail in their application and suggest the Council may want to provide direction in this regard before considering EFPs for final approval.

Mann/Paine, At-sea and Shoreside West Coast Whiting Fishery, Attachment 4:
This EFP application is sponsored by the Midwater Trawlers Association and the United Catcher Boats, for the purpose of using EM under a maximum retention scenario. The applicant has

indicated that all vessels belonging to the Mid-water Trawlers Cooperative (18) and all eligible vessels represented by United Catcher Boast (16) would be eligible to participate under this EFP, for a total of 34 vessels. They further estimate that, of these 34 vessels, 26 to 30 may participate, making this application the largest participant pool by far.

Although yet to be determined, the applicant indicates that an umbrella organization will manage one EFP listing the participating vessels. The application contains an in-depth discussion regarding EFP compliance, required data collection, and vessel monitoring plans. Although some specific consequences for violations of the EFP provisions are discussed, the EC believes more detail of specific behavior expectations and consequences for failure to meet the expectations would be beneficial.

In describing the EM system, the applicant indicates up to four cameras will be included in the system. The EC notes that this may not be adequate for some vessels and that the number of cameras and their placement should be determined through development of the Individual Vessel Monitoring Plan (IVMP). Unlike the other applications before the Council, there is no discussion of using observers during EM deployment as a means of conducting a blind comparison.

Unique to this application is the proposal to test two types of video review, both 100 percent review of the video, and an audit approach where the logbook is the self-reported data, with video review of reported discard events and a 10 percent random review of the video.

All in all, the application appears to be adequate for analysis, and generally provides the Council with a good overview proposal for consideration.

Conclusion:
In summary, the EC believes it is in the applicants' best interest to provide as much detail as they can pertaining to their EM proposals. We recognize that following the Council's final EFP approval decision, NMFS will continue working with the applicants to further develop the details contained within their applications.

PFMC
06/22/14

Agenda Item F.5.b
Supplemental GAP Report
June 2014

GROUNDFISH ADVISORY SUBPANEL REPORT ON FINAL EXEMPTED FISHING PERMIT (EFP) APPROVAL FOR 2015-2016

The Groundfish Advisory Subpanel (GAP) was briefed by Mr. Brett Wiedoff on four Exempted Fishing Permits (EFP) for electronic monitoring (EM), as well as an additional EFP for yellowtail rockfish jig fishing off California. The GAP supports final approval for all five EFPs. Specific comments and recommendations are provided below.

As we mentioned in our F.2 statement on the electronic monitoring regulatory process, and in previous statements on EM EFPs, the GAP believes EM is a major priority and could prove critical to the long-term success and durability of the groundfish trawl catch share program. To reiterate our previous statements, costs of participating in the individual fishing quota program are high and growing, access to target stocks remains low, and many trailing amendments that could reduce cost or increase profitability have yet to be implemented. Moving forward with EM EFPs could provide relief for a small subset of the fleet, and should provide valuable information for the EM regulatory process, which we believe will ultimately reduce some of the cost burden and provide additional operational flexibility.

The GAP discussed several overarching issues that pertain to all of the EM EFPs. The first was compliance monitoring and what level of coverage should be required in addition to EM. The GAP believes that there is a great deal of confusion around this topic. While some level of observer coverage will always be required for biological sampling purposes, that should be a National Marine Fisheries Service (NMFS) West Coast Groundfish Observers Program decision and should not be part of this discussion.

Generally speaking, the GAP believes that ongoing observer coverage for compliance monitoring purposes in addition to whatever level is needed for biological sampling will be detrimental to the utility and viability of the EFPs. It will add significant cost, and may serve to confuse the results. Further, it’s not clear what purpose additional observer coverage would serve. If there is going to be additional observer coverage for compliance monitoring, the GAP believes everyone would benefit from a much clearer explanation of the rationale.

Similarly the GAP does not support any arbitrary limits on the number of participants for each EFP. Reducing the number of participants potentially increases the costs to each participant (less people to spread costs over) and this is contrary to the objectives for moving forward with EM.

Concerns about shoreside catch monitors have also been raised and discussed. As we explained in our statement on F.2, we believe there are several different options that should be explored, including models that utilize community members who can become certified by NMFS to act as catch monitors.

NMFS has been clear that they believe the EFPs are an important tool to help inform the regulatory process for EM. The GAP agrees and believes that the EFPs should all move forward and be implemented as soon as possible.

Finally, the GAP believes the yellowtail rockfish EFP is promising and should also move forward.

PFMC
06/22/14

GMT Supplemental Report

Category	Leipzig	Cal. Risk Pool (Fixed Gear)	Cal. Risk Pool (Bottom Trawl)	Mann & Paine	Eder et. al.
Maximized retention or optimized?	Max	Max	Both	Max	Max
Observer coverage during EM [a]	2 trips	20%	20%	No [b]	< 30%
Risk of exceeding ACLs	Low	Low	Low	Low	Low
Individual accountability	Yes	Yes	Yes	Yes	Yes
Use chute/choke point for discards	only halibut, can be prescribed	Yes	Yes	yes, designated spot on deck	yes, choke point
Broad application (depth)	Shoreward and seaward of RCA	shoreward & seaward of RCA	shoreward & seaward of RCA	depends on concentration of whiting	seaward of the RCA
Broad application (latitude)	OR/WA	likely S of 40-10 only	likely S of 40-10 only	depends on concentration of whiting	Coastwide
Multiple strategies?	bottom trawl	longline and pot	bottom trawl, possibility of Scottish seine	shoreside and catcher vessel/mothership mid-water trawl	longline and pot
Possible to compare observer to electronic monitoring?	Yes (2 trips)	Yes	Yes	No, done in previous PFMC study	Yes
Possible to compare electronic monitoring and discard log?	Yes	Yes	Yes	Yes	Yes
Possible for direct halibut viability?	Yes, 2 trips in beginning	Yes	Yes	Yes, 100% mortality	Yes
Incentives for compliance, amongst the EFP participants?	if individual hinders use of cameras, permit gets revoked	collective contract (joint liability)	collective contract (joint liability)	individual violators will be removed from EFP	individual violators will be removed from EFP

GROUNDFISH MANAGEMENT TEAM REPORT ON REVIEW OF EXEMPTED FISHING PERMITS FOR 2015-2016 GROUNDFISH FISHERIES AND ELECTRONIC MONITORING

The Groundfish Management Team (GMT) reviewed the yellowtail rockfish exempted fishing permit (EFP) application for 2015-2016 that was forwarded for review at the November 2013 Council meeting and submitted for approval at this meeting. Additionally, the GMT reviewed the four electronic monitoring (EM) EFP applications that were forwarded for review at the April 2014 Council meeting. The GMT's review was based on the evaluation criteria in the Council Operating Procedure (COP) 19 on EFPs.

The GMT reviewed the EFPs based on their technical merits and points out that the Council will likely need to make their final decision on the San Francisco Community Fishing Association (SFCFA) EFP based partially on the availability of overfished species, relative to the 2015-2016 harvest specifications. At this meeting, the Council will be considering and adopting final preferred set aside amounts to be deducted from the annual catch limits (ACLs) or annual catch targets (ACTs) under Agenda Items F.7. The total set aside amount will include those reserved for EFPs under this agenda item. Table 1 summarizes the set asides by species and EFP requested by the applicants and the Council's preliminary preferred alternative set asides for 2015-2016 adopted in November for use in the analysis in the draft Environmental Impact Statement. The four EFP applications for the use of EM are not requesting set-asides; all EFP activities will occur under normal fishing activities, trip limits, individual fishing quota (IFQ) limits, etc.

COP 19 outlines several questions for the GMT to consider when reviewing EFP applications. A primary requirement of EFPs is the evaluation of fishing gear or management measures that can be transferred into regulation and eventually applied fleet-wide. EFPs that rely upon operator experience, skill, or abilities that cannot be harnessed through a regulation or readily replicated by other fishermen, fail to meet this requirement because the resulting bycatch rates may differ from those estimated in the EFP. In addition, the groundfish Fishery Management Plan (FMP) also states that the purpose for EFPs is "to promote increased utilization of underutilized species, realize the expansion potential of the domestic groundfish fishery, and increase the harvest efficiency of the fishery consistent with the Magnuson-Stevens Act and the management goals of the FMP."

Renewal EFP

Yellowtail rockfish jig fishing off California – San Francisco Community Fishing Association / Emley and Platt

This EFP (Agenda Item F.5.a., Attachment 5) is intended to test commercial jig gear that is configured to selectively target yellowtail rockfish in mid-water (30-100 fathom) areas of the rockfish conservation area (RCA) in northern California while avoiding harvest of overfished species. In November 2013, the Council preliminarily approved the set-asides for this EFP contained in Table 1 of the GMT Report (Agenda Item H.2.b. Supplemental GMT Report) with a reduction in the set-aside amount for canary rockfish to 1.0 mt and increase in the set-aside for yelloweye rockfish to 0.03 mt (Table 1). The GMT notes that the requested set-aside table included in the November 2013 application (Agenda Item H.2.a., Attachment 4, November 2013), had incorrect values most notably for chilipepper and yellowtail rockfish. Those values have been corrected in the current version. The table of requested set-asides (Table 1) in this report reflects the corrected values.

For 2013-2014, and again for 2015-2016, the applicants requested 1.0 mt of black rockfish to cover any catches that may occur while fishing in the shallower depths. The GMT noted that black rockfish are covered under a state issued deeper nearshore permit and cannot be landed without this permit. At that time it was uncertain whether all the participants in this EFP had the appropriate state permit necessary to land black rockfish (note: deeper nearshore species permits are issued to individuals, not vessels and are non-transferrable). As such, the GMT again recommends removing black rockfish from the list of species to be retained, as was done in the 2013-2014 terms and conditions of the EFP. It should also be noted that the take, retention, and landing of any nearshore species requires the appropriate state issued permit.

The GMT continues to see the value of the data that could be gathered from this EFP and based on its technical merits, supports Council approval for 2015-2016.

New Electronic Monitoring EFPs

Overarching Considerations

The GMT would like to note that typically EFPs are done to inform a regulatory process. It is difficult to consider rule development for the electronic monitoring program at the same time as the EFPs, and vice versa. The EFPs to test electronic monitoring could be used to explore and solve issues that are identified through the regulatory process. These EFPs may also provide unanticipated results that will help in refining and improving the regulatory framework for the EM program.

All four of the new EFP applications are requesting the use of electronic monitoring systems in place of human fisheries observers to test cost savings, catch accounting, safety factors, and compliance monitoring. None of these applications are requesting additional set-asides of overfished or non-overfished species to pursue their project. All catch will come from their normal individual fishing quota (IFQ) operations and quota pounds.

The GMT held a publicly noticed webinar on Tuesday, June 10 to discuss the overall electronic monitoring program and the electronic monitoring EFP applications. The GMT would like to thank the applicants that participated in the webinar for being available to answer questions, provide clarification, and feedback.

The GMT evaluated each of the applications in relation to the requirements of COP-19 and appreciates the clarifications by the applicants. Additionally, all of the applications appear to have addressed the issues that the Council brought up for them in April.

The GMT then focused discussions on some "bigger picture" questions about the electronic monitoring EFPs. Some of these questions/topics were covered in more detail in Agenda Item F.2.b, Supplemental GMT Report, and are summarized as:

- What question(s) need to be answered (i.e. compliance monitoring vs. catch accounting)?
- Will there be a broad application of results (e.g., by latitude and depth)
- What precision and accuracy of discard quantification and catch accounting is necessary?
- What sampling rates are necessary?
- What is the risk of exceeding annual catch limits (ACL)?

In thinking about those questions, the GMT, with help from the applicants, developed Table 2. Categories shown in the table provide an additional tool for comparing and considering the EFPs. Some clarification of table categories and responses follow.

- Maximized Retention: All EFPs plan to implement maximized retention for all vessels and all trips, with one exception. The California Risk Pool EFP intends to use maximized retention for all vessels and trips except for two trawl vessels, which will implement optimized retention (i.e., discard select groundfish species).
- Observer Coverage: The observer coverage rates proposed by the applicants are shown.
- Risk of Exceeding ACLs: Is there an increased risk of exceeding the ACL if these EFPs move forward? Because most are maximized retention, and only 2 vessels plan optimized retention for species that show low attainment rate (see Agenda Item F.2.b, Supplemental GMT Report), the GMT concluded the additional risk of exceeding ACLs is low from these EFPs
- Individual Accountability: Is the EFP designed to ensure individual accountability?
- Provide comparison with and without observers. The GMT is uncertain whether the applicants will be making that comparison. Regardless, the EFPs have been designed in a way that the data should be available, at least for later analysis.
- Use of Chute or Choke Point: Do the applicants plan to use either a chute for all discards, or a choke point (focal point) where all discards will be clearly seen and recorded by the camera?
- Broad Application (depth): What is the intended depth ranges for fishing by applicants, and is it broad enough to draw inference for the fleet?
- Broad Application (latitude): What is the intended latitudinal distribution by the applicant and is it broad enough to draw inference for the fleet?
- Multiple Strategies: Will multiple fishing strategies be implemented? For trawl, fishing gear and catch varies shoreward and seaward of the rockfish conservation area (RCA). Fixed gear EFPs intend to use pots and longline.
- Direct Comparison of EM and Observers: Will the design be such that direct comparisons can be made between EM and Observers (or EM with and without observers present)?
- Direct Comparison of EM and Logbook Discard Estimates: Will the design be such that direct comparisons can be made between EM and logbooks?
- Incentives for Compliance: Is the EFP designed to ensure or incentivize compliance with the specifications of the EFP?

The GMT do not consider whiting vessels not carrying observers under EFPs as a negative to what can be learned from EFPs. The shoreside whiting fishery operated without observers 2004-2010, and participated extensively with the Pacific States Marine Fisheries Commission (PSFMC) EM studies. In addition, whiting fisheries by design are much different than the other sectors, in that catch is dumped directly under the deck (unsorted) or the catch is transferred directly to the mothership without reaching the deck of the catcher vessel. Ultimately, the West Coast Observer Program (WCGOP) makes the determination of necessary observer coverage, not the GMT.

EFP Reports

The GMT recommends the Council consider reporting requirements by the EFPs, needed to track catch and manage the fisheries. The timing, frequency and content of the reports should be coordinated with the managing entity. The frequency of these reports could be quarterly, and some elements that should be included in the reports are: total landed pounds by species/complex and total discard estimates by species/complex.

Pacific Halibut and Individual Bycatch Quotas (IBQ)

The GMT recommends continued communication and coordination with the International Pacific Halibut Commission (IPHC) in regards to the discard mortality estimation of Pacific halibut. IPHC may be able to provide additional insight on what works and what doesn't, based on their experiences working with fisheries in British Columbia and Alaska. In their supplemental letter (Agenda Item F.3.b, Supplemental IPHC Report), IPHC expressed willingness to work with the applicants and Council on this process. The GMT suggests the Council not exclude any of the current halibut discard alternatives from consideration and analysis until IPHC has provided their input. This will hopefully prevent the situation where the only alternatives forwarded by the Council and analyzed are ones that IPHC does not see as viable.

The GMT reminds the Council of the Amendment 20 goals and objectives for Pacific halibut IBQ: *The trawl rationalization program is expected to provide individual fishery participants more flexibility and more individual accountability for their impact on overfished species, other groundfish species, and possibly Pacific halibut* (Groundfish FMP Amendment 20 Environmental Impact Statement). These EFPs, and the overall regulatory process, should achieve those same goals, unless the Council intends to treat halibut bycatch in the rationalized fishery differently

Applicability

The GMT discussed the importance of the applicability of results. In other words, how applicable are the results to the broader fishery? If the purpose of EFPs is to evaluate potential regulatory structure, as well as precision and accuracy of discard estimates and regulatory compliance, then EFPs should be conducted across a range of depths, latitudes, sectors, and fishing strategies. This will ensure that lessons learned may be applicable (or not applicable) for a broad range of vessel types and strategies. Although the breadth of coastal coverage or gear coverage may not be complete for each individual EFP, collectively, these EFPs extend across the entire coast, across most fishing depths, and include all gear types and strategies.

Therefore, the GMT sees merit in the EM EFPs and recommends they move forward with the request to work with NMFS and IPHC to further refine the methodology and details.

GMT Recommendations

1. **approve the SFCFA mid-water yellowtail rockfish EFP for 2015-2016, with the set-asides in Table 1**
2. **forward the four EM EFP applications**
    a. **requesting the applicants continue to work with NMFS to refine the projects prior to issuance of the EFP**
    b. **work with IPHC to develop and refine the methods for estimating Pacific halibut discard mortality prior to issuance of the EFP**
    c. **the Council consider inseason reporting requirements by the EFPs needed to track and manage the fisheries**

Table 1. Request EFP set-asides for 2015-2016.

	Species	SFCFA	Leipzig	CA Risk Pool	Mann/ Paine	Eder et al.	Total EFP Requests	PPA 2015-2016 set-asides a/
Overfished Species	Bocaccio	3	Covered with IFQ				3	6
	Canary	1					1	1
	Cowcod	0.015					0.015	0.015
	Darkblotched	0.1					0.1	0.2
	POP	-					0	0
	Yelloweye	0.030					0.030	0.03
	Petrale	-					0	0
Non-Overfished Species	Lingcod N of 42° N lat. (OR & WA)	0.5	Covered with IFQ b/				0.5	0
	Lingcod S of 42° N lat. (CA)	1					1	0.05
	Pacific Cod	1					1	0
	Sablefish N. of 36° N lat.	-					0	3
	Sablefish S. of 36° N lat.	-					0	0
	Dover Sole	-					0	0
	English Sole	-					0	0
	Arrowtooth Flounder	-					0	0
	Starry Flounder	-					0	0
	Other Flatfish	-					0	0
	Chilipepper S. of 40° 10' N lat.	10					10	200
	Splitnose S of 40° 10' N. lat.	1.5					1.5	1.5
	Widow	9					9	9
	Yellowtail N of 40° 10' N. lat.	10					10	0
	Shortspine Thornyhead N. of 34° 27' N. lat.	-					0	0
	Shortspine Thornyhead S. of 34° 27' N. lat.	-					0	0
	Longspine Thornyhead N. of 34° 27' N. lat.	-					0	0
	Longspine Thornyhead S. of 34° 27' N. lat.	-					0	0
	Minor Slope Rockfish N. of 40° 10' N. lat.	1					1	0
	Minor Slope Rockfish S. of 40° 10' N. lat.	1					1	1
	Minor Shelf Rockfish N. of 40° 10' N. lat.	3					3	0

	Minor Shelf Rockfish S. of 40° 10' N. lat. c/	30		30	1
	Black Rockfish N. of 46° 16' N. lat. (WA)	-		0	0
	Black Rockfish S. of 46° 16' N. lat. (OR & CA)	1		1	1
	Pacific Whiting	1		1	1
	Cabezon N. of 42° N. lat. (OR)	-		0	0
	Cabezon S. of 42° N. lat. (CA)	-		0	0
	Shortbelly	-		0	0
	California Scorpionfish	-		0	0
	Longnose Skate	-		0	0
	Other Fish d/	1		1	1

- = no impacts requested

a/ council approved values from November 2013

b/ all impacts will come from quota pounds of applicants, except for non-IFQ species

c/ includes yellowtail rockfish

d/ 1.0 mt put in as a place holder for spiny dogfish

Table 2. Additional categories for comparison or consideration of the EM EFP applications.

Category	Leipzig	Cal. Risk Pool (Fixed Gear)	Cal. Risk Pool (Bottom Trawl)	Mann & Paine	Eder et. al.
Maximized retention or optimized?	Max	Max	Both	Max	Max
Observer coverage during EM [a]	2 trips	20%	20%	No [b]	< 30%
Risk of exceeding ACLs	Low	Low	Low	Low	Low
Individual accountability	Yes	Yes	Yes	Yes	Yes
Use chute/choke point for discards	only halibut, can be prescribed	Yes	Yes	yes, designated spot on deck	yes, choke point
Broad application (depth)	Shoreward and seaward of RCA	shoreward & seaward of RCA	shoreward & seaward of RCA	depends on concentration of whiting	seaward of the RCA
Broad application (latitude)	OR/WA	likely S of 40-10 only	likely S of 40-10 only	depends on concentration of whiting	Coastwide
Multiple strategies?	bottom trawl	longline and pot	bottom trawl, possibility of Scottish seine	shoreside and catcher vessel/mothership mid-water trawl	longline and pot
Possible to compare observer to electronic monitoring?	Yes (2 trips)	Yes	Yes	No, done in previous PFMC study	Yes
Possible to compare electronic monitoring and discard log?	Yes	Yes	Yes	Yes	Yes
Possible for direct halibut viability?	Yes, 2 trips in beginning	Yes	Yes	Yes, 100% mortality	Yes
Incentives for compliance, amongst the EFP participants?	if individual hinders use of cameras, permit gets revoked	collective contract (joint liability)	collective contract (joint liability)	individual violators will be removed from EFP	individual violators will be removed from EFP

[a/] Provides more opportunity to compare observer vs EM directly (for discards). Note, if this were done, the applicant only pays for one (i.e., Observer). Data would be available for someone else to analyze and compare later

[b/] The whiting fishery dumps catch immediately under deck, operated under EM for a decade, and provided high participation with the PSMFC studies in 2012 and 2013.

PFMC
06/22/14

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INTERNATIONAL PACIFIC HALIBUT COMMISSION

ESTABLISHED BY A CONVENTION BETWEEN CANADA

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June 16, 2014

Ms. Dorothy M. Lowman, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

RE: Agenda Item F.5. Final Exempted Fishing Permit Approval for 2015-2016

Dear Chair Lowman:

The staff of International Pacific Halibut Commission (IPHC or Commission) has reviewed the submission of proposed electronic monitoring experimental fishing permit (EFP) applications. We have the following comments for your consideration.

1. For all of the proposals, any provision involving retention of halibut by non-hook gear requires permission from the IPHC. Authority to define legal gear for halibut retention rests solely with the Halibut Convention between Canada and the United States. As you know, the Commission has previously granted this permission as part of the EFP for the hake fishery, largely because of the small quantities involved.

2. The staff welcomes the initiative to integrate multiple tools (EM, observers, historical data) to estimate halibut mortality rates. We note that multiple methods to determine those rates are presented in the proposals, some with more detail and potential applicability than others. There is precedent for using assumed discard mortality rates (DMR), in some Alaskan fisheries. These DMRs are calculated annually from observer data and a three-year average used in bycatch management (see attached paper). However, the data are continually updated via annual observer coverage at 100% for most fisheries in the Bering Sea. This continuous and comprehensive data collection is a fundamental difference between the proposed EFP (to be based on combinations of EM, partial observer coverage, and past average DMRs), and procedures used for fisheries in the Bering Sea.

   The potential to use observer data and EM, in conjunction with characteristics of hauls and treatment of halibut on deck, holds some promise to streamline mortality accounting and estimation. However, a procedure using the mortality rates associated with various haul characteristics (tow duration, weight and species composition of the catch, sea and air temperature, etc.) and treatment of halibut (time on deck, handling procedures) needs to be based on an adequate data set of such observations, and the associated condition factors of the halibut, in order to estimate those rates. We do not have such a data set and available observations indicate that mortality rates are quite sensitive to these elements, particularly for some fisheries and gears. This variability underscores the need for a comprehensive data set with which to estimate average DMRs. We would welcome the opportunity to work with the proponents to begin the construction and potential use of such a data set. The Commission staff recognizes the Council's desire to move toward a new model for bycatch mortality estimation and we look forward to cooperating in this effort.

Sincerely,

Bruce M. Leaman, Ph.D.
Executive Director

cc: IPHC Commissioners

Recommendations for Pacific halibut discard mortality rates in the 2013-2015 groundfish fisheries off Alaska

Gregg H. Williams

Abstract

Analysis of 2009-2011 observer data on the release condition of halibut from trawl, longline, and pot vessels fishing groundfish off Alaska has resulted in new estimates of discard mortality rates for discarded halibut in each target fishery for those years. The new rates are similar to those determined in previous analyses. The rates were added to the accumulated time series, which serve as the basis for recommendations to the North Pacific Fishery Management Council and the National Marine Fisheries Service for assumed rates to be used in the in-season estimation of halibut bycatch mortality for the 2013-2015 groundfish fisheries off Alaska.

Introduction

Pacific halibut discard mortality rates (DMRs) in the Alaskan groundfish fisheries are estimated from viability (injury and condition) data collected by fishery observers. These data are analyzed each year by staff of the International Pacific Halibut Commission (IPHC). This paper reports on an analysis of viability data collected during the 2009-2011 Community Development Quota (CDQ) and non-CDQ groundfish fisheries off Alaska. The results from these three years are combined with previous years' data to form the basis for recommended DMRs to be used for in-season estimation and management of halibut bycatch mortality in the 2013-2015 CDQ and non-CDQ groundfish fisheries.

Data description and methods

The analysis followed the same approach that has been employed since 1996, which was originally described by Williams (1997). Observer haul data from the NMFS groundfish observer database formed the basis of the analysis. The data records included the catch of groundfish by species or species group, estimates of the number and weight (kg) of halibut, and the number and length of halibut assessed for release viability by category (excellent/poor/dead for trawl and pot gear; minor/moderate/severe/dead for longline gear). Records for all hauls sampled by observers in 2009-2011 were obtained; hauls not sampled for species composition were excluded.

The hauls were assigned to target fishery categories based on the species composition of the catch within the haul, relative to the overall total and retained catches (Table 1). For example, hauls were coded as midwater pollock if pollock comprised 95% or more of the summed total catch for the reporting week (Sunday-Saturday). Flatfish targets in the Bering Sea/Aleutians (BSA) were determined in a succession of comparisons of individual flatfish species compositions in the catch. The determination for the flatfish targets was based on the greatest percentage of the non-arrowtooth flounder catch. Table 1 shows the target codes and definitions used.

Fishery observers examined halibut for release condition or injury immediately before being returned to the sea. Each fish was judged according to a set of criteria (Williams and Chen 2004), which were used to determine the presence and extent of internal and external injuries and body damage from predators (e.g., amphipods and marine mammals). A dichotomous key, first introduced in 2000, was supplied to observers to reduce subjectivity in the determination of condition and injury. Observers recorded the number of halibut in excellent, poor, and dead condition (trawls and pots) or with minor, moderate, or severe injuries, or dead (longlines) on each haul or set sampled, respectively. Samples were only collected on hauls that were sampled for species composition. The species composition sampling provides an estimate of the total number of halibut caught in the haul, as well as the catch of groundfish necessary for determining the target. Observers were instructed to limit the number of fish examined to a maximum of 20, although this was occasionally exceeded by enthusiastic observers.

Next, the viability distribution for a target fishery was calculated. First, for each haul, the proportion of halibut in each category was extrapolated to the total number of halibut caught. The extrapolated numbers of halibut for each vessel by viability category were then summed within each region/gear/target strata.

The general model for calculating the DMR for halibut caught by gear g was of the form:

$$DMR_g = \sum_{i=1}^{4} \left(m_{i,g} \times P_i \right)$$

where ***m*** is the mortality rate for gear ***g***, and ***P*** is the proportion of halibut in condition ***i***, where 1 is excellent/minor, 2 is poor/moderate, 3 is dead (trawl or pot)/severe, and 4 is dead (longline).

There are several factors that contribute to release viability, which vary by gear type. With trawl-caught halibut, condition is related to the size of the catch, tow duration, and halibut size. For longline bycatch, injuries are most frequently caused by improper release methods used by vessel crews. Another significant factor is the length of the soak time, which can exacerbate the mortality caused by hooking injuries and also increase the potential for amphipod predation. The condition of halibut caught in pots is affected by soak time and the presence of other animals in the pot, especially crabs, whose spiny carapaces have been observed to scratch and abrade the skin of the captive halibut.

The mortality rate ***m*** varies among gear types and represents the aggregate effects of external and internal injuries to the fish and the presence of predation by amphipods or marine mammals. The mortality rates have been determined through long-term tagging studies conducted by IPHC. See Clark et al. (1992) for trawls, Williams (1997) for pots, and Kaimmer and Trumble (1998) for longlines. Estimated halibut mortality rates by gear and condition/injury were as follows:

Gear (*g*)	m_{exc}	m_{poor}	m_{dead}	
Trawl	0.20	0.55	0.90	
Pot	0.00	1.00	1.00	
	m_{minor}	$m_{moderate}$	m_{severe}	m_{dead}
Longline	0.035	0.363	0.662	1.00

Mean fishery DMRs and associated standard errors were estimated by assuming that each vessel acts as a separate sampling unit, so that a DMR was calculated for each individual vessel in a target fishery. The DMR for a target fishery was then estimated as the mean of vessel DMRs, where the vessel's proportion of the total number of bycaught halibut was used as a weighting factor, as follows:

Let DMR_v = observed DMR on vessel ***v***

p_v = proportion of total number of halibut caught on vessel ***v*** in a fishery

Then $$\overline{DMR} = \sum_{v=1}^{n}\left(p_v \times DMR_v\right)$$

Standard errors of the weighted mean DMR were estimated as:

$$V\left(\overline{DMR}\right) = \sum_{v=1}^{n}\left(p_v^2 \times V\left(DMR_v\right)\right)$$

and $$SE\left(\overline{DMR}\right) = \sqrt{V\left(\overline{DMR}\right)}$$

where $V\left(DMR_v\right)$ is the sample variance of all the $DMRs_v$, and $V\left(\overline{DMR}\right)$ and $SE\left(\overline{DMR}\right)$ are the variance and standard error of $\overline{DMR}$, respectively.

Results

Non-CDQ fisheries

A summary of observer coverage, sampling, and halibut size composition data is shown in Table 2. Coverage and sampling in the major targets produced a large number of sampled hauls, and a substantial number of halibut sampled. For example, observers sampled over 5,000 hauls and 4,200 halibut in the BSA midwater pollock fishery in 2009. Two flatfish targets, yellowfin and rock soles, often had some of the largest halibut sample sizes than any other target. Sample sizes were generally very high (>1,000 hauls and/or >1,000 halibut measured) in most BSA trawl fisheries. The longline fishery for cod was the only BSA longline fishery to receive significant sampling in 2009-2011. In past years, sampling has also occurred on rockfish and turbot vessels but only minimally, and 2009-2011 was no exception, as only turbot fishing had any sampling. Pot fishing was focused on cod, as in past years.

Most of the sampling in GOA trawl fisheries occurred in the cod, rockfish, and flatfish targets. The rockfish fishery tallied the largest number of observed tows; this probably reflects the higher observer coverage requirements of the Central Gulf Rockfish Program. Sampling of the cod and the two pollock fisheries occurred at similar levels (31-39 vessels; roughly 200-400 hauls). Sampling of flatfish fishing occurred in the shallow water flatfish, arrowtooth, and rex sole targets. Only minimal vessel effort was noted in the deepwater flatfish target, which in past years was primarily directed at Dover sole. The number of sampled longline and pot vessels targeting cod was similar to past years.

Sampling and fishery totals of release viability (condition or injury) data by region and fishery are summarized in Table 3. The sample totals represent the summed observations recorded by observers. In most cases, these raw data total less than those shown in Table 2, as the latter include some halibut which were not examined for condition/injury. The observations on each haul were extrapolated upwards to the total number of halibut caught on the haul, and then summed across vessel and target fishery strata. For most fisheries, the distribution of the extrapolated viability data is very similar to the raw data. The complete time series of fishery DMRs, expressed as percentages, is provided in Tables 4 and 5 for the BSA and GOA, respectively.

CDQ fisheries

In 2009-2011, CDQ fishing was conducted using pots, trawls, and longlines. The primary species targeted by trawl operations included pollock, and rock sole and yellowfin sole during 2010-2011. Pacific cod were targeted by longline, and sablefish by pots. Sampling levels and injury/viability data for CDQ operations are summarized in Table 6; the time series of mean annual DMRs is shown in Table 7.

Almost all halibut caught in the trawl operations were dead when examined. Typically this is caused by a larger haul size and/or longer haul duration.

Of the 13 DMRs calculated for the 2009-2011 CDQ trawl targets, all but two were either 0.89 or 0.90. These results are generally higher than what is seen in non-CDQ fishing for the same target, which suggests there are other variables which are negatively affecting the condition of the released halibut. For example, different catch processing or handling methods for CDQ hauls may contribute to poorer release viability.

Longline CDQ fishing consisted of 14-17 vessels targeting cod. In previous analyses, the distribution of release injuries to halibut in the CDQ longline cod fishery has been similar to that observed in the non-CDQ cod fishery. However, the results for 2010 were much higher than the non-CDQ results (0.18 in CDQ vs. 0.09 in non-CDQ).

The pot fishery targeted sablefish, with either two or three vessels observed. Very few halibut were examined by observers, but not many halibut were caught. The fishery DMR (0.50) was unchanged during 2009-2010, but dropped quite a bit (0.31) in 2011, more in line with the long term mean. Halibut mortality is positively correlated with longer pot soak time; long soaks increase the potential for amphipod predation of captured fish in the pot.

Recommendations for 2013-15

The North Pacific Fishery Management Council is using a plan in which the DMRs used to monitor halibut bycatch are an average of data from the most recent 10-year period. These 10-year mean DMRs for each fishery are used for a 3-year period, with the justification being two-fold: 1) interannual variability of fishery DMRs is relatively small, and 2) to provide stability for the industry to better plan their operations. The following table outlines the range of data used for the specific years of application:

10-Year Basis Period	Years of application
1990-1999	2001 - 2003
1993-2002	2004 – 2006
1996-2005	2007 - 2009
1999-2008	2010 - 2012
2002-2011	2013 - 2015

As shown, information from 2002-2011 is the basis for the DMR recommendations for 2013-2015. The 10-year mean DMRs for 2013-2015 are shown in Table 8. For some targets, a full ten years of data are not available, so the recommended DMR is based on as much data as is available from the 2002-2011 basis period.

For CDQ targets with no past observations or data, such as longline turbot, and pot cod, DMRs derived from non-CDQ fisheries data are recommended. For the 'other species' and any other target not explicitly noted here in the non-CDQ fisheries, the DMR for the cod fishery in that region/gear stratum is recommended.

References

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Table 1. Groundfish target definitions and target determination criteria for observer sampled hauls.

BSA		GOA	
Target	**Definition**	**Target**	**Definition**
A	Atka mackerel	A	Atka mackerel
B	Bottom pollock	B	Bottom pollock
C	Pacific cod	C	Pacific cod
F	Other flatfish	D	Deep water flatfish
K	Rockfish	H	Shallow water flatfish
L	Flathead sole	K	Rockfish
O	Other spp.	L	Flathead sole
P	Midwater pollock	O	Other spp.
R	Rock sole	P	Midwater pollock
S	Sablefish	S	Sablefish
T	Greenland turbot	W	Arrowtooth flounder
W	Arrowtooth flounder	X	Rex sole
Y	Yellowfin sole		

CDQ and Non-CDQ TARGET FISHERY DETERMINATION

Bering Sea/Aleutians

P if pollock ≥ 95% of total catch, or
W if arrowtooth flounder ≥ 65% of total catch.
Y/R/L/F if (rock sole + other flatfish + yellowfin sole + flathead) is the largest component of the retained catch using this rule:
Y if yellowfin sole is ≥ 70% of (rock sole + other flatfish + yellowfin sole + flathead sole), or
R if rock sole > other flatfish and rock sole > flathead sole, or
L if flathead sole > other flatfish and flathead sole > rock sole, or
F if none of the three conditions above are met.

Note: If target is not P, W, Y, R, L or F, then target is whichever species or species group (A, B, C, K, O, S, or T) forms the largest part of the total catch.

Gulf of Alaska

P if pollock ≥ 95% of total catch, or
W if arrowtooth flounder ≥ 65% of total catch.

Note: If target is not P or W, then target is whichever species or species group (A, B, C, D, H, K, L, O, S, or X) forms the largest part of the total catch.

Table 2. Summary information on fishery effort, observer sampling, and halibut bycatch size composition in non-CDQ fisheries.

2009						
Area/Gear /Target	**No. of vsls Sampled**	**No. of sampled hauls**	**No. of fish Measured**	**Mean length (cm)**	**Percent <65 cm**	**Percent < 82 cm**
BSA Longline						
Pacific cod	37	5723	9372	66.3	50	88
Turbot	2	40	2	77.5	0	50
BSA Pot						
Pacific cod	22	434	57	69.1	0	13
BSA Trawl						
Atka mackerel	7	1149	190	118.7	8	33
Bottom pollock	103	3901	12286	46.7	93	98
Pacific cod	57	2306	3711	54.4	77	93
Other flatfish	0	0	0	--	--	--
Rockfish	10	407	245	65.2	52	80
Flathead sole	12	1165	1883	58.6	71	92
Midwtr pollock	84	5576	4237	69.1	47	78
Rock sole	23	2510	14449	40.5	95	98
Sablefish	0	0	0	--	--	--
Turbot	6	618	149	97.4	11	48
Arrowtooth flndr	3	225	214	67.3	45	92
Yellowfin sole	28	4132	11050	45.4	87	95
GOA Longline						
Pacific cod	21	509	1395	66.9	48	88
GOA Pot						
Pacific cod	15	140	78	71.6	27	76
GOA Trawl						
Bottom pollock	33	289	178	59.5	73	97
Pacific cod	33	293	1582	53.6	84	99
Dp wtr flatfish	0	0	0	--	--	--
Shall wtr flatfish	26	380	1677	54.7	75	93
Rockfish	41	1259	587	73.3	33	75
Flathead sole	11	86	254	54.2	77	94
Midwtr pollock	32	189	9	67.3	22	100
Sablefish	11	76	44	86.8	7	39
Arrowtooth flndr	16	94	281	61.1	70	90
Rex sole	8	352	1088	58.1	72	96

Table 2. (cont'd)

2010						
Area/Gear /Target	**No. of vsls Sampled**	**No. of sampled hauls**	**No. of fish Measured**	**Mean length (cm)**	**Percent <65 cm**	**Percent < 82 cm**
BSA Longline						
Pacific cod	35	5019	8737	66.7	51	90
Turbot	5	202	17	81.1	17	88
BSA Pot						
Pacific cod	34	571	453	67.2	38	95
BSA Trawl						
Atka mackerel	7	1209	172	99.1	23	51
Bottom pollock	73	1805	3301	54.2	84	96
Pacific cod	45	1042	3640	48.2	91	98
Other flatfish	1	18	187	54.9	82	95
Rockfish	9	428	365	70.1	49	75
Flathead sole	12	1137	1611	63.0	62	88
Midwtr pollock	85	6344	4231	64.4	58	85
Rock sole	19	4091	15310	45.9	90	98
Sablefish	0	0	0	--	0	0
Turbot	6	792	270	106.0	14	31
Arrowtooth flndr	1	32	11	81.3	9	55
Yellowfin sole	26	5089	7905	54.8	79	95
GOA Longline						
Pacific cod	19	781	2048	70.3	31	85
GOA Pot						
Pacific cod	10	143	215	78.9	5	68
GOA Trawl						
Bottom pollock	35	266	547	61.2	66	91
Pacific cod	37	421	1940	54.8	84	97
Dp wtr flatfish	1	13	29	51.9	83	100
Shall wtr flatfish	18	251	901	54.9	77	94
Rockfish	43	1194	751	71.7	30	78
Flathead sole	14	182	431	64.6	57	82
Midwtr pollock	31	202	49	62.8	65	94
Sablefish	9	47	27	69.7	26	89
Arrowtooth flndr	1	5	19	63.0	58	74
Rex sole	8	357	1744	60.5	66	95

Table 2. (cont'd)

2011						
Area/Gear /Target	**No. of vsls Sampled**	**No. of sampled hauls**	**No. of fish Measured**	**Mean length (cm)**	**Percent <65 cm**	**Percent < 82 cm**
BSA Longline						
Pacific cod	31	6094	11536	64.5	56	91
Turbot	7	212	21	71.3	38	81
BSA Pot						
Pacific cod	32	768	1087	64.6	49	97
BSA Trawl						
Atka mackerel	7	1045	521	74.0	39	72
Bottom pollock	101	4241	5881	50.8	85	97
Pacific cod	44	1373	4320	49.5	90	98
Other flatfish	0	0	0	--	--	--
Rockfish	15	646	465	71.7	48	78
Flathead sole	10	599	1009	65.8	55	84
Midwtr pollock	98	11555	5115	58.8	69	92
Rock sole	20	2681	8422	43.1	89	97
Sablefish	0	0	0	--	--	--
Turbot	9	435	245	90.7	17	45
Arrowtooth flndr	5	215	379	67.0	36	92
Yellowfin sole	29	6279	6608	58.3	70	92
GOA Longline						
Pacific cod	16	941	2379	69.5	37	84
GOA Pot						
Pacific cod	16	386	1343	76.0	6	80
GOA Trawl						
Bottom pollock	31	260	563	63.0	59	89
Pacific cod	40	518	2751	60.0	69	97
Dp wtr flatfish	2	19	5	55.8	100	100
Shall wtr flatfish	8	59	257	60.0	65	94
Rockfish	39	1126	825	72.0	34	73
Flathead sole	15	147	309	59.0	76	90
Midwtr pollock	39	328	5	76.2	40	80
Sablefish	12	65	42	74.8	31	74
Arrowtooth flndr	14	208	268	66.3	53	87
Rex sole	6	255	1008	61.7	64	95

Table 3. Distribution of halibut viability/injury data by target fishery.

2009								
	Sample totals			Projected fishery totals				
Target	**Exc**	**Poor**	**Dead**	**Exc**	**Poor**	**Dead**	**DMR**	**SE**
BSA Trawl								
Atka mackerel	0	0	15	0	0	1035	**0.900**	0.0000
Bottom pollock	29	54	10924	3229	2859	206254	**0.881**	0.0108
Pacific cod	252	166	986	8363	4724	39002	**0.764**	0.0134
Other flatfish	0	0	0	0	0	0	--	--
Rockfish	16	16	103	284	599	5333	**0.826**	0.0107
Flathead sole	77	62	249	1646	1539	5858	**0.753**	0.0317
Midwtr pollock	28	40	4078	844	113	17307	**0.842**	0.0183
Rock sole	48	280	4873	1839	12810	291328	**0.881**	0.0180
Arrowtooth flounder	0	0	0	0	0	0	--	--
Yellowfin sole	86	129	3991	2132	4345	314938	**0.874**	0.0131
BSA Pot								
Pacific cod	51	4	2	161	15	6	**0.113**	0.1283
GOA Trawl								
Bottom pollock	34	30	49	3493	679	1997	**0.574**	0.0690
Pacific cod	334	186	560	14418	6779	25036	**0.621**	0.0465
Shall wtr flatfish	226	310	462	5539	10740	17238	**0.635**	0.0478
Rockfish	93	88	138	1732	598	4101	**0.670**	0.0419
Flathead sole	20	4	10	529	121	319	**0.452**	0.0100
Midwtr pollock	0	0	0	0	0	0	--	--
Arrowtooth fldr	37	49	153	2785	2680	11634	**0.690**	0.0559
Rex sole	32	67	399	876	1680	21925	**0.841**	0.0396
GOA Pot								
Pacific cod	55	16	7	178	72	30	**0.306**	0.1552

	Sample totals				Projected fishery totals					
Target	**Minor**	**Mod**	**Severe**	**Dead**	**Minor**	**Mod**	**Severe**	**Dead**	**DMR**	**SE**
BSA Longline										
Pacific cod	8319	705	111	124	243517	20620	3353	3992	**0.084**	0.0181
Turbot	1	0	1	0	0	29	0	29	**0.349**	--
GOA Longline										
Pacific cod	1230	94	15	56	53024	4597	727	2634	**0.103**	0.0397

Table 3. (cont'd)

2010								
	Sample totals			Projected fishery totals				
Target	**Exc**	**Poor**	**Dead**	**Exc**	**Poor**	**Dead**	**DMR**	**SE**
BSA Trawl								
Atka mackerel	0	1	19	0	83	971	**0.871**	0.0265
Bottom pollock	45	78	2376	2220	2945	31493	**0.776**	0.0058
Pacific cod	540	507	1377	16693	16084	34176	**0.626**	0.0069
Other flatfish	0	0	0	0	0	0	--	--
Rockfish	1	0	3	103	0	366	**0.667**	0.0057
Flathead sole	3	18	173	49	568	4282	**0.822**	0.0010
Midwtr pollock	7	13	3772	487	117	17254	**0.867**	0.0030
Rock sole	49	135	5045	2048	5543	228545	**0.878**	0.0035
Arrowtooth flounder	0	0	0	0	0	0	--	--
Yellowfin sole	188	226	2083	5831	6276	94215	**0.847**	0.0062
BSA Pot								
Pacific cod	384	48	10	1158	113	36	**0.119**	0.0536
GOA Trawl								
Bottom pollock	137	130	140	4814	6285	4457	**0.535**	0.0188
Pacific cod	226	282	705	4852	7487	20411	**0.695**	0.0089
Shall wtr flatfish	193	194	254	7136	6925	9676	**0.555**	0.0377
Rockfish	51	90	79	850	1605	2527	**0.662**	0.0065
Flathead sole	30	68	137	754	1414	6284	**0.731**	0.0490
Midwtr pollock	0	0	0	0	0	0	--	--
Arrowtooth fldr	0	0	10	0	0	585	**0.900**	0.0000
Rex sole	49	23	378	1155	1001	22087	**0.803**	0.273
GOA Pot								
Pacific cod	194	9	9	704	39	54	**0.130**	0.0618

	Sample totals				Projected fishery totals					
Target	**Minor**	**Mod**	**Severe**	**Dead**	**Minor**	**Mod**	**Severe**	**Dead**	**DMR**	**SE**
BSA Longline										
Pacific cod	6753	736	99	186	219512	17264	2270	6453	**0.089**	0.0097
Turbot	16	1	0	0	376	17	0	0	**0.062**	0.0000
GOA Longline										
Pacific cod	1823	157	13	55	51683	5121	223	2152	**0.093**	0.0157

Table 3. (cont'd)

2011								
	Sample totals			Projected fishery totals				
Target	Exc	Poor	Dead	Exc	Poor	Dead	DMR	SE
BSA Trawl								
Atka mackerel	12	6	19	514	258	1455	**0.667**	0.0420
Bottom pollock	70	68	4501	3762	4233	95067	**0.848**	0.0087
Pacific cod	560	1062	1502	13653	24350	29397	**0.646**	0.0354
Other flatfish	0	0	0	0	0	0	---	---
Rockfish	14	15	60	381	206	3305	**0.874**	0.0120
Flathead sole	21	16	32	357	349	821	**0.551**	0.0142
Midwtr pollock	13	32	4297	819	1533	26690	**0.860**	0.0137
Rock sole	74	39	650	2281	1718	51253	**0.840**	0.0315
Arrowtooth fldr	0	0	0	0	0	0	---	---
Yellowfin sole	119	94	967	3871	4379	57537	**0.785**	0.0373
BSA Pot								
Pacific cod	997	37	50	3326	134	158	**0.128**	0.1670
GOA Trawl								
Bottom pollock	115	75	156	3753	3814	6399	**0.566**	0.0396
Pacific cod	416	371	382	19808	13203	16978	**0.515**	0.0324
Shall wtr flatfish	77	81	65	2486	1443	2856	**0.524**	0.0954
Rockfish	64	152	121	1547	4913	4220	**0.629**	0.0514
Flathead sole	33	31	195	713	724	5790	**0.691**	0.0913
Midwtr pollock	0	0	0	0	0	0	--	--
Sablefish	22	5	4	143	49	22	**0.370**	0.0086
Arrowtooth fldr	3	8	15	105	209	623	**0.807**	0.0152
Rex sole	35	102	257	1428	3243	10483	**0.818**	0.0205
GOA Pot								
Pacific cod	1015	84	104	3063	357	210	**0.103**	0.0721

	Sample totals				Projected fishery totals					
Target	Minor	Mod	Severe	Dead	Minor	Mod	Severe	Dead	DMR	SE
BSA Longline										
Pacific cod	9285	849	121	250	291669	23754	3877	10531	**0.089**	0.0259
Turbot	19	1	1	0	690	92	44	0	**0.090**	0.0087
GOA Longline										
Pacific cod	2010	205	31	53	62782	4753	682	1604	**0.082**	0.0324

Table 4. Summary of halibut discard mortality rates (DMRs), expressed as percentages, in the non-CDQ Bering Sea/Aleutian (BSA) groundfish fisheries during 1990-2011.

Gear/Target	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11
BSA Trawl																						
Atka mackerel	66	77	71	69	73	73	83	85	77	81	77	73	85	67	63	67	64	89	90	90	87	67
Bottom pollock	68	74	78	78	80	73	79	72	80	74	67	74	78	65	73	79	74	69	79	88	78	85
Pacific cod	68	64	69	67	64	71	70	67	66	69	69	69	69	67	70	81	77	78	61	76	63	65
Other Flatfish	80	75	76	69	61	68	67	71	78	63	76	81	77	79	80	65	82	-	41	-	-	-
Rockfish	65	67	69	69	75	68	72	71	56	81	89	85	73	84	68	79	90	87	73	83	67	87
Flathead sole	-	-	-	-	67	62	66	57	70	79	74	69	60	69	70	83	75	80	79	75	82	55
Midwtr pollock	85	82	85	85	80	79	83	87	86	87	88	89	90	89	88	90	90	90	85	84	87	86
Rock sole	64	79	78	76	76	73	74	77	79	81	75	77	83	82	85	84	83	83	86	88	88	84
Sablefish	46	66	-	26	20	-	-	-	-	90	60	-	-	-	-	-	-	-	-	-	-	-
Turbot	69	55	-	-	58	75	70	75	86	70	74	68	75	67	31	82	-	-	-	-	-	-
Arrowtooth fldr	-	-	-	-	-	-	-	-	-	-	-	-	-	67	67	90	-	-	78	-	-	-
Yellowfin sole	83	88	83	80	81	77	76	80	82	78	77	74	77	81	86	85	87	77	87	87	85	79
BSA Pot																						
Pacific cod	12	4	12	4	10	10	7	4	13	9	13	6	5	6	7	3	8	15	4	11	12	13
BSA Longline																						
Pacific cod	19	23	21	17	15	14	12	11	11	12	12	12	10	8	10	8	10	9	8	8	9	9
Rockfish	17	55	-	6	23	-	20	4	52	-	12	10	4	-	-	-	-	-	-	-	-	-
Sablefish	14	32	14	13	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbot	15	30	11	10	14	9	15	22	18	17	14	6	23	7	4	6	8	-	17	35	6	9

Table 5. Summary of halibut discard mortality rates (DMRs), expressed as percentages, in the Gulf of Alaska (GOA) groundfish fisheries during 1990-2011.

Gear/Target	‘90	‘91	‘92	‘93	‘94	‘95	‘96	‘97	‘98	‘99	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11
GOA Trawl																						
Atka mackerel	67	89	81	67	53	-	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottom pollock	51	62	66	57	48	66	79	66	55	55	52	58	55	47	73	45	70	69	70	57	54	57
Pacific cod	60	62	66	59	53	64	70	62	64	54	57	67	59	69	63	66	56	61	63	62	70	52
Deep wtr flats	61	58	70	59	60	56	71	61	51	51	62	49	48	31	49	-	-	-	-	-	-	-
Shall wtr flats	66	71	69	65	62	70	71	71	67	81	67	62	66	80	71	77	70	71	66	64	56	52
Rockfish	65	75	79	75	58	71	65	63	68	74	71	61	64	65	73	66	48	77	75	67	66	63
Flathead sole	-	-	-	-	54	64	67	74	39	51	69	68	74	49	62	57	63	83	78	45	73	69
Midwtr pollock	71	82	72	63	61	51	81	70	80	86	80	89	90	34	88	62	66	87	-	-	-	-
Sablefish	70	60	68	59	67	58	80	61	-	68	38	66	62	-	79	-	89	52	-	-	-	-
Arrowtooth fldr	-	-	-	-	-	-	66	48	62	73	75	86	76	70	65	66	76	64	73	69	90	81
Rex sole	-	-	-	-	56	76	63	47	58	70	71	62	57	69	67	61	45	57	85	84	80	82
GOA Pot																						
Pacific cod	12	7	16	24	17	21	7	11	16	13	8	33	19	21	22	13	15	17	10	31	13	10
GOA Longline																						
Pacific cod	15	18	13	7	11	13	11	22	11	17	16	11	11	13	16	8	13	7	10	10	9	8
Rockfish	6	-	-	7	-	4	13	-	9	-	9	-	-	-	-	-	-	-	-	-	-	-
Sablefish	17	27	28	30	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6. Summary of vessel sampling and halibut viability/injury data from the Bering Sea/Aleutian Community Development Quota (CDQ) fisheries.

2009

Target	# of Vsls	# of Hauls	Sample totals				Projected fishery totals					
			Exc	Poor	Dead		Exc	Poor	Dead		DMR	SE
CDQ Trawl												
Atka m	3	195	0	0	0		0	0	0		**--**	--
B poll	16	116	8	4	249		763	454	3465		**0.738**	0.091
P cod	5	28	0	0	3		0	0	27		**0.900**	0.000
Rckfsh	3	41	0	0	0		0	0	0		**--**	--
M poll	14	897	0	0	955		0	0	4635		**0.900**	0.000
R sole	3	56	0	0	0		0	0	0		**--**	--
Turbot	2	114	0	0	31		0	0	417		**0.900**	0.000
YF sole	3	53	0	0	0		0	0	0		**--**	--
CDQ Pot												
Sable	3	95	15	8	6		46	26	20		**0.503**	0.3591
CDQ Longline			**Minor**	**Mod**	**Sev**	**Dead**	**Minor**	**Mod**	**Sev**	**Dead**	**DMR**	**SE**
P cod	17	2096	1740	154	43	32	46952	4818	1151	665	**0.080**	0.0348

2010

Target	# of Vsls	# of Hauls	Exc	Poor	Dead		Exc	Poor	Dead		DMR	SE
CDQ Trawl												
Atka m	2	181	0	0	0		0	0	0		**--**	--
B poll	14	98	0	0	162		0	0	1202		**0.900**	0.000
P cod	4	31	0	0	0		0	0	0		**--**	--
Rckfsh	3	49	0	0	0		0	0	0		**--**	--
M poll	12	806	1	0	474		1	0	1653		**0.894**	0.0304
R sole	4	122	0	0	4		0	0	158		**0.900**	0.0000
Turbot	3	15	0	0	0		0	0	0		**--**	--
YF sole	5	183	0	0	0		0	0	0		**--**	--
CDQ Pot												
Sable	3	145	29	8	8		93	26	25		**0.499**	0.1633
CDQ Longline			**Minor**	**Mod**	**Sev**	**Dead**	**Minor**	**Mod**	**Sev**	**Dead**	**DMR**	**SE**
P cod	16	2209	1731	170	19	35	40409	5094	306	950	**0.183**	0.0448

2011

Target	# of Vsls	# of Hauls	Exc	Poor	Dead		Exc	Poor	Dead		DMR	SE
CDQ Trawl												
Atka m	3	96	0	0	3		0	0	196		**0.900**	---
B poll	20	216	18	11	657		488	213	4824		**0.824**	0.0260
P cod	7	31	0	0	21		0	0	1290		**0.900**	0.0000
Rckfish	5	61	0	0	0		0	0	0		**---**	---
M poll	15	1138	1	0	1652		1	0	8052		**0.900**	0.0041
R sole	9	264	1	3	99		23	65	4136		**0.891**	0.0029
Turbot	4	14	0	0	0		0	0	0		**---**	---
YF sole	9	717	0	4	171		0	134	11248		**0.897**	0.0017
CDQ Pot												
Sable	2	99	60	8	14		171	17	37		**0.313**	0.3972
CDQ Longline			**Minor**	**Mod**	**Sev**	**Dead**	**Minor**	**Mod**	**Sev**	**Dead**	**DMR**	**SE**
P cod	14	1596	1524	210	32	41	40637	6967	1503	1145	**0.100**	0.0418

Table 7. Summary of halibut discard mortality rates (DMRs), expressed as percentages, in the Community Development Quota (CDQ) Bering Sea/Aleutian (BSA) groundfish fisheries during 1998-2011.

Gear/Target	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
CDQ Trawl														
Atka mackerel	-	82	89	80	90	86	87	89	80	79	90	-	-	90
Bottom pollock	90	88	90	90	66	-	84	90	88	83	90	74	90	82
Pac cod	-	-	-	-	-	-	-	-	-	-	90	90	-	90
Rockfish	-	88	-	90	-	-	-	-	69	82	89	-	-	-
Flathead sole	-	-	83	90	-	-	-	-	-	79	-	-	-	-
Midwtr pollock	90	90	88	89	89	90	90	90	90	90	89	90	89	90
Rock sole	-	-	-	-	-	-	-	-	86	89	86	-	90	89
Turbot	-	-	-	-	-	-	-	-	-	-	88	90	-	-
Yellowfin sole	-	83	-	-	81	89	88	88	73	87	89	-	-	90
CDQ Pot														
Sablefish	-	-	38	46	25	22	18	56	40	24	22	50	50	31
CDQ Longline														
Pacific cod	10	10	13	11	9	9	9	10	10	8	9	8	18	10
Turbot	-	-	4	-	-	-	-	-	-	-	-	-	-	-

Table 8. Recommended Pacific halibut discard mortality rates (DMRs), expressed as percentages, for 2013-2015 CDQ and non-CDQ groundfish fisheries off Alaska.

I. Non-CDQ

Bering Sea/Aleutians			Gulf of Alaska		
Gear/Target	**Used in 2010-2012**	**2013-2015 Recommendation**	**Gear/Target**	**Used in 2010-2012**	**2013-2015 Recommendation**
Trawl			***Trawl***		
Atka mack	76	77	Bottom poll	59	60
Bottom poll	73	77	Pacific cod	62	62
Pacific cod	71	71	Dpwtr flats	48	43
Other Flats	72	71	Shallwtr flats	71	67
Rockfish	81	79	Rockfish	67	66
Flathead sole	74	73	Flathead sole	65	65
Midwtr poll	89	88	Midwtr poll	76	71
Rock sole	82	85	Sablefish	65	71
Sablefish	75	75	Arr. fldr	72	73
Turbot	67	64	Rex sole	64	69
Arr. fldr	76	76			
YF sole	81	83			
Pot			***Pot***		
Pacific cod	8	8	Pacific cod	17	17
Longline			***Longline***		
Pacific cod	10	9	Pacific cod	12	11
Rockfish	9	4	Rockfish	9	9
Turbot	11	13			

II. Bering Sea/Aleutians CDQ

Gear/Target	Used in 2010-2012	2013-2015 Recommendation
Trawl		
Atka mackerel	85	86
Bottom pollock	85	83
Pacific cod	90	90
Rockfish	84	80
Flathead sole	84	79
Midwtr pollock	90	90
Rock sole	87	88
Turbot	88	89
Yellowfin sole	85	86
Pot		
Sablefish	32	34
Longline		
Pacific cod	10	10
Turbot	4	4

Agenda Item F.5.b
Supplemental SSC Report
June 2014

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON FINAL EXEMPTED FISHING PERMIT (EFP) APPROVAL FOR 2015–2016

Mr. Brett Wiedoff briefed the Scientific and Statistical Committee (SSC) on the revised exempted fishing permit (EFP) applications for electronic monitoring (EM) (Agenda Item F.5.a Attachments 1 – 4). The applicants were present to answer questions. The utility of the data obtained through these EFPs can be enhanced if there is consistency in data collection and reporting procedures. If the information is not collected and compiled in a consistent manner, it may result in a lost opportunity to compare results among EFPs and to compare results between EFP and non-EFP fleets. For example, economic data are valuable in evaluating cost effectiveness of EM. Collection of common data components, such as cost of equipment purchase, maintenance, and video review, should be considered by all EFP participants. The SSC encourages the EFP applicants, the Council staff, and National Marine Fisheries Service regional staff to collaborate on identifying common data components, standardizing reporting procedures, and planning for future data analyses.

The SSC found insufficient information to evaluate whether the level of observer coverage in the applications is adequate. Observer responsibilities include compliance monitoring and collecting scientific data and discard samples at sea. Since most of the EFPs are premised on maximized retention, the role of the observer on an EFP vessel will be different than on non-EFP vessels. It is not clear to the SSC how changes in observer coverage with EFPs might affect the quantity and quality of data needed for science, management, and compliance monitoring. The SSC requests that the observer program provide information regarding the data currently being collected, how they are used, and how they might be affected by reduced observer coverage.

PFMC
06/22/14

ALASKAN OBSERVERS

Agenda Item F.5.c
Supplemental Public Comment
June 2014

27 May 2014

Dorothy Lowman
Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Dear Dorothy,

As the Council continues to consider approval of the various Electronic Monitoring (EM) EFP's currently under consideration, we would like to point out a number of questions that need to be answered and impacts that need to be addressed before Observer Providers and the Observer and Monitoring programs are in a position to maintain required coverages on the West Coast in 2015.

1) What level of observer coverage will vessels participating in the various EM EFP's be required to take? Observer coverage in the EM EFP's is currently set at a level somewhere between zero and 100%. This leaves providers able to wonder but unable to plan, and we imagine it leaves the Agency in much the same place. Since each EFP might end up with different coverage requirements, the sooner the Council can get this question sorted out the better.

2) How many vessels will be permitted to participate in each EFP? At one time a limit of six boats per permit was being discussed, but that's apparently gone away. Again, not knowing how extensive participation may be makes any planning impossible.

3) It is remarkable that the EFP proposals fail to mention Catch Monitoring, since all deliveries made by EFP participants--whether or not a given trip is observed--will have to be monitored.

   The Catch Monitoring requirement could turn out to be particularly onerous in California. Fishing effort in California is light enough so that it has been a challenge to maintain the employment of observers who both ride boats and monitor offloads. If a number of vessels in Central and Southern CA are part of the EM EFP in that area and are subject to something less than 100% observer coverage, then the number of employed days available will be reduced from where it stands now. This will make it more difficult than ever to provide observer and monitor services in that area.

   Will the Council make EFP participants responsible for ensuring monitors are in place before offloads begin? Or will this responsibility rest with First Receivers?

4) In determining observer coverage levels for the various EFP's, the Council should consider that any coverage requirement of less than 100% will result in the loss of scientific data that the Agency needs in order to evaluate the effectiveness of EM. To gather this information from

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unobserved trips, the Observer Program will have to design an approach to gather this data during offloads. Catch Monitors, as they are currently trained, do not gather this kind of data. If additional personnel are required to gather the data, the Council will need to determine who will be responsible for ensuring they are present and how they will be paid for.

In the rush to put EM into place, it seems a number of important details have gone unaddressed. Taking for granted that providers will figure out how to handle whatever observing and monitoring needs arise from implementation of the various EM projects before the Council is a mistake—instead, the effects should be acknowledged and addressed as part of the EFP approval process.

Sincerely,

ALASKAN OBSERVERS, INC.

Michael Lake
President

FIXED GEAR SABLEFISH CATCH SHARE PROGRAM REVIEW, INCLUDING FEDERAL ELECTRONIC FISH TICKETS FOR OPEN ACCESS SABLEFISH DELIVERIES

The Council began a review of its sablefish permit stacking program at its September 2013 meeting. Phase I of the program review includes:

1) an assessment of the program as it has performed against its original objectives;
2) early consideration of two issues for action—
   a) rules for assessing permit control, and
   b) electronic fish tickets; and
3) identification of additional issues for potential action.

The Council is scheduled to approve the final program assessment document and final preferred alternatives for the two action items at this meeting. If, during the review, additional issues for action are identified, a second phase of the review may be conducted for the purpose of considering action on these issues. These other issues would be added to the omnibus action under F.9 and prioritized along with other groundfish items at the September 2014 Council meeting.

The first phase of this review process will produce two separate documents: a program assessment and a document that presents and analyzes impacts for the two action issues.

The first of these two documents is the program assessment document (Agenda Item F.6.a, Attachment 1). Based on guidance provided at the April Council meeting, additional information on the following topics was added to the review: development of the permit system; post-implementation changes in the groundfish management regime; permit and vessel length distributions; Northwest Fishery Science Center safety study; tier utilization; community dependence on fisheries; regional economic benefits; and net revenue estimates. A pre-briefing book draft was made available to the public on May 12 (http://www.pcouncil.org/2014/05/30362/pre-pub-rvw-draft-fgsps-0514/), which included everything except the sections on permit and vessel length and Section 3.3 "Prevent Excessive Concentration of Harvest Privileges," both of which are included in the final draft provided here.

The latter of these two documents (Agenda Item F.6.a, Attachment 2) is the Council decision analysis document, which is also the environmental analysis (EA) required under the National Environmental Policy Act and will fulfill the analytical requirements of the Magnuson-Stevens Act and other applicable law. On the issue of the rules for assessing the thee-permit control limit, the Council selected Alternative 2a as its preliminary preferred alternative, which provides a limited exception to the rule—for 20 percent vessel ownership. Additionally, since the April Council meeting, Council staff has identified two additional areas in which the Council may wish to add provisions to the alternative: rules for assessing individual and collective control (ownership pass through), and rules on coordinated ownership. Strawman suboptions for Council consideration have been added to the action alternatives. Further, NMFS has identified a different approach for addressing the purpose and need for the action on the control limit and has provided that approach as Agenda Item F.6.a, NMFS Report 2. On the electronic fish ticket issue, in April the Council did not select a preferred alternative but did remove suboptions that would have maintained paper fish tickets and removed some language that contained unnecessary implementation details. Additionally, NMFS has identified a number of implementing issues for Council consideration on this topic (Agenda Item F.6.b, NMFS Report 1).

In April of 2012, under its trawl trailing actions, the Council took final action on a decision to allow joint registration of trawl and fixed gear (longline and fishpot) permits to the same vessel at the same time. National Marine Fisheries Service (NMFS) is developing a Secretarial review and implementation package on this issue, which will be combined with the two action items being considered as part of this review. In June, after the Council takes final action on the fixed gear catch sharing program review and issues for action, a draft EA will be published and proposed regulations promulgated on all three issues. If NMFS identifies any questions regarding Council intent with respect to the joint registration issue (none have been identified as of the time of the advance briefing book), it may bring those questions to the Council under the omnibus considerations (Agenda Item F.3).

Council Action:

1. **Provide guidance on finalization of the Phase I review document, as appropriate, including recommendations, if any.**
2. **Select final preferred alternatives for the rules for assessing permit control and electronic fish ticket requirements.**
3. **Identify Phase II issues for inclusion in the omnibus process, if any (Agenda Item F.9).**

Reference Materials:

1. Agenda Item F.6.a, Attachment 1: Public Review Draft Pacific Coast Groundfish Limited Entry Fixed Gear Sablefish Permit Stacking (Catch Shares) Program Review.
2. Agenda Item F.6.a, Attachment 2: Action to the Fixed Gear Sablefish Fishery Managed under the Pacific Coast Groundfish Fishery Management Plan, Including Measures to: Implement electronic fish tickets for sablefish landings; and Modify the own/control limit – Council Decision Document and Draft Environmental Assessment and Regulatory Impact Review.
3. Agenda Item F.6.b, NMFS Report 1: Implementation Issues Associated with Electronic Fish Tickets.
4. Agenda Item F.6.b, NMFS Report 2: Addendum to the Own/Control Limits Measure: A NMFS-Proposed Alternative and Concerns Regarding the Existing Preliminary Preferred Alternative (PPA).

Agenda Order:

a. Agenda Item Overview — Jim Seger
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Approve Program Review Document, Adopt Phase I Final Preferred Alternatives on Own/Control Criteria and Electronic Fish Tickets; Scope Phase II Issues, as Necessary

PFMC
05/30/14

PUBLIC REVIEW DRAFT

PACIFIC COAST GROUNDFISH LIMITED ENTRY FIXED GEAR SABLEFISH PERMIT STACKING (CATCH SHARES) PROGRAM REVIEW

PACIFIC FISHERY MANAGEMENT COUNCIL
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AND

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JUNE 2014

DOCUMENT PREPARATION AND ACKNOWLEDGEMENTS

Preparation of this draft review of the limited entry fixed gear (LEFG) sablefish permit stacking program was performed by a work group composed of the following members:

Mr. Jim Seger and Dr. John Coon	Pacific Fishery Management Council
Dr. Edward Waters	Economics Consultant
Ms. Ariel Jacobs, Dr. Steve Freese, and Mr. Kevin Ford	National Marine Fisheries Service, West Coast Region

Additional assistance and consultation was provided by personnel of the National Marine Fisheries Service, Northwest Fisheries Science Center, especially Mr. John Bishop, Dr. Carl Lian, Ms. Alia Al-Humaidhi, and Ms. Lisa Pfeiffer.

A draft report of the Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number FNA10NMF4410014. This public review draft is not citable.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

ACL	Annual catch limit
AKFIN	Alaska Fisheries Information Network. Provides commercial fishery data for Alaska fisheries.
Council	Pacific Fishery Management Council
DTL	Daily trip limit
FMP	Fishery management plan
IFQ	Individual fishing quota
IQ	Individual quota
LAPP	Limited access privilege program
LE	Limited entry
LEFG	Limited entry fixed gear
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
OOB	Owner-on-board
PacFIN	Pacific Coast Fisheries Information Network. Provides commercial fishery data for Washington, Oregon, and California (maintained by the Pacific States Marine Fisheries Commission)
RCA	Rockfish Conservation Area
SSC	Scientific and Statistical Committee
USCG	United States Coast Guard
VMS	Vessel monitoring system

1.0 INTRODUCTION

This review document concerns implementation of Amendment 14 to the Pacific Coast Groundfish Fishery Management Plan (FMP). Amendment 14 (PFMC, 2001) was approved by the Pacific Fishery Management Council (Council) at its November 2000 meeting and partially implemented by National Marine Fisheries Service (NMFS) on August 2, 2001(Federal Register, 2001), in time to provide for a limited entry fixed gear (LEFG) sablefish season (longline and pot gear) from August 15 through October 31, 2001. The amendment, which covers the LEFG sablefish fishery north of 36° N. latitude, was fully implemented for the 2002 fishery. This amendment created a permit stacking program for permits with sablefish endorsements (i.e., the sablefish permit stacking program or simply the sablefish program). The program was expected to lengthen the duration of the LEFG primary sablefish fishery, increase safety and flexibility for fishery participants, and reduce capacity in the LEFG fleet.

1.1 Purpose and Need for a Program Review

The purpose of this document is to provide an overall review of the sablefish program to determine how well it has met the Council's stated objectives, and to help identify any potential modifications or improvements to the program which would then be considered through the Council's standard notice and review process. The goals and objectives of the program are based on, and are consistent with, the goals and objectives of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), which is the ultimate authority for regional council fishery management.

While the sablefish program seems to have been generally successful at achieving its main objectives, a few limited requests for program modifications have emerged in the more than 12 years that have elapsed since its implementation (see Section 1.2). During that time there have been several changes in the fishery and groundfish management. In consideration of the changes and time elapsed, the Council and NMFS have agreed upon the need to review the program with a more in-depth look to determine how well it has met its original objectives and how well it continues to serve Pacific Coast groundfish management and its stakeholders. In addition, the sablefish permit stacking program is of a type of fishery management program that was categorized in the 2006 reauthorization of the MSA as a limited access privilege program (LAPP). After 2006, any programs initiated as LAPPs had to meet certain requirements listed in Section 303A(c) of the MSA, including the need to be reviewed on a periodic basis. While it was initiated as a LAPP prior to the MSA requirements for new LAPPs, a periodic review of any program to determine how well it is working and achieving its original objectives is a prudent management process and is consistent with the requirements in §303A of the MSA.

1.2 Concurrent Considerations of the Sablefish Program

Separate from this review, the Council is currently considering two potential modifications to the regulations implementing the sablefish program: 1) liberalizing the own-and-hold threshold which currently specifies that no matter how small, any partial ownership of a permit or a vessel registered to a permit, results in those permits counting toward the individual's three-permit maximum control limit, and 2) requiring the use of electronic reporting to aid in the tracking of landings. A final Council decision on these two potential changes to the sablefish program is scheduled for the June 2014 Council meeting. Additionally, in trailing actions for the trawl individual fishing quotas (IFQ) program (trawl rationalization) the Council has previously approved a regulatory change to allow fixed gear and trawl permits to be jointly registered to the same vessel at the same time. NMFS is in the process of considering the Council's recommendation on joint registration and may incorporate that proposed action into the same regulatory package with the own-and-hold threshold and electronic reporting issues.

2.0 BACKGROUND

2.1 Pre-Permit Stacking Management History

Sablefish (*Anoplopoma fimbria*), also known as "black cod," is one of the most valuable species in the groundfish fishery off Washington, Oregon, and California. Because of its high exvessel value per pound, sablefish is a desirable target species for many West Coast fisheries and gear groups. Management of sablefish was, and continues to be, divided at 36° N. latitude (approximately 20 miles south of Point Sur, California) with separate annual catch limits (ACLs) for the northern and southern fisheries divided by this line. The ACLs in the north are substantially higher than those in the south (the northern ACL was three times that set for the southern area). The Council made several sablefish allocation decisions over the 15 years prior to implementation of Amendment 14 in an attempt to divide this desirable resource among different sectors of the fishery in an equitable and beneficial way.

Intersector Allocation and Seasonal Management. In 1987, an allocation of northern area sablefish was established that provided 52 percent to the trawl fishery and 48 percent to the non-trawl gear groups. This allocation was later adjusted to 58 percent and 42 percent for trawl and non-trawl, respectively. Industry representatives for participants in the non-trawl sablefish fisheries expressed their desire that the fishery be managed on a seasonal basis (as opposed to the year-round policy the Council pursued for most sectors of the groundfish fishery). The pursuit of seasonal management for the non-trawl segment of the sablefish fishery was a key decision that, when combined with a decline in sablefish abundance and increasing effort, ultimately impacted safety, efficiency, and allocation issues that the permit stacking program was meant to address.

License Limitation. The vast majority of the trawl and non-trawl sablefish harvest (as well as that of other groundfish species) was placed under a license limitation program through Amendment 6 to the groundfish FMP, recommended by the Council in 1991 (PFMC, 1992) and implemented in 1994. Of the non-tribal commercial optimum yield of sablefish, 90.6 percent was allocated to the limited entry (LE) fishery and 9.4 percent was allocated to the open access fishery. The LE sablefish allocation was then allocated 58 percent to the LE trawl sector and 42 percent to the LE non-trawl (fixed gear) sector. The license limitation system provided the underlying structure for the LEFG sablefish catch share program that was finally implemented in 2001 under Amendment 14. Under Amendment 6, the owners of vessels which met a July 11, 1984 through August 1, 1988 (qualifying period) minimum landing requirement were given LE permits endorsed for the gear that was used to meet the requirement and endorsed for the size of the vessel. Permits were provided for trawl, longline, and fishpot vessels which were allowed to qualify for more than one gear endorsement (but only one permit was issued for each vessel). Minimum landing requirements were set with the intent of establishing LE fleets that were the size of the active fleet in 1987. The requirement for a longline permit was 6 days of landings over 500 pounds or 37.5 metric tons of total landings in the qualifying period. The requirement for a fishpot permit was 5 days of landings over 500 pounds or 150 mt of total landings in the qualifying period. The 1987 “active fleet” objective was met for the longline and fishpot vessels. Vessels using all gear types other than trawl, longline, and fishpot were left in the open access groundfish fishery, and a small open access opportunity was also provided for fishpot and longline vessels that did not qualify for permits. The opportunity for use of longline and fishpot gear in the open access fishery was provided because landings less than 500 pounds were not counted toward the landing requirement.[1]

Deliberations on a Fixed Gear Sablefish IFQ Program. After the Council finished its 1991 deliberation on Amendment 6, recognizing that a license limitation program would only slow the growth in capacity, the Council moved immediately to consideration of an IFQ program for the fixed gear sablefish fishery. Work on this program continued from 1991 through 1994. In the fall of 1994, the Council set its deliberations aside in response to a request from the West Coast Congressional delegation to defer action until the MSA reauthorization was completed. In its 1996 re-authorization of the MSA, Congress included a moratorium on implementing new, individual quota (IQ) programs through October 1, 2000, bringing deliberations on a sablefish IFQ Program to a complete halt.

Subdivision and Management of the Fixed Gear Allocation and Derby Management. Until implementation of IFQs as part of the trawl rationalization program in 2011, the coastwide trawl

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[1] A similar opportunity was not provided for trawl vessels because the 500 pound minimum had no effect on the number of vessels qualifying.

fishery took sablefish as part of its year-round cumulative trip limit fisheries. During this same time, the northern area fixed gear fleet landed 85 percent of its allocation in a directed sablefish season, and 15 percent of its allocation in daily trip limit (DTL) sablefish fisheries. In the north, DTL regulations were in place before and after the directed sablefish season. The southern fixed gear fleet landed all of its allowed harvest in a DTL fishery. The directed season north of 36º N. latitude had become increasingly tense over the years as vessel capacity and competition for landings increased and amounts of fish available for harvest decreased. Through 1996, the directed (or “primary”) season was managed as an open competition derby in which vessels raced with each other to catch fish before the quota was gone and the fishery closed. Derby duration shortened each year, until the fishery was just five days long in 1996.

The Sablefish Endorsement and Equal Cumulative Limits. Concern for the safety of participants in the sablefish derby led the Council to develop Amendment 9 to the FMP (PFMC, 1996). NMFS implemented Amendment 9, the sablefish endorsement program, in 1997. Under this program, the LE permit holders were eligible for sablefish endorsements based on their permit history. A fixed gear sablefish endorsement was added to permits that had a history of landing more than 16,000 pounds of sablefish in any one year from 1984 to 1994. Permits without sufficient sablefish landings history were not endorsed for future participation in the primary season, but could still be used in the DTL fisheries. When this endorsement was adopted, it was recognized that it was only the first in a series of stop gap measures to control increasing capacity and deteriorating seasons in the fishery.

Even with the sablefish endorsement to prevent LE vessels from shifting into the sablefish fishery, the fishing season was expected to remain short. In order to lengthen the season, equal limits on the harvest of all qualified participants (sablefish endorsement holders) were imposed in 1997. However, the season still had to be limited to keep the fishery from being classified as an IQ program, prohibited under the MSA moratorium on such programs. A fishery with a limited class of participants, each with an amount of fish they are allowed to harvest, is an IQ. The moratorium was interpreted to cover any program that would allow a vessel ample time and opportunity to catch a limit allocated specifically to that vessel. The moratorium forced the Council to manage the primary season for a short duration that prevented many participants from fully taking their vessel-specific limits (a “modified derby”). To further assure that the cumulative limits would not be categorized as an IQ program, regulations were established to set a maximum season length of 10 days. After the modified derby, any of the primary fishery allocation remaining was taken in a two-week mop-up fishery in which each vessel had the same cumulative limit. Equal cumulative limits for the primary fishery were viewed by the Council as being extraordinarily reallocative in nature, but for 1997, equal limits were the only option available to lengthen the season and to begin to address safety issues.

Three Tiers of Cumulative Limits. The inequitable allocation system created by the equal cumulative limits was partially resolved with a “three-tier” system, which was established by regulatory amendment for 1998 and beyond. Under this “three-tier” system, the primary fishery continued to be managed by providing each vessel with a single cumulative limit; however, sablefish endorsement holders were ranked into three different tiers based on their permit histories, with the lowest tier (Tier 3) having the lowest qualification requirements and receiving the lowest cumulative limits. This system is described in greater detail in Section 2.3. Annual management of the three-tier cumulative limit system required that the allocation for this fishery be divided such that there were three different cumulative limits for the different tiers. While somewhat more equitable than the cumulative limit program, the three-tier system still required some fishermen to make large cutbacks in their harvest levels while allowing others to expand. The system provided little flexibility to operators to determine the manner in which their sablefish catch was harvested or to scale their harvest upward to match their pre-existing levels of capital investment. This lack of flexibility undoubtedly reduced efficiency, resulting in a lower net value for harvest.

Continuation of Short Seasons. Even under the three-tier system, the fishery still had to be managed as a modified derby, and the seasons were still too short (between 6-9 days) to allow fishermen to operate with care and safety. Short derby seasons are believed to result in accidents due to fatigue and financial pressure to fish and transit under unsafe conditions.

Fixed Gear Sablefish Catch Shares. The MSA moratorium on new IQ programs expired on October 1, 2000. On December 21, 2000, Public Law 106-553, an appropriations bill for the National Oceanic and Atmospheric Administration (NOAA), contained a continuation of the IQ moratorium through October 1, 2002 and an exception to that moratorium for the West Coast fixed gear sablefish fishery. On August 2, 2001, Amendment 14 implemented a permit stacking program, in which up to three sablefish-endorsed permits could be registered for use with a single vessel and that vessel could then have access to the primary season sablefish cumulative limits associated with each of those permits. Most importantly, the exception to the IQ moratorium for the fixed gear sablefish fishery allowed longer seasons (April through October, as implemented through Amendment 14) so that each vessel could fish against its limits at its own speed.

Phased Implementation of Catch Shares. Portions of Amendment 14 were implemented for the 2001 primary sablefish season. The extended sablefish season (April 1 through October 31) was fully implemented in 2002. In 2006, NMFS implemented additional regulations for Amendment 14. In the future, NMFS will consider implementing a permit stacking program fee system as required by the MSA (see Section 3.11). Table 2-1 recounts the implementation history.

Table 2-1. Implementation of Amendment 14.

Date	Action	Reference
08/02/2001	NMFS final rule implementing initial permit stacking provisions as follows: 1) up to 3 sablefish-endorsed permits per vessel; 2) limited entry, primary sablefish season of August 15 - October 31; 3) a vessel may fish for sablefish in the primary season with any of the gears specified on at least one of the limited entry sablefish-endorsed permits registered for use with that vessel; 4) no person may own or hold more than 3 sablefish-endorsed limited entry permits unless that person owned more than 3 permits as of November 1, 2000; 5) no partnership or corporation may own a sablefish-endorsed limited entry permit unless that partnership or corporation owned a permit as of November 1, 2000; 6) cumulative limits for species other than sablefish and for the sablefish daily trip limit (DTL) fishery remain per vessel limits and are not affected by permit stacking; and 7) the limited entry DTL fishery for sablefish is open during the primary season for vessels not participating in the primary season.	66 FR 41152, August 7, 2001
03/01/2002	As part of the final rule implementing the 2002 groundfish regulations, the primary limited entry sablefish season was extended to April 1 – October 31.	67 FR 10490, March 7, 2002
04/03/2006	Final rule including additional permit stacking regulations as follows: 1) permit owners and permit holders required to document their permit ownership interests to ensure that no person holds or has ownership interest in more than 3 permits; 2) owner-on-board requirement for permit owners who did not own sablefish-endorsed permits as of November 1, 2000; 3) an opportunity for permit owners to add a spouse as co-owner; 4) vessels not meeting minimum frozen sablefish historic landing requirements are not allowed to process sablefish at sea; 5) permit transferors required to certify sablefish landings during mid-season transfers; and 6) a definition of the term “base permit.”	71 FR 10614, March 2, 2006

2.2 Permit Stacking Program Goals and Objectives

The legal basis for Amendment 14 is the Groundfish FMP approved by the Secretary of Commerce under the authority provided by the MSA.

Permit stacking and its accompanying regulatory provisions were expected to help the Council address objectives related to National Standards 4 (fair and equitable allocation), 5 (consider efficiency), 6 (take into account variations and contingencies), 8 (take communities into account), 9 (minimize bycatch and bycatch mortality), and 10 (promote safety). Specifically, it was expected to affect achievement of Groundfish FMP Goals 2 (maximize the value of the resource as a whole) and 3 (achieve maximum biological yield) through impacts related to Objectives 6 (achieve greatest net benefit), 9 (reduce wastage), 11 (minimize bycatch), 12 (equitable sharing of the conservation burden), 13 (minimize gear conflicts), and 14 (accomplish changes with minimum disruption).

Key objectives of Amendment 14 and the permit stacking program were further defined as provided in Table 2-2.

The stacking program was intended to modify the economic and social impacts of the fishery management system in order to attain a more favorable result with respect to the entire suite of standards, goals, and objectives for management of the groundfish fishery.

Table 2-2. Key objectives of the permit stacking program and consistency with management objectives.

Key Objective	Consistency with Management Objectives of the FMP and MSA
1. Rationalize the fleet and promote efficiency	Capacity reduction is one of the key elements of the Council's strategic plan. The strategic plan generally approaches capacity reduction by reducing the number of fishing vessels. This reduction does not of itself imply the rationalization of the fleet or increased efficiency. It is possible that the most efficient fixed gear sablefish harvest could involve a greater number of vessels taking sablefish as bycatch in other fisheries. However, given the high degree of overcapitalization in the fishery, it is believed that a reduction in capacity will generally move the fishery toward greater efficiency, addressing National Standard (NS) 5 and FMP Objective 6 on net national benefits.
2. Maintain or direct benefits toward fishing communities	This objective relates to NS 8 on fishing communities and FMP Objective 16 on fishing communities.
3. Prevent excessive concentration of harvest privileges	This objective relates to NS 4 on allocation, NS 8 on fishing communities, and FMP Objective 15 on avoiding adverse impacts to small entities.
4. Mitigate the reallocational effects of recent policies (3-tier system and equal limits)	This objective relates to NS 4 on allocation and FMP Objectives 12 on equitable allocation and 14 on minimizing disruption.

Key Objective	Consistency with Management Objectives of the FMP and MSA
5. Promote equity	This objective relates to NS 4 on allocation and FMP Objective 12 on equitable sharing.
6. Resolve or prevent new allocation issues from arising	This objective relates to NS 4 on allocation and FMP Objectives 12 on equitable sharing and 14 on minimizing disruption.
7. Promote safety	This objective relates to NS 10 and FMP Objective 17 on safety.
8. Improve product quality and value	This objective relates to NS 5 on efficiency and FMP Objective 6 on net national benefits.
9. Take action without creating substantial new disruptive effects.	This objective relates to FMP Objective 14 on minimizing disruption.
10. Create a program that will readily transition to a multi-month IQ program.	This objective relates to capacity reduction recommendations in the strategic plan. Where individual quotas are transferable and divisible, they address NS 6 by providing the fleet with substantial flexibility to respond to changing conditions in the fishery and NS 5 by taking efficiency into account. FMP Objective 6 is also addressed.

2.3 Description of the Current Permit Stacking Program

The sablefish fishery primary season managed under the permit stacking program occurs north of 36º N. latitude. Vessels in this fishery registered to at least one LE permit with a gear endorsement for either longline or trap (or pot) gear and an endorsement for sablefish, fish a specified tier limit. Such vessels are eligible to fish in the DTL fishery before the primary season (i.e., January through March) and after their aggregate tier limit on the vessels have been harvested, or the season has ended, whichever comes first. This transition between fisheries often occurs during the sablefish primary season. Under the permit stacking program, each fixed gear sablefish endorsed LE permit is assigned to one of three tiers. The permit's tier level determines the poundage of sablefish which can be landed by that permit each season while participating in the primary sablefish fishery. Sablefish endorsements and their tiers may not be transferred separately from the LE permits. For sablefish endorsed, LE permits, the Regional Administrator biennially or annually announces the size of the cumulative trip limit for each of the three tiers associated with the sablefish endorsement such that the ratio of limits between the tiers is approximately 1:1.75:3.85 for Tier 3, Tier 2, and Tier 1, respectively. Up to three permits can be stacked onto a single vessel, allowing that vessel to land up to the sum of the three tier limits in aggregate.

The program also includes other provisions, including a prohibition on the ownership of permits by corporations or other business entities, a permit owner-on-board requirement, a limit on the number of permits any individual or entity (individually and collectively) can own or hold, and a prohibition on at-sea processing. A grandfather clause was provided for each of these provisions, allowing the continuation of situations in place prior to Council action. For non-grandfathered permits, the owner of the permit must be on-board the vessel during the primary season when that permit's tier amount is being fished. If landings from a trip will be attributed to multiple permits, then the owners of those permits being fished must be onboard during fishing operations. However, there are medical and death exemptions from this requirement.

Currently there are 164 sablefish endorsed permits of which 131 are endorsed for longline only; 27 are fishpot endorsed only, and six have two gear endorsements (i.e., four are endorsed for both longline and fishpot gear, one is endorsed for both fishpot and trawl gear, and one is endorsed for both longline and trawl gear). The number of permits by tier level is as follows: Tier 1 – 28 permits; Tier 2 – 42 permits, and Tier 3 – 94 permits. As of August 2013, approximately 40 vessels have stacked permits.

2.4 Relevant Groundfish Policy and Regulatory Changes since Program Implementation

Since the implementation of the fixed gear sablefish permit stacking program, numerous regulatory changes have taken place within the Pacific Coast groundfish fishery. Chief among these changes was implementation of groundfish conservation areas (i.e., ecologically important habitat closed areas and rockfish conservation areas) and the rationalization of the trawl fishery. Vessel movement between the LEFG sablefish fishery and the rationalized trawl fishery make the development of the rationalized trawl fishery especially important in reviewing the sablefish program.

Fishery Disaster and Rockfish Conservation Areas. Just as the Council policies for the LEFG catch share program were being finalized in 2000, a number of stocks were being identified as overfished, primarily rockfishes, and severe harvest reductions were imposed on the groundfish fishery. The first stock assessments identifying the overfished status of some rockfish species were published in 1999. In 2000, the West Coast groundfish fishery was declared a disaster and new management measures were sought to reduce impacts. In the fall of 2002, vast swaths of the continental shelf were closed in order to reduce bycatch of overfished darkblotched rockfish. In 2003, Rockfish Conservation Area (RCA) closures were imposed for both fixed gear and trawl vessels to protect a number of overfished rockfish species.

Vessel Monitoring System. The need to enforce the RCAs led to a requirement that, starting in 2003, all LE vessels carry equipment and subscribe to services to allow satellite tracking of vessels, a vessel monitoring system (VMS).

Trawl Rationalization. Deliberations over rationalization of the trawl fishery began in 2003 and the program was implemented for the 2011 fishery. Trawl rationalization involved two closely related and interlinked decisions. The first was the specification of the management system used to rationalize the trawl fishery—Amendment 20 to the groundfish FMP (PFMC and

NMFS, 2010). Amendment 20 involved the consideration of harvest control tools such as IFQs and harvester co-ops. The second decision involved determining the proportion of the available catch that would be allocated to the trawl versus the non-trawl fishery. This decision was addressed as Amendment 21 to the Groundfish FMP (PFMC, 2010).

The trawl rationalization program allows gear switching (the use of nontrawl gear to catch fish under the trawl IFQ program). Gear switching not only allows trawl vessels to use fixed gear to catch sablefish, it also allows fixed gear vessels to acquire a trawl permit and trawl IFQ to increase their harvest of sablefish while using fixed gear. Whether by trawl or fixed gear vessels, the result has been an increase in the harvest of sablefish with fixed gear, increasing competition and potential conflict on the fixed gear sablefish fishing grounds.

3.0 PROGRAM PERFORMANCE AND REVIEW

This review of the LEFG sablefish LAPP will concentrate on assessing achievement of the 10 key objectives of the sablefish program (Sections 3.1 through 3.10) as provided in Groundfish Amendment 14 and summarized in Table 2-2 of this document. These objectives are all socio-economic objectives. While the biological impacts of the sablefish permit stacking program have not been quantified, they are believed to be insignificant. The impacts, if any, would result from a potential increase in unreported discards of smaller sablefish and changes in retention of other groundfish species. An increase in discard of small-sized sablefish (high-grading) might be expected because the permit tier limits are landing limits rather than catch limits, which would limit both catch and discards. The degree of high-grading will be a function of the price differential between large and small fish, catch composition by size class, and fishing costs. The degree of high-grading cannot be assessed based on fish tickets as there is no reliable data on size composition of landings because different buyers use different size categories. The ending of the derby fishery constraint may have allowed vessels to increase their retention of other groundfish or may have had no effect. Under current management, the conservation of sablefish and other groundfish is protected by ACLs which are independent of the permit stacking program.

This is the first official review of the impacts and outcome of this program by the Council. In 2013, NOAA published a technical memorandum on the performance of U.S. catch share programs (Brinson, Ayeisha A. and Thunberg, Eric A., 2013) which included a review of the Pacific Coast sablefish fishery. The authors of that report found evidence for capacity reduction in the fishery as well as better achievement of the catch quota. Total revenue (adjusted for inflation) also increased, however, they were not able to determine what part of the change might be due to the program versus other market forces.

This review will utilize primarily available Pacific Fishery Information Network (PacFIN) landings data, Alaska Fishery Information Network (AKFIN) vessel participation indicators ("yes/no" flags), and U.S. Coast Guard records on safety incidents to look at how the program has met its objectives.

The assessment of each objective of the program, as identified above, follows in sections 3.1 through 3.10 below.

3.1 Rationalize the Fleet and Promote Efficiency

3.1.1 Background

Rationalizing the fleet and promoting efficiency, primarily through reducing the number of participating vessels (capacity reduction) and lengthening the season, was a key objective of Amendment 14. In considering how to reduce the fleet, the Council also had to balance that reduction with its other objective of preventing excessive concentration of harvest privileges (see also Section 3.3). At the time Amendment 14 was adopted, the Council had just completed the Groundfish Strategic Plan (PFMC, 2000) for which capacity reduction is one of the goals. In support of the Council's Strategic Plan development process, the Scientific and Statistical Committee (SSC) assessed the capital utilization rates in year 2000 groundfish fisheries. The SSC characterized the capital utilization rate for a fishery as "the percentage of boats in the [year 2000] fleet needed to harvest the groundfish available in 2000." For the LEFG sablefish fishery, the SSC calculated that just 9 percent of the vessels in that fleet in 2000 were capable of harvesting that fleet's sablefish allocation for that year. While the Council was not interested in reducing the number of vessels participating in the LEFG sablefish fleet to 9 percent of the year 2000 levels, capacity reduction was a significant objective for Amendment 14 and the permit stacking program.

Amendment 14 was designed to allow the fleet to achieve some balance between too little and too much capacity reduction, without specific criteria for what constituted "too little" or "too much." Too little capacity reduction could mean that commercial fishermen intending to make a career of fishing would have to rely on sablefish landings providing a smaller proportion of their incomes and require more reliance on other fisheries. Too much capacity reduction could mean that the fleet could be reduced and concentrated to such a small number of vessels that harvest benefits from the fishery would be channeled to relatively few individuals, coastal communities, and processors.

Amendment 14 was explicitly *not* designed to reduce the fleet numbers to as few vessels as possible. The Council's judgment on whether the fleet's capacity has been reduced by too much or by too little, and whether excessive concentration of harvest privileges has occurred, will be necessarily qualitative, since the Council did not set an explicit capacity reduction goal with Amendment 14.

Information and data for considering whether the fleet has been rationalized and made more efficient include assessing the following changes:

- season length and average fishing days by year;
- number of participating vessels, attainment of allocations, and the concentration of harvest, including combinations of stacked permits, landings, and revenue by vessels in the fishery, both before and after program implementation;
- vessel capacities; and
- permit prices for available years.

While we do not have an assessment of pre-program net revenues per vessel to compare with similar post-program data, there is information available on the LEFG sablefish fishery for 2010 which has been compiled by Dr. Carl Lian of the Northwest Fisheries Science Center. Dr. Lian's paper, which is attached at the end of our review, provides estimates of total cost net revenue earned by commercial catcher vessels in the West Coast LEFG groundfish fishery, West Coast LEFG sablefish fishery, and the West Coast LEFG primary sablefish fishery. These estimates have been developed based on cost information collected through the NMFS periodic voluntary economic data collection program. An explanation of the estimates and how they were derived is provided in the attached document.[2] Based on the most recent year of data available (2010), estimated average per vessel total cost net revenue estimates were as follows:

- All LEFG vessels: $14,530
- Only those LE vessels participating in the fixed gear sablefish fishery: $13,042
- Only those LE vessels participating in the fixed gear sablefish primary fishery: $18,159

Total cost net revenue estimates for the fleet as a whole in 2010 were as follows:

- All 142 LEFG vessels: $2,063,260
- The 139 LE vessels participating in the fixed gear sablefish fishery: $1,812,838
- The 90 LE vessels participating in the fixed gear sablefish primary fishery: $1,634,310

Additional breakdowns of these estimates are provided in the attached document.

3.1.2 Assessment

Season Length and Average Fishing Days per Year. The sablefish program provided an immediate and significant lengthening of the primary sablefish fishery and average duration of the time over which a vessel might fish. Table 3-1 provides a succinct display of the season length and management history, including the mop-up fishery. In 1996, the primary fishery lasted only 5 days (noon to noon, September 1-6) in the derby mode. Beginning with 2002, the

[2] The explanation in Dr. Lian's paper includes the caution that net revenue is an upwardly biased indicator of profitability since the cost-earnings surveys used do not capture 100 percent of the costs associated with operating a commercial fishing vessel.

annual primary sablefish season was increased to 7 months in length (April 1 through October 31), giving fishermen and processors far more flexibility in how and when they fished and made landings. It also eliminated the need for a mop-up fishery.

Table 3-1. Season length and management summary for the primary LEFG sablefish season north of 36° N. latitude, 1992 through the present.

Year	Primary Season Length	Management
1992-1994	2 to 3 weeks	Derby
1995	7 days	Derby with Mop-up Fishery (Mop-up Season Sep. 1-30; Cumulative Trip Limit 5,500 lb per Vessel)
1996	5 days	Derby with Mop-up Fishery (Mop-up Season Oct. 1-15; Cumulative Trip Limit 3,400 lb per Vessel)
1997	9 days	Equal Limits/Modified Derby with Mop-up Fishery (Mop-up Season Oct. 1-22; Cumulative Trip Limt 8,500 lb per Vessel)
1998	6 days	Tiered Limits/Modified Derby with Mop-up Fishery (Mop-up Season Aug. 28-Sep. 12; Cumulative Trip Limit 3,200 lb per Vessel)
1999	9 days	Tiered Limits/Modified Derby with Mop-up Fishery (Mop-up Season Sep. 20-25; Cumulative Trip Limit 1,100 lb per Vessel)
2000	9 days	Tiered Limits/Modified Derby with Mop-up Fishery (Mop-up Season Sep. 5-19; Cumulative Trip Limit 3,000 lb per Vessel)
2001	Aug. 15 - Oct. 31	Aug. 2 implementation of Permit Stacking
2002-present	Apr. 1 - Oct. 31	Permit Stacking

Figure 3-1 displays the average duration in days over which a vessel was fished per year in the primary sablefish fishery (calendar days from a vessel's first until its last landing made as part of the primary sablefish fishery). Looked upon in that way, within the 7 months of fishing opportunity each year from 2002 to 2013, individual vessels tailored seasons for themselves that ranged on average from 51 to 75 days. If the duration is weighted by the landings per vessel[3], the average duration ranged from 52 to 81 days.

Number of Vessels, Attainment of Allocations, and Concentration of Harvest. With regard to reducing the capacity of the fishery, Figure 3-2 displays the number of vessels participating in the sablefish fishery prior to and following implementation of the sablefish tier program. Primary season participation from 1996 through 2000 (prior to the program) averaged 146

[3] Weighting each vessel's season duration by its total primary sablefish landings adjusts for vessels that may have had relatively low total landings or that may have fished only sporadically during the season.

vessels compared to an average of 90 vessels after program implementation (2002 through 2013), a 38 percent decrease. The number of vessels and landings in the primary season fishery prior to 1998 were not recorded separately from the total fishery, and are estimates based on counts of vessels in the LE fishery that landed at least 1 mt of sablefish north of Santa Barbara County within the appropriate season periods.

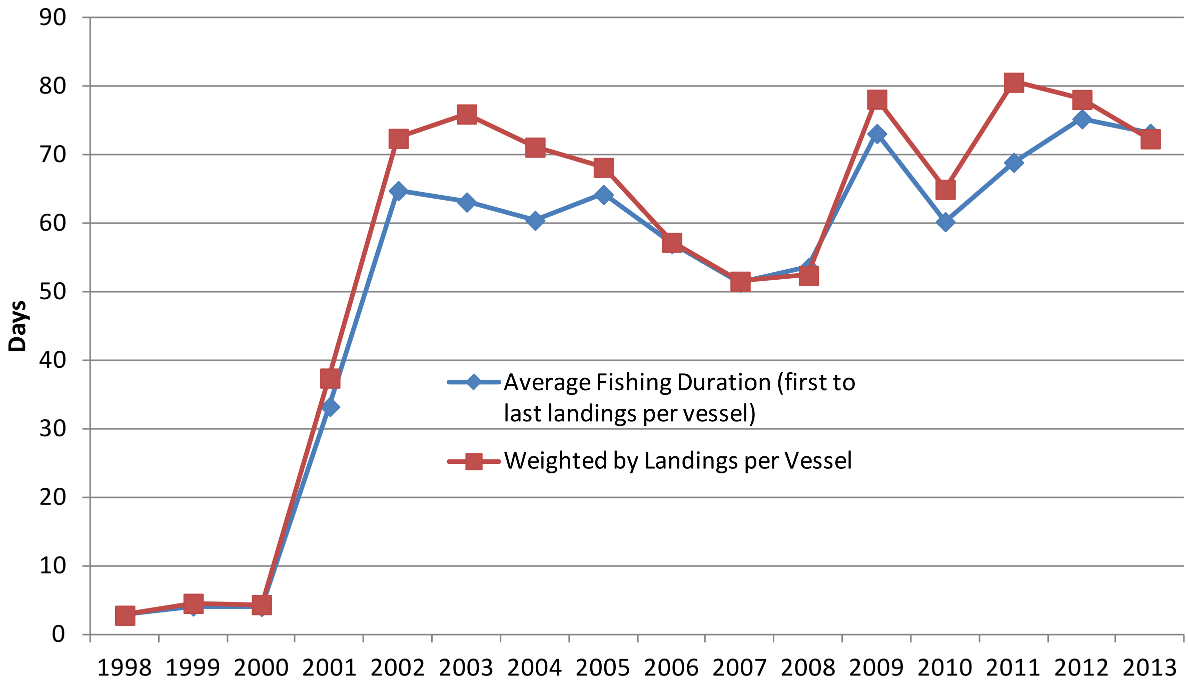

Figure 3-1. Average duration in days from first to last day of landings for vessels participating in the primary sablefish fishery (1998-2013).

Figure 3-3 displays the historical sablefish fishery allocations from 1996 through 2013 by total, primary, and DTL fisheries. Note that the allocations reported for years prior to 2002 in this and the following two figures include the total LEFG sablefish fishery, as there were no explicit allocations to primary and nonprimary fisheries. Figure 3-4 displays the LEFG sablefish fishery allocation and landings from 1996 through 2013. Note that from 1998 through 2001 the reported landings include the DTL and mop-up fisheries. Figure 3-5 displays the annual percent of the LEFG sablefish allocation landed each year of the period 1996 through 2013. Comparing pre-program (1996 through 2001) and post-implementation (2002 through 2013) periods, it can be seen that since implementation of the program the percentage landed appears within a more consistent range and has not exceeded the allocation. This appearance may be a factor of the short timeframe over which the pre-program landings are graphed, but seems more likely the result of the longer, less derby-like fisheries which are more efficiently prosecuted and managed to meet individual (permit tiers) and aggregate (sector allocation) targets.

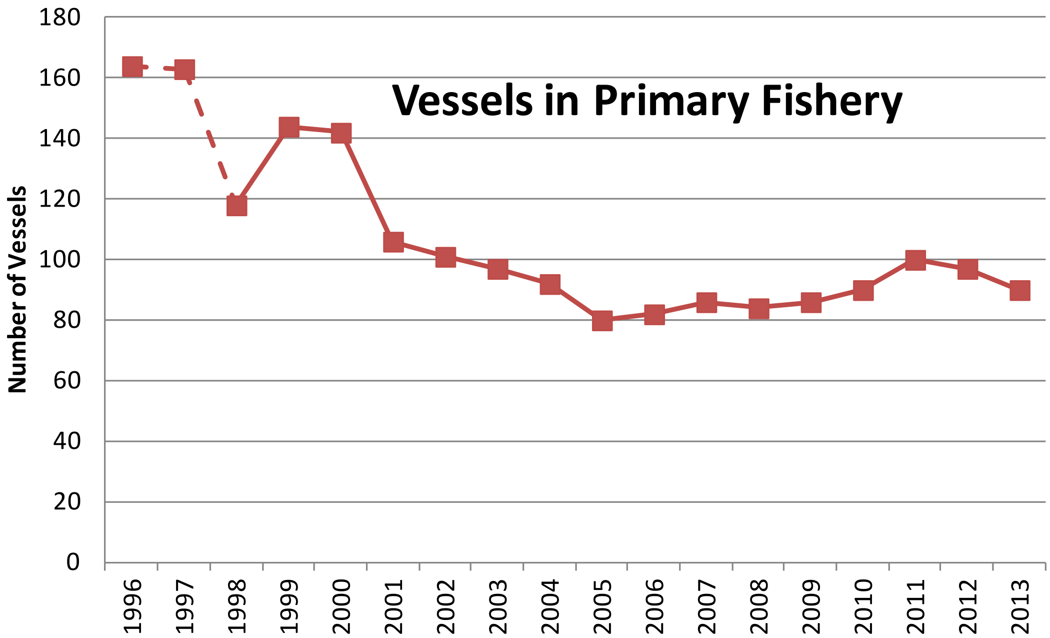

Figure 3-2. Number of vessels participating in the LEFG primary sablefish fishery from 1998 to 2013. Vessel counts for years prior to 1998 are estimated based on vessels in the LE fishery that landed at least 1 mt of sablefish north of Santa Barbara County within the appropriate season periods.

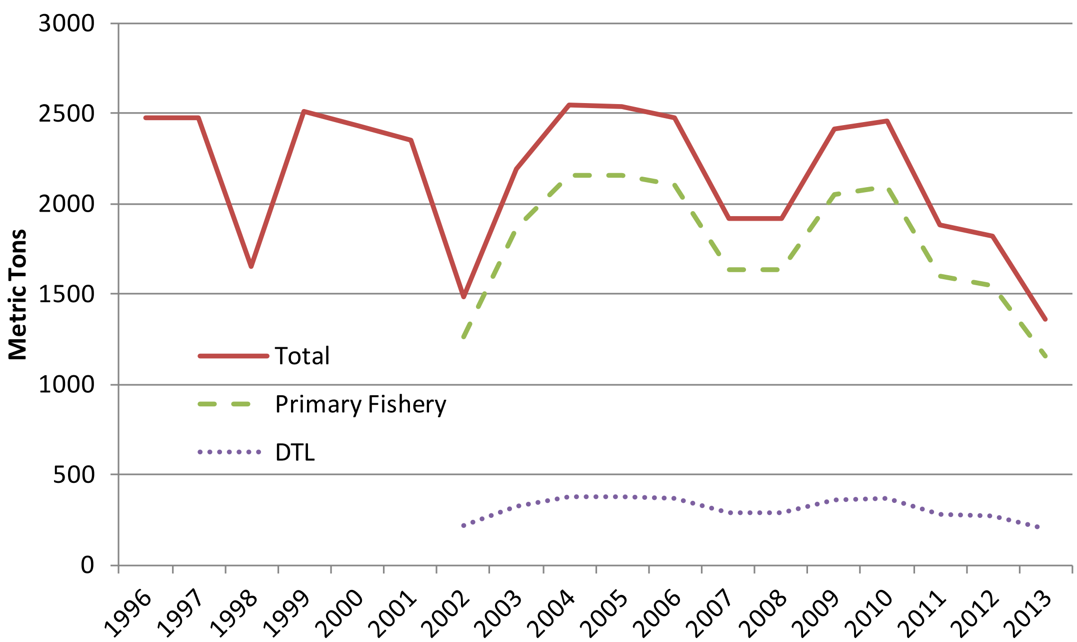

Figure 3-3. LEFG Sablefish fishery allocations by total, primary, and DTL fisheries, 1996-2013. Prior to 2002 there were no explicit allocations to the primary and DTL fisheries.

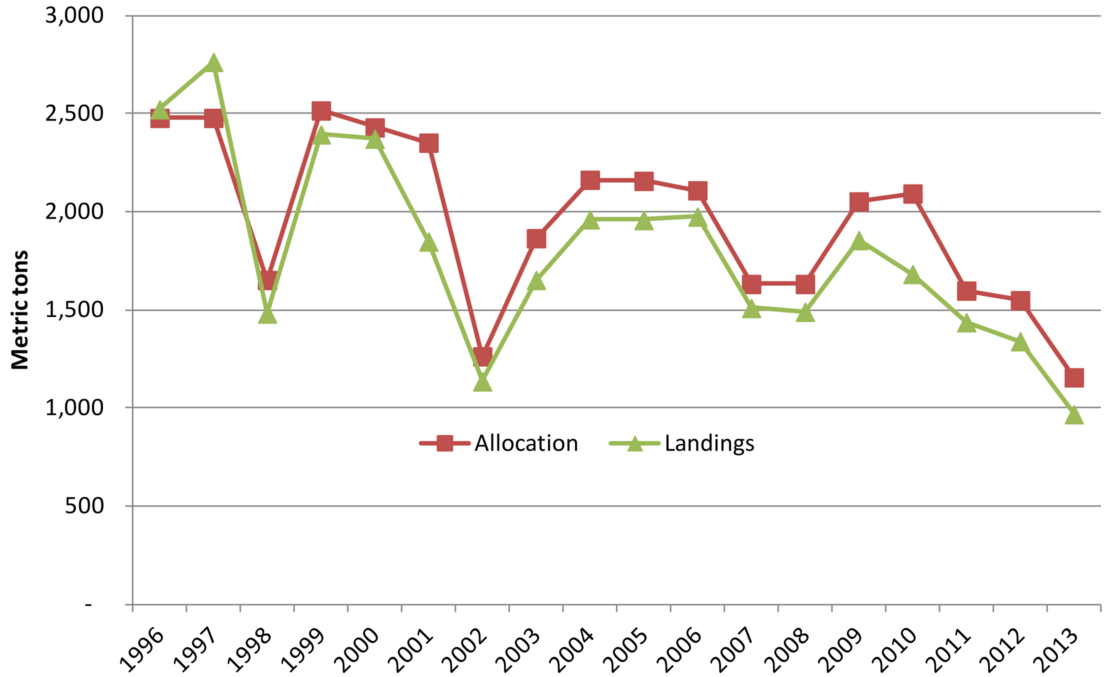

Figure 3-4. LEFG sablefish allocations and landings, 1996 through 2013. Years prior to 2002 include the mop-up and DTL fisheries, while years from 2002 to 2013 are for the primary season only.

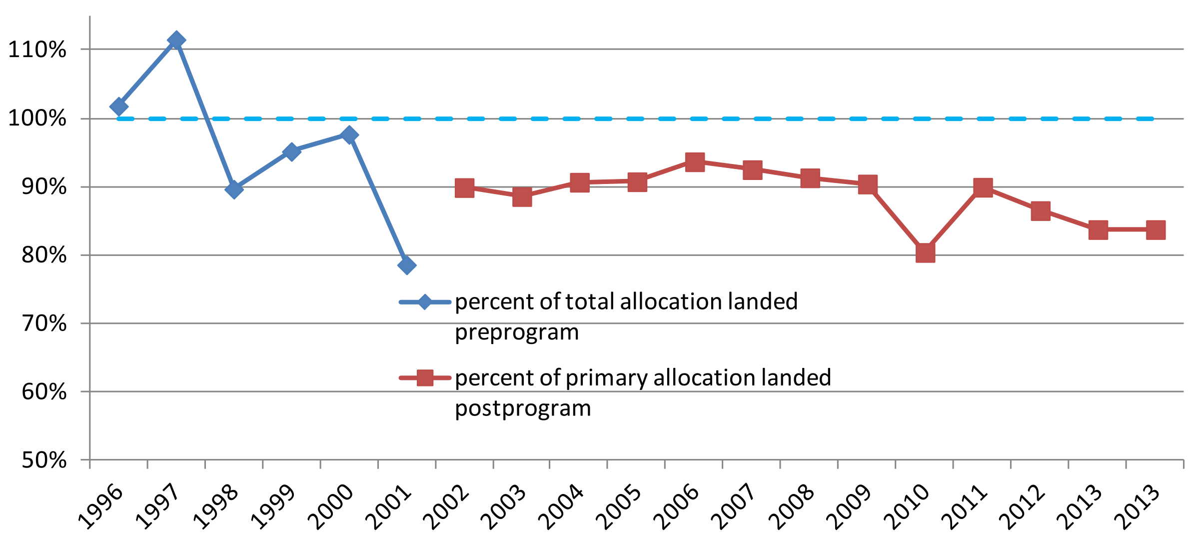

Figure 3-5. Pre- and post-program LEFG sablefish allocations and landings as a percent of the allocations, 1996 through 2013.

Over the period of program implementation, Tables 3-2 and 3-3 compare the number of vessels, their relative allocations, and landings by the various possible permit and permit stacking combinations for the years 2002, 2004, 2008, and 2012. Table 3-3 also displays the percent of the sablefish trawl IFQ harvested by vessels with tier permits during the years 2011 through 2013 (17.2 percent).

From the snapshots within the first 12 years of the program provided by Tables 3-2 and 3-3, it is hard to pick out any consistent direction of change that would indicate significant consolidation or disaggregation of permits and landings at the fleet level or on a per-vessel basis. The number of vessels with combinations other than a single Tier 3 permit varied only slightly between 58 and 61 vessels. The main differences between years are due to the number of vessels with only a single Tier 3 permit (last row before the total in Table 3-2).

Table 3-4 is somewhat more informative as to how the different permit tiers have or have not been stacked. The higher tier permits (Tier 1 and Tier 2) appear more likely to be stacked (consolidated) to the maximum of three. The stacking of three Tier 1 or three Tier 2 permits on a single vessel showed a fairly consistent increase (consolidation) from 2002 to 2012, increasing by over 46 percent in each case. At the same time, as would be expected, the frequency of vessels with only one or two permits declined. For all tiers, permits that are not triple-stacked are fairly evenly split between being double-stacked and unstacked. For Tier 3 permits there is an interesting anomaly which has not yet been explained. There appears to have been a consistent increase in the number of Tier 3 permits stacked until a change occurred between 2008 and 2012, during which the occurrence of triple-stacked permits dropped from 43 down to 22, almost as low as in the first full year of the program. ***The drafting team for this document solicits information that may explain this apparent anomaly.***

Figure 3-6 displays how the participating vessels and concentration of landings in the LEFG primary sablefish fishery changed during selected years between 1996 and 2012. The number of participating vessels decreased fairly consistently from a high of 164 in 1996 to a low of 82 in 2006. After 2006, the number of vessels participating in the primary fishery increased to 84 in 2008, 90 in 2010, and 97 in 2012. The number of vessels participating in 2012 was the highest since 92 participated in 2004. The concentration of landings among vessels generally increased over this period as well, which is more apparent in Figure 3-7 which normalizes the curves by comparing share of harvest to percent of fleet rather than to the number of vessels (Figure 3-6).

Table 3-2. Comparison of the number of vessels and allocations for various combinations of stacked permits in 2002, 2004, 2008, and 2012. (Note that this snapshot in time may not capture changes in permit combinations during the season.)

Possible Combinations of Stacked Permits by Tier				Relative Total Allocation for the Permit Combination	Number of Vessels															
					Total by Permit Combination				Stacking Only Longline Permits				Stacking Only Pot Permits				Stacking Both Longline and Pot Permits			
Tier 1 (3.85)	Tier 2 (1.75)	Tier 3 (1.0)	Total Number		2002	2004	2008	2012	2002	2004	2008	2012	2002	2004	2008	2012	2002	2004	2008	2012
3			3	11.55	1	1	1	2	0	0	0	0	1	1	1	2	0	0	0	0
2	1		3	9.45	1	1	2	3	0	0	1	1	0	0	0	0	1	1	1	2
2		1	3	8.7	2	1	1	1	0	1	1	1	1	0	0	0	1	0	0	0
1	2		3	7.35	-	1	1	3	-	1	1	1	-	0	0	0	-	0	0	2
1	1	1	3	6.6	4	7	5	2	1	1	1	0	0	0	0	0	3	6	4	2
1		2	3	5.85	-	2	-	-	-	1	-	-	-	0	-	-	-	1	-	-
	3		3	5.25	1	1	-	-	1	1	-	-	0	0	-	-	0	0	-	-
	2	1	3	4.5	2	2	4	3	2	2	2	2	0	0	0	0	0	0	2	1
	1	2	3	3.75	3	2	3	5	2	2	3	3	0	0	0	0	1	0	0	2
		3	3	3	2	6	9	2	1	4	7	1	0	0	0	0	1	2	2	1
2			2	7.7	1	1	-	1	1	0	-	1	0	1	-	0	0	0	-	0
1	1		2	5.6	2	3	3	-	2	2	1	-	0	0	0	-	0	1	2	-
1		1	2	4.85	3	1	2	2	1	0	0	0	0	0	0	0	2	1	2	2
	2		2	3.5	1	2	1	3	0	1	1	2	0	0	0	0	1	1	0	1
	1	1	2	2.75	7	8	6	3	6	7	4	2	0	0	0	0	1	1	2	1
		2	2	2	7	9	10	13	6	7	8	12	0	1	1	0	1	1	1	1
1			1	3.85	7	4	4	3	4	2	3	2	3	2	1	1	0	0	0	0
	1		1	1.75	17	9	10	12	14	6	9	11	3	3	1	1	0	0	0	0
		1	1	1	49	29	22	39	43	26	20	35	5	2	1	3	1[a/]	1	1	1
				TOTAL	**110**	**90**	**84**	**97**	**84**	**64**	**62**	**74**	**13**	**10**	**5**	**7**	**13**	**16**	**17**	**16**

a/ This permit is endorsed for both longline and pot gear and, therefore, is recorded in the last four columns of the table.

Table 3-3. Comparison of sablefish landings by vessels under various allocations and combinations of stacked permits in 2002, 2004, 2008, and 2012, and share of sablefish trawl IFQ landed by these vessels in 2011-2013.

Combinations of Stacked Permits by Tier: Tier 1 (3.85)	Tier 2 (1.75)	Tier 3 (1.0)	Total Number of Permits	Relative Total Allocation for the Permit Combination	Total Vessels with this Combination of Sablefish Permits: 2002	2004	2008	2012	Sablefish Landings (1,000's of Pounds) within a Combination of Tiers: Total 2002	Total 2004	Total 2008	Total 2012	Average per Vessel 2002	Average per Vessel 2004	Average per Vessel 2008	Average per Vessel 2012	Average Percent of Total Fleet Landings per Vessel 2002	2004	2008	2012	Percent of Total Fleet Represented by all Vessels with this Combination 2002	2004	2008	2012	Share of Sablefish IFQ landed 2011-2013
3			3	11.55	1	1	1	2																	
2	1		3	9.45	1	1	2	3																	
2		1	3	8.7	2	1	1	1																	
				Subtotal	4	3	4	6	363	543	520	653	91	181	130	109	3.6%	4.2%	4.0%	3.7%	15%	13%	16%	22%	5.7%
1	2		3	7.35	-	1	1	3																	
1	1	1	3	6.6	4	7	5	2																	
				Subtotal	4	8	6	5	245	894	489	418	61	112	82	84	2.4%	2.6%	2.5%	2.8%	10%	21%	15%	14%	1.8%
1		2	3	5.85	-	2	-	-																	
	3		3	5.25	1	1	-	-																	
	2	1	3	4.5	2	2	4	3																	
				Subtotal	3	5	4	3	132	396	206	117	44	79	52	39	1.8%	1.8%	1.6%	1.3%	5%	9%	6%	4%	-
	1	2	3	3.75	3	2	3	5																	
		3	3	3	2	6	9	2																	
				Subtotal	5	8	12	7	156	407	477	252	31	51	40	36	1.2%	1.2%	1.2%	1.2%	6%	9%	15%	9%	-
2			2	7.7	1	1	-	1																	
1	1		2	5.6	2	3	3	-																	
1		1	2	4.85	3	1	2	2																	
				Subtotal	6	5	5	3	323	574	351	209	54	115	70	70	2.2%	2.7%	2.1%	2.4%	13%	13%	11%	7%	1.3%
	2		2	3.5	1	2	1	3																	
	1	1	2	2.75	7	8	6	3																	
				Subtotal	8	10	7	6	212	449	242	223	26	45	35	37	0.6%	1.0%	1.1%	1.3%	8%	10%	7%	8%	1.4%
		2	2	2	7	9	10	13	130	208	178	238	19	23	18	18	0.4%	0.5%	0.5%	0.6%	5%	5%	5%	8%	-
1			1	3.85	7	4	4	3	267	186	335	152	38	46	84	51	0.9%	1.1%	2.5%	1.7%	10%	4%	10%	5%	5.9%
	1		1	1.75	17	9	10	12	261	240	229	236	15	27	23	20	0.4%	0.6%	0.7%	0.7%	11%	6%	7%	8%	1.0%
		1	1	1	49	29	22	39	414	428	258	457	8	15	12	12	0.2%	0.3%	0.4%	0.4%	18%	10%	8%	15%	-
				TOTAL	**110**	**90**	**84**	**97**	**2,503**	**4,323**	**3,285**	**2,955**	**23**	**48**	**39**	**30**					**100%**	**100%**	**100%**	**100%**	**17.2%**

Table 3-4. Number of other permits with which a permit is stacked, by tier (includes post-July 1st registrations).[a/]

Permit Combinations	2002		2004		2008		2012
Tier 1 Permit Stacked with:			**Number of Tier 1 Permits**				
Two Other Permits	13	↗	17	↗	18	↗	19
One Other Permit	7	↘	6	↘	5	↘	4
No Other Permits	7	↘	4	→	4	→	4
Total Permits for the Tier	27		27		27		27
Tier 2 Permit Stacked with:			**Number of Tier 2 Permits**				
Two Other Permits	15	↗	19	↗	23	↘	22
One Other Permit	11	↗	15	↘	10	↘	9
No Other Permits	17	↘	9	↗	10	↗	12
Total Permits for the Tier	43		43		43		43
Tier 3 Permit Stacked with:			**Number of Tier 3 Permits**				
Two Other Permits	20	↑	36	↗	43	↓	22
One Other Permit	24	↗	29	→	29	↗	33
No Other Permits	50	↓	29	↘	22	↑	39
Total Permits for the Tier	94		94		94		94
Total Permits	164	→	164	→	164	→	164
Total Vessels	110	↓	90	↘	84	↑	97

a/ Analysis based on registrations as of July 1 each year plus post-July 1 registrations for permits not registered on July 1st.

In Figure 3-7, an equal distribution line has been added which indicates the shape of the curve in the event that each vessel had landed exactly the same amount in a given year. Greater deviations from the equal distribution line indicate relatively greater concentration of landings among fewer vessels. The graph shows the distribution changing over the years since program implementation. The dark line for 1996 shows the distribution during the final year of the derby fishery. The 1997 line shows the degree to which management under equal cumulative limits equalized the distribution of harvest among vessels. The lines for 1998 and 2000 show movement toward the 1996 distribution. After the permit stacking provisions went to effect in 2001, the lines move even closer to the 1996 line. The similarity of the curves for the earliest year, 1996, to the most recent year, 2012, is striking (see Section 3.4 for additional discussion of this graph). Although many fewer vessels participated in the fishery in 2012 than in 1996, they delivered a similar cumulative distribution of landings in both years.

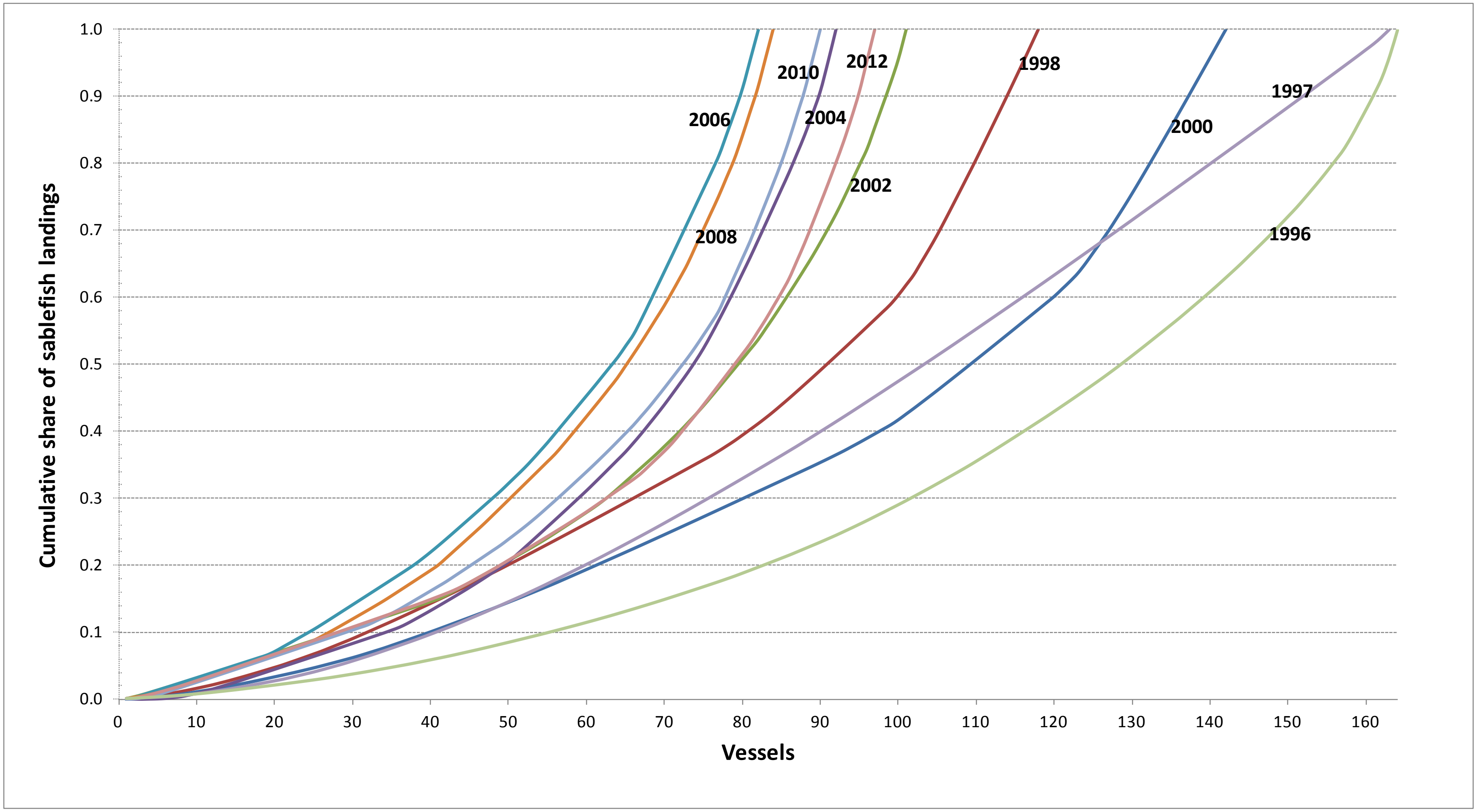

Figure 3-6. Cumulative share of landings by the number of vessels participating in the LEFG primary sablefish fishery during selected years from 1996-2012.

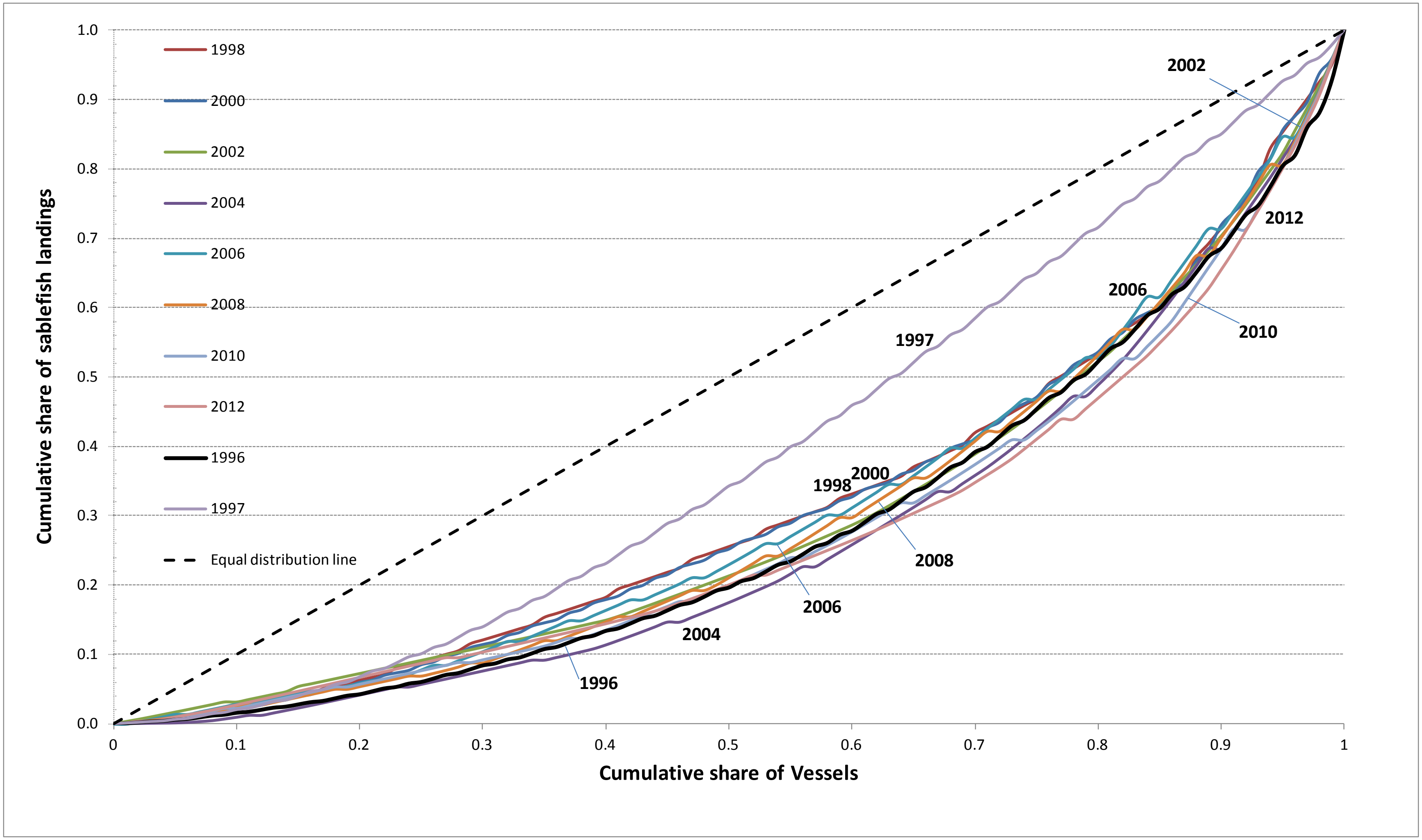

Figure 3-7. Concentration of landings by the cumulative share of vessels participating in the LEFG primary sablefish fishery for selected years from 1996-2012.

The similarity in the concentration of primary sablefish landings for 2012 and 1996 is reinforced by comparing the Gini coefficient values for concentration of landings by vessels in those years shown in Figure 3-8 (derived from the data displayed in Figure 3-7). Gini coefficients are an indicator of the deviation from the equal distribution line shown in Figure 3-7. A Gini coefficient of zero indicates an equal distribution of landings, while a value of 1 indicates that a single vessel made all the landings (i.e., the most concentrated distribution). Gini coefficient values greater than zero and less than one indicate increasingly concentrated landings distributions. The figure shows that since the imposition of the equal cumulative limits fishery in 1997, the distribution of landings has generally trended toward recreating the concentration exhibited by the 1996 fishery. The 2013 Gini coefficient value of 0.47 is about 7 percent higher than the value for the fishery of 0.44 in 1996.

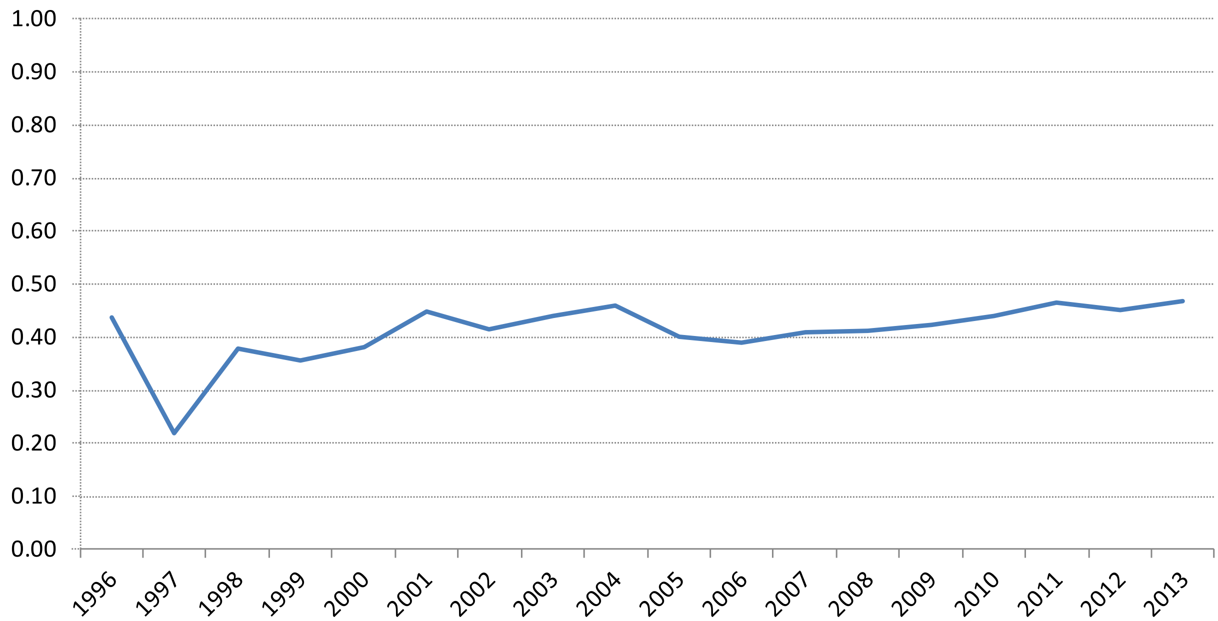

Figure 3-8. Gini coefficients for the concentration of landings by vessels in the LEFG primary sablefish fishery for years before and after full implementation of the permit stacking program in 2002.

[Note: A Gini coefficient of 0 implies a perfectly even distribution among all participants, while a coefficient of 1 indicates one vessel landed all of the fish.]

Vessel Capacity. Table 3-5 and Figures 3-9 and 3-10 display information about the distribution of vessel lengths and permit length endorsements in the LEFG sablefish fishery in 2012. Table 3-5 shows the distribution of length endorsements for sablefish permits by tier and also by gear endorsement. The table shows the average length endorsement for Tier 1 permits (66.6 feet) is longer than the average for both Tier 2 permits (53.1 feet) and Tier 3 permits (47 feet). The minimum length endorsements follow the same pattern, with the minimum Tier 1 permit length endorsement (40 feet) exceeding those for both Tier 2 (32 feet) and Tier 3 permits (18 feet).

However the same is not true for the maximum length endorsements. While the longest Tier 3 permit (97.3 feet) is shorter than the longest Tier 1 permit (138 feet), it is longer than the longest Tier 2 permit (88 feet). From Table 3-5 it is difficult to discern any meaningful patterns regarding permit length and gear endorsements.

Table 3-5. Distribution of permit length endorsements for LEFG sablefish permits in 2012.

Permit Category	Number of Permits	Permit Length Endorsements in Feet			Permits Within One Standard Deviation	
		Average	Range of: Minimum to Maximum	Range of: One Standard Deviation	Number	Percent
Tier 1	28	66.6	40 to 138	44.4 to 88.9	20	71.4%
Tier 2	42	53.1	32 to 88	39.8 to 66.3	28	66.7%
Tier 3	94	47.0	18 to 97.3	35.1 to 59.0	67	71.3%
Longline	132	50.2	18 to 97.3	36.9 to 63.5	90	68.2%
Pot	28	60.4	32 to 138	35.6 to 85.3	19	67.9%
Both Longline and Pot	4	49.2	40 to 55.3	43.5 to 54.9	2	50.0%

Figure 3-9 shows the number of vessels carrying stacked (two or three) and unstacked (one) permits by vessel length class on July 1, 2012. Vessel length classes were constructed so that an approximately equal number of vessels fell into each class. From the figure it is evident that permit stacking is more prevalent on longer vessels than on shorter ones. Seventy five percent of the 20 vessels involved in the fishery that are at least 60 feet in length carried stacked permits, while only 50 percent of the 18 vessels between 50 and 60 feet in length and the 22 vessels between 43 and 50 feet in length carried stacked permits. Only one of the 17 vessels less than 35 feet in length carried stacked permits.

Figure 3-10 shows the distribution of stacked and unstacked permits by permit length endorsement class. The permit length endorsement categories were chosen to mirror the vessel length classes in Figure 3-9. In Figure 3-10, stacked permits are further bifurcated into base and non-base categories (for administrative purposes, NMFS normally designates one of the permits in a stack as the "base permit"). The figure shows that among permit length endorsement categories, the greatest number of stacked base permits is in the greater-than-or-equal-to 60 feet category, while the greatest number of stacked non-base permits is in the 35-to-43 feet category (as is the greatest number of unstacked permits).

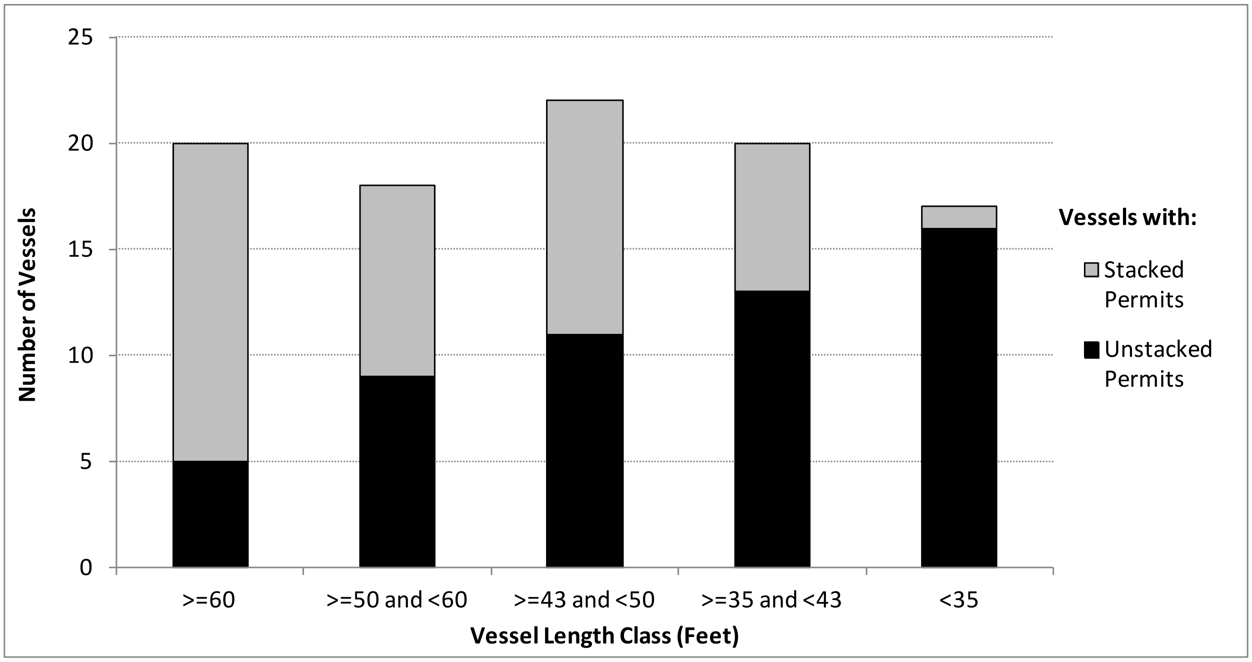

Figure 3-9. Number of LEFG sablefish vessels in 2012 with unstacked and stacked permits by vessel length class.

[Note: There were three permits with length endorsements of 64.1, 45.0 and 34.2 that were not associated with vessels on the reference date, 07-01-2012.]

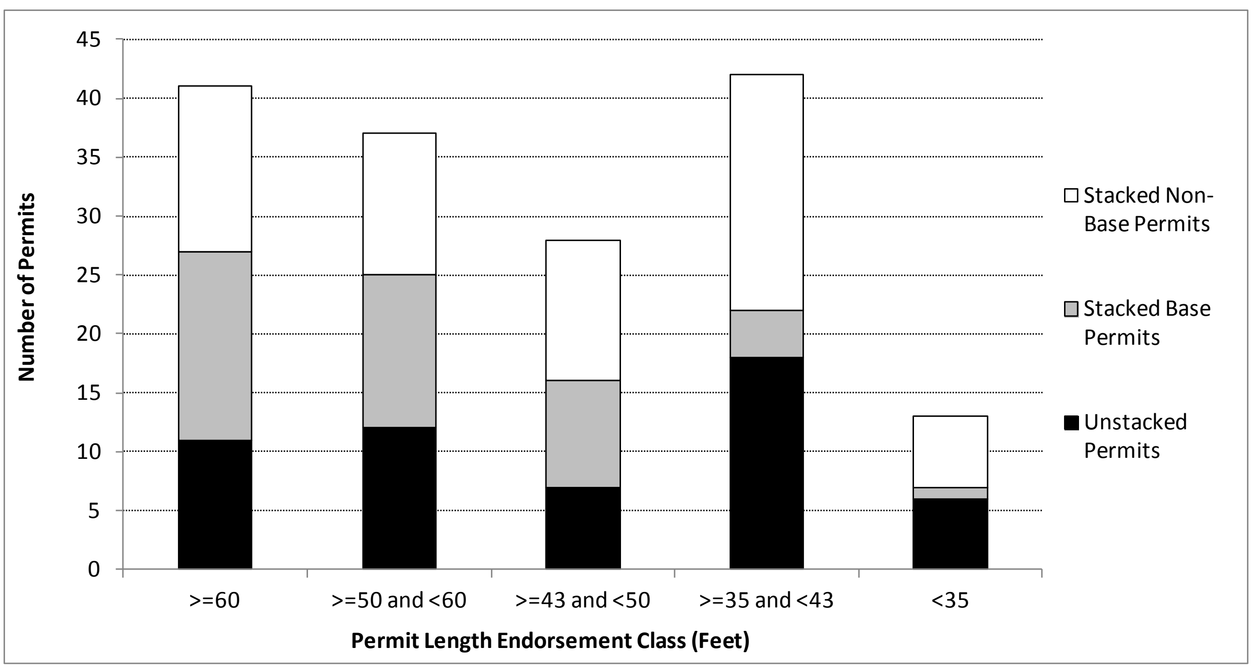

Figure 3-10. Number of LEFG sablefish permits in 2012 by permit length endorsement class and status (unstacked, stacked base, and stacked-non-base). See Note for Figure 3-9.

Comparing Figure 3-9 to Figure 3-10 shows permits are being used on vessels smaller than what is authorized by the length endorsements of the permits, indicating that the average size of vessels being used in the fleet has declined since the derby fishery, a possible source of increased efficiency. For example Figure 3-9 shows there are 20 vessels greater than 60 feet in length in the fishery while Figure 3-10 shows that permits with length endorsements greater than 60 feet are being used as the "primary" permit (i.e., the sum of the unstacked permits and the stacked base permits) on 27 vessels. When permits are stacked one permit is identified as the base permit ("Stacked base permits") and the vessel length must be of a size authorized by that permit's length endorsement. Similarly, there are 18 vessels between 50 and 60 feet in length (Figure 3-9) but there are 25 permits in that length endorsement class being used as primary permits (Figure 3-10), indicating that smaller vessels are being used than would be allowable based on the length endorsements of the associated permits authorizing those vessels' participation (i.e., the length endorsements on the unstacked or base permits). Continuing, there are 20 vessels between 35 and 43 feet in length but there are 22 permits in that length endorsement class being used as primary permits. Vessels in the 43-to-50 foot and less-than-35-foot categories appear to be absorbing the larger permits. For example, there are 22 vessels in the 43-to-50 foot size category, but only 16 such permits active as either unstacked or base permits, indicating there are vessels in this category that are using permits that authorize larger vessels. Similarly, there are 17 vessels in the less-than-35 foot size category, but only 7 such permits active as either unstacked or base permits.

Permit Prices. Information on sablefish permit prices proved to be too limited for use in determining any trends in the permit values over time. Table 3-6 shows recent offerings of tier permit prices from Dock Street Brokers website. This snapshot appears to show a preponderance of trading for Tier 3 permits (the lowest quota share level).

Table 3-6. Recent listings of West Coast longline sablefish-endorsed permits offered for sale on Dock Street Brokers (info@dockstreetbrokers.com).

Type of Permit	Asking Price	Updated	Notes
Tier 1	$825,000	11/26/2012	- pot endorsed
Tier 2		05/17/2013	- Call for Pricing
Tier 2		03/05/2014	- Will trade for northern sablefish trawl quota
Tier 3	$165,000	08/23/2013	- make offer
Tier 3	$197,000	10/15/2013	- Good to ~70' LOA
Tier 3	$155,000	03/10/2014	- SOLD
Tier 3	$140,000	02/21/2014	- Price Reduced** good to 51 feet
Tier 3	$208,000	01/25/2013	
Tier 3	$145,000	02/25/2014	- SOLD 3/10/2014
Tier 3	$170,000	04/02/2013	
Tier 3		05/17/2013	- Pot Endorsed Call for pricing
Tier 3	$13,000	04/14/2014	- Lease available for 2014 season

3.2 Maintain or Direct Benefits toward Fishing Communities

3.2.1 Background

This objective relates most directly to National Standard (NS) 8 and FMP Objective 16 (take socio-economic needs of fishing communities into account) [4]. Did the program provide for the sustained participation of fishing communities and, to the extent practicable, minimize adverse economic impacts on such communities?

To consider how well the sablefish program maintained or directed benefits toward fishing communities requires data on changes in the sablefish landings by West Coast port over the life of the program. Additionally, an owner-on-board requirement, intended, in part, to direct benefits toward local fishing communities, can be assessed by evaluating changes in the number of entities subject to the provision. The following information was considered or analyzed for this objective:

- Identification of the primary ports where sablefish landings (both primary season landings and landings made in the DTL fishery) are occurring;
- Calculation of a port involvement and dependence ratio; and
- Percent of landings by owner on board versus non-owner on board vessels.

3.2.2 Assessment

Port Involvement. Figure 3-11 displays the involvement of individual port groups in the LEFG sablefish fishery for even years from 1996 through 2012. Involvement is measured as the exvessel value of fixed gear sablefish landings in a port as a share of the total exvessel value of the entire West Coast fixed gear sablefish fishery. Figure 3-12 removes some of the complexity in viewing the pre- and post-program changes by using three-year averages to display the same data. The most significant shifts in involvement appear to be at the northern and southern extremities of the region, with Puget Sound becoming less involved in the fishery in more recent years (in terms of landings to the area) and Morro Bay having increasing involvement. The Brookings area also appears to show a trend toward increased involvement since implementation of the program in 2002. Port Orford is part of the Brookings area and has an active non-profit organization (Port Orford Ocean Resources Team) which seeks to enhance the small fixed gear fishery operating out of that port. The existence of the permit stacking program may have enhanced the ability of the community to influence the development of the fishery in the port and the community's economic future. However, for most ports, no consistent trend is obvious from these figures, and it is not possible to separate the effects of the program from the many other causes of variation in involvement by the port groups.

[4] Objective 17 at the time Amendment 14 was adopted.

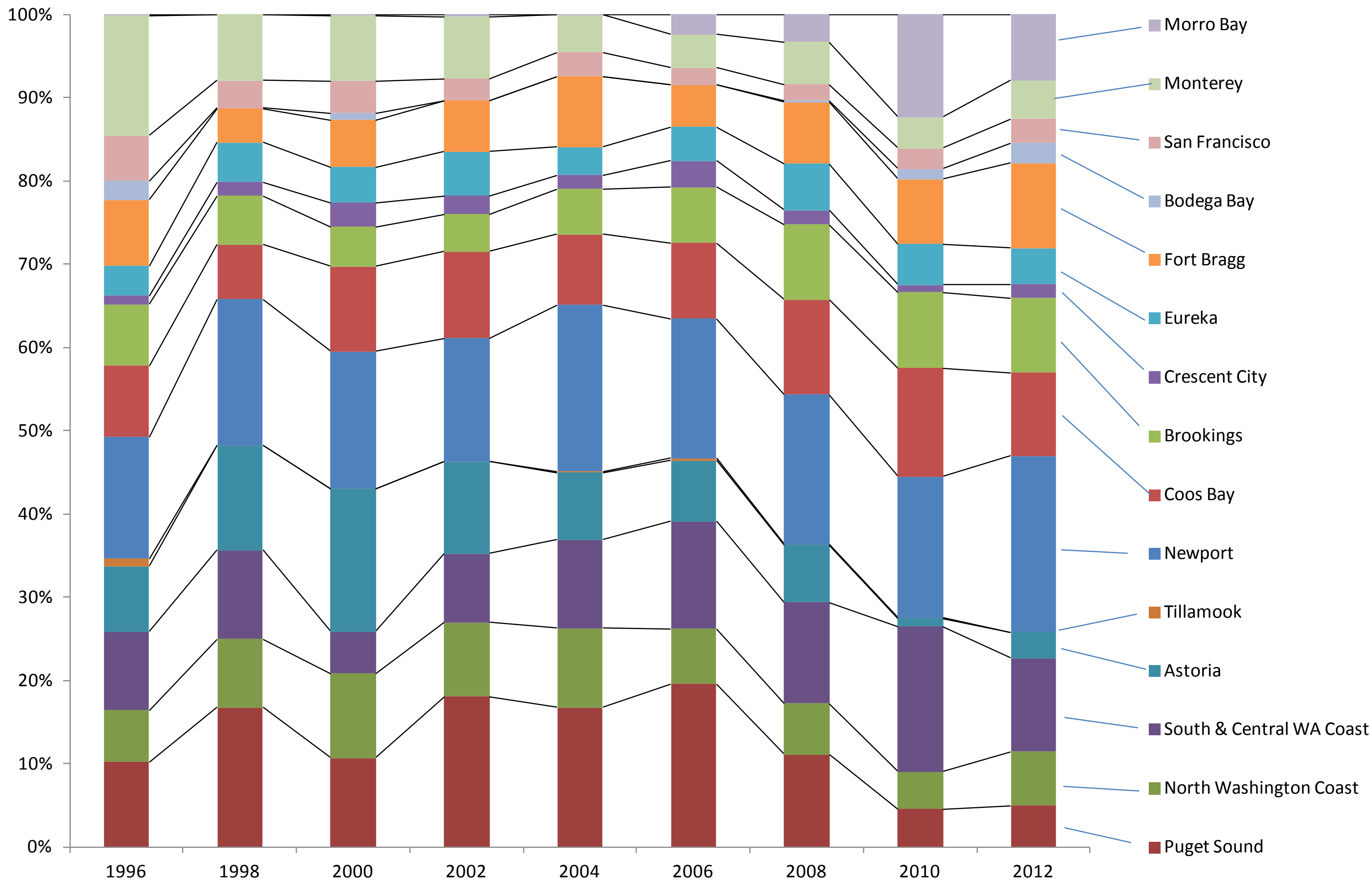

Figure 3-11. Involvement (percent of West Coast exvessel revenue) in the LEFG sablefish fishery by port group (data for even years 1996-2012).

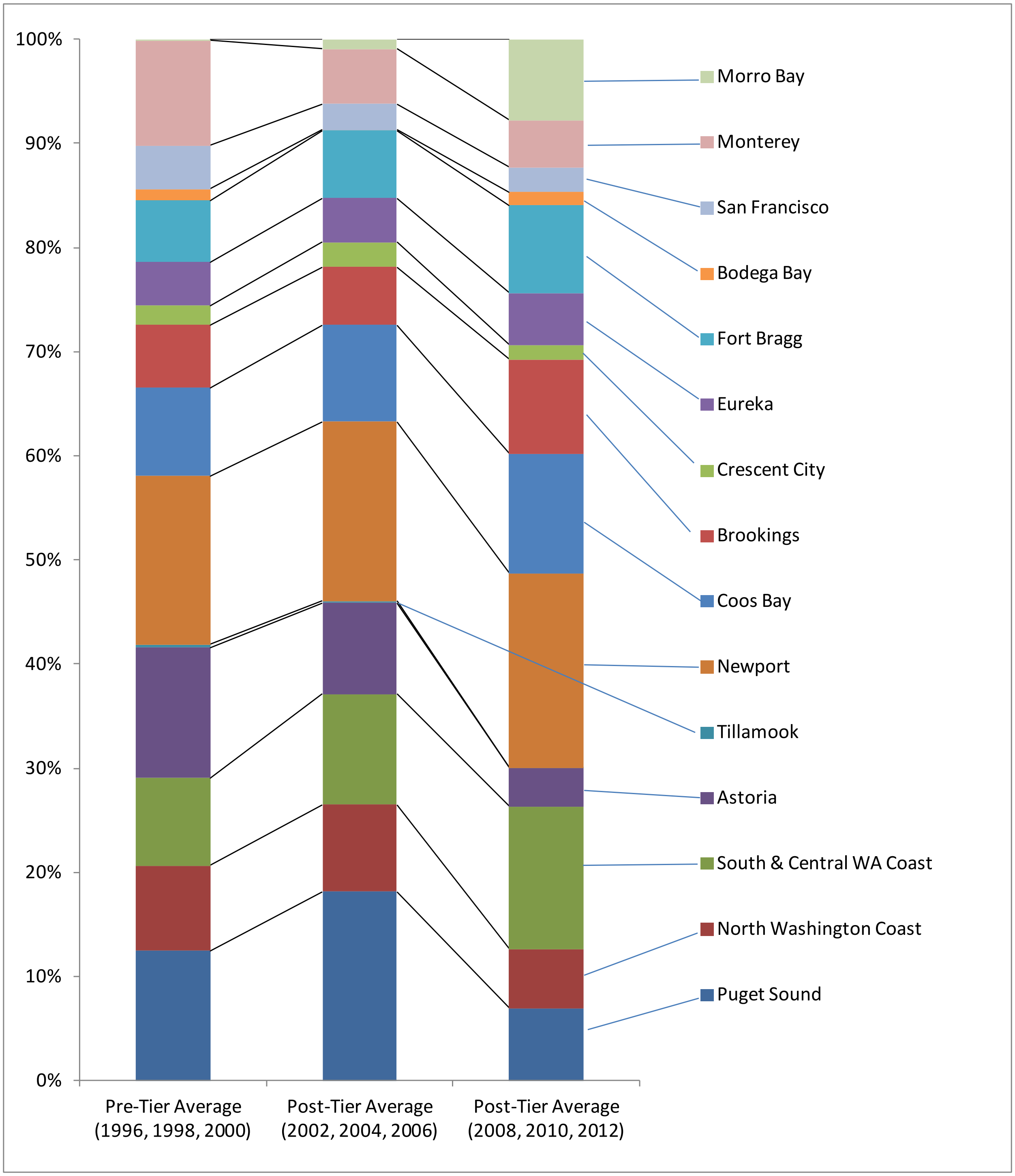

Figure 3-12. Involvement (percent of West Coast exvessel revenue) in the LEFG sablefish fishery by port group in terms of 3-year averages (data for even years 1996-2012).

Port Dependence. Figures 3-13 and 3-14 display the dependence of port groups on revenue from the LEFG sablefish fishery measured as a percent of each port's total landings revenue from all non-tribal fisheries. The pattern for most ports shows annual variation within a range that might be expected given changes in species availability, weather, market forces, and varying allocations. However, a huge spike in revenue dependence for Morro Bay in 2010 (Figure 3-13) may reflect the beginning of The Nature Conservancy exempted fishing permit program under which vessels with trawl permits were authorized to use fixed gear. Trawl landings in Morro Bay dropped to zero in that year, but reappeared in 2011 and 2012.

Another apparent deviation involves ports in Puget Sound which exhibited a significant drop in fixed gear sablefish landings and dependence since 2008 for reasons that are unclear (Figure 3-14). Perhaps there were changes in buying station operations, or vessels changing their main port of landing. ***The drafting team for this document solicits information on the reasons for this deviation*.**

Figure 3-15 displays port dependence in terms of employment (number of jobs). The figure compares the number of jobs provided by the LEFG sablefish fishery with employment generated by the total non-tribal groundfish fishery and the total port area labor force (based on the estimated number of jobs in 2014 (from IO-PAC analysis of the 2015-2016 groundfish management specifications process) and the total work force in 2012 (taken from U.S. Bureau of Labor Statistics county-level data). While the data displayed in Figure 3-15 indicate the sablefish fishery provides a relatively small number of jobs in comparison to the total non-tribal groundfish fishery and coastwide labor force, for a few ports it constitutes a significant proportion of the groundfish labor force, providing 20 percent or more of non-tribal groundfish fishery employment for the port areas of Puget Sound, North Washington Coast, Crescent City, Fort Bragg, Bodega Bay, Santa Barbara, and Los Angeles.

Figure 3-16 displays port dependence in terms of income (total salary and wages). Again these estimates are from IO-PAC analysis of the 2015-2016 groundfish management specifications and data from the U.S. Bureau of Labor Statistics. As would be expected, this data fairly closely mirrors the employment dependence results in Figure 3-15.

Landings Under the Owner-on-board (OOB) Exemption. Table 3-7 shows the distribution of vessels and landings (at 4-year intervals from 2000 to 2012) for vessels controlled by entities that were exempt from the OOB permit requirement. The table shows the number of vessels that participated in the primary fishery with OOB exemptions declined from 2000 to 2008 and remained relatively unchanged from 2008 to 2012. However, the share of total vessels with owners exempt from the OOB provision declined over the entire period and in each of the years displayed. The share of total primary fishery landings accounted for by these vessels also declined during that time, although not as precipitously as the share of total vessels.

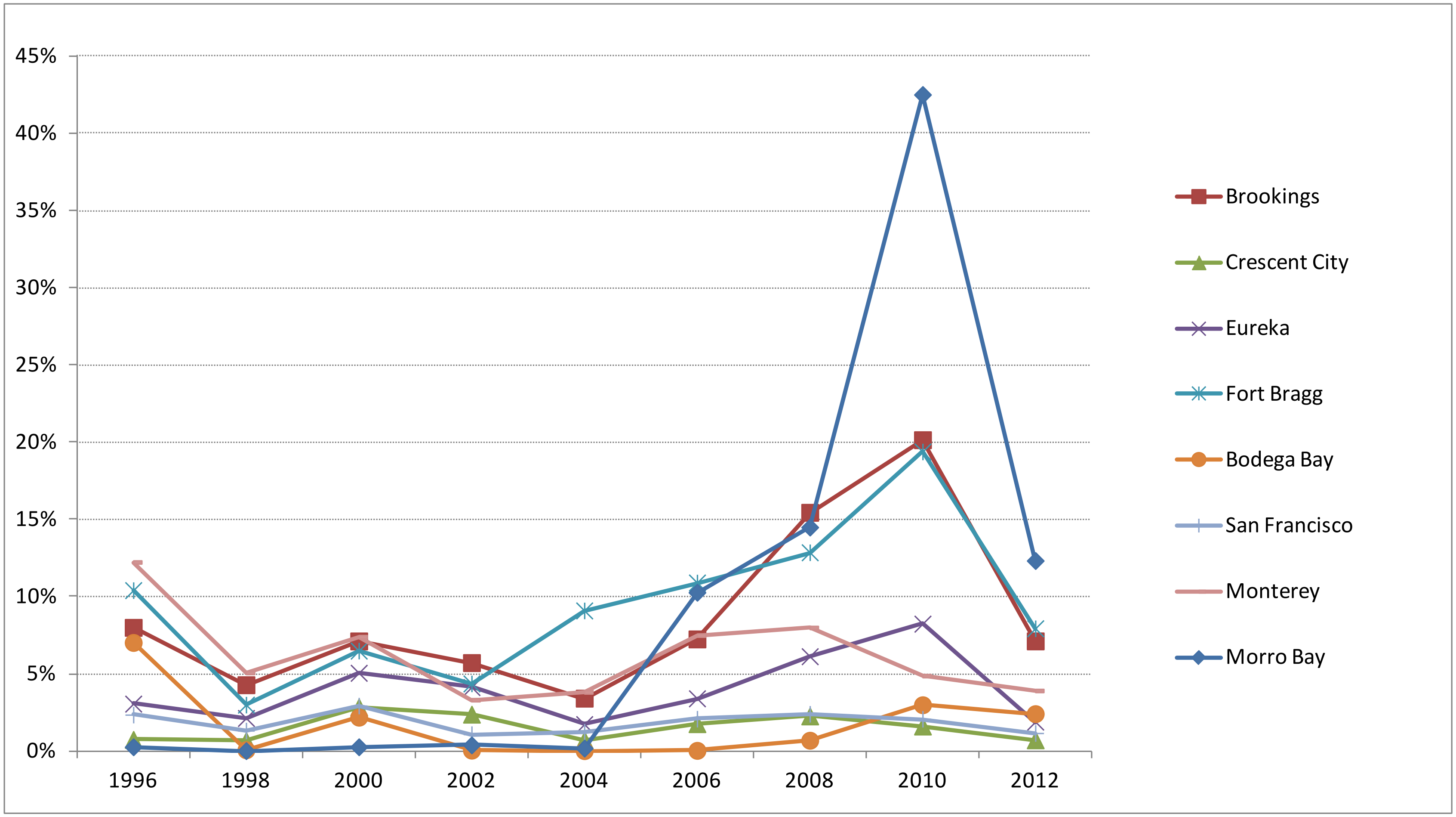

Figure 3-13. Dependence (percent of port total exvessel revenue) on LEFG sablefish landings by port group from Brookings, Oregon to Morro Bay, California (data for even years 1996-2012).

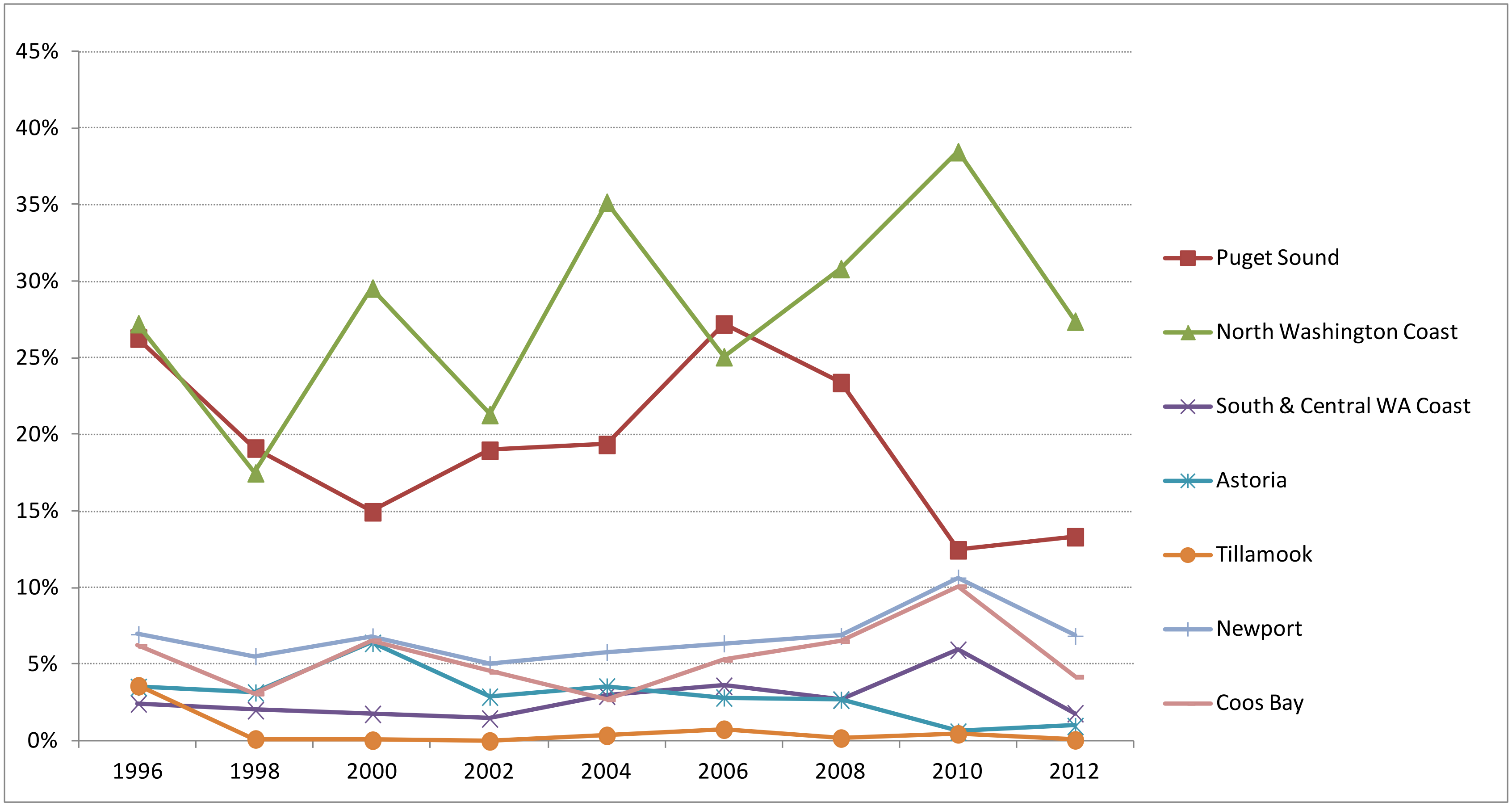

Figure 3-14. Dependence (percent or port total exvessel revenue) on LEFG sablefish landings by port group from the North Washington Coast to Coos Bay, Oregon (data for even years (1996-2012).

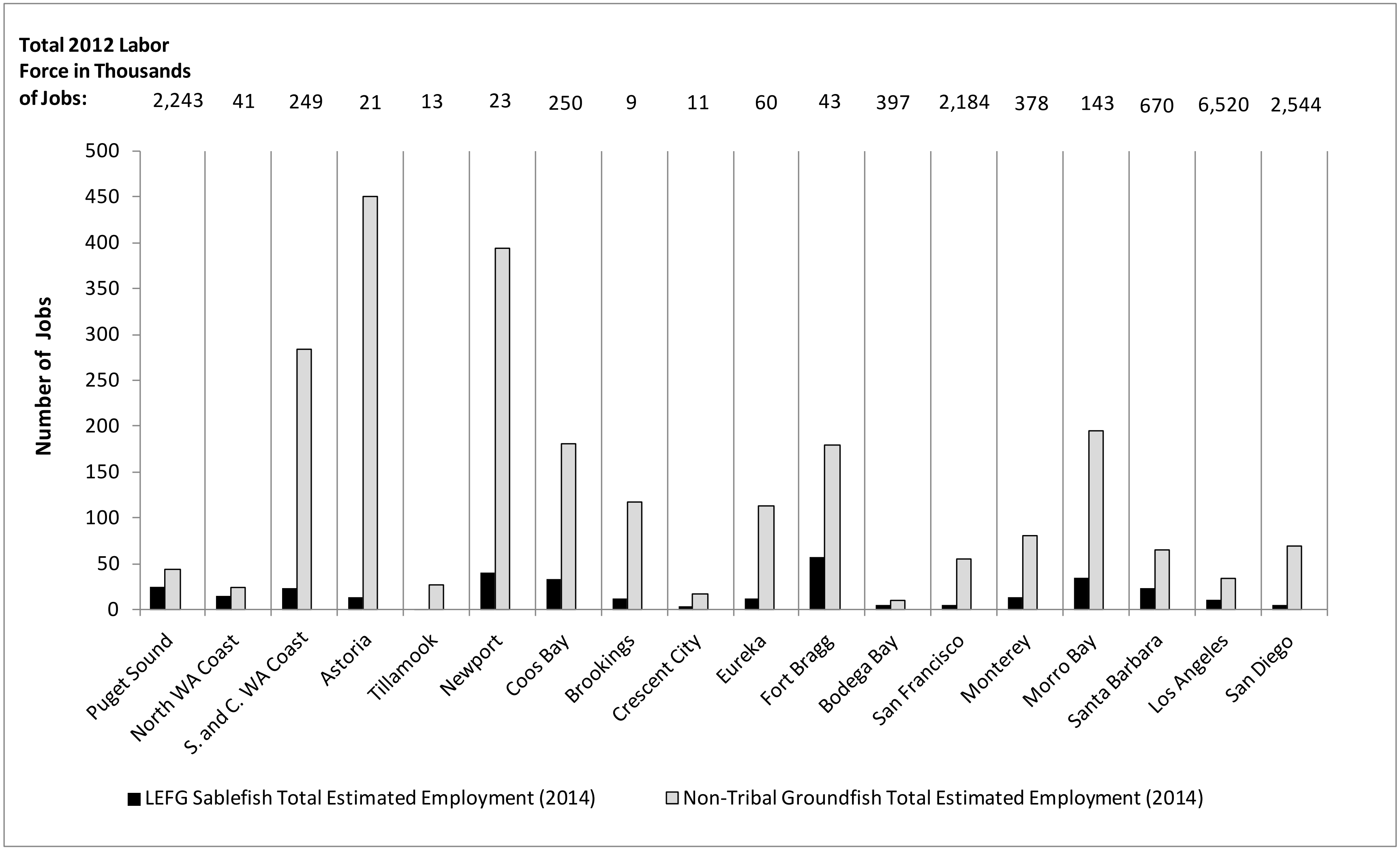

Figure 3-15. West Coast port dependence on the LEFG sablefish fishery in terms of employment (estimated number of jobs using 2014 data) in comparison to employment by the total non-tribal groundfish fishery (2014 data) and the total port-area labor force (2012 data).

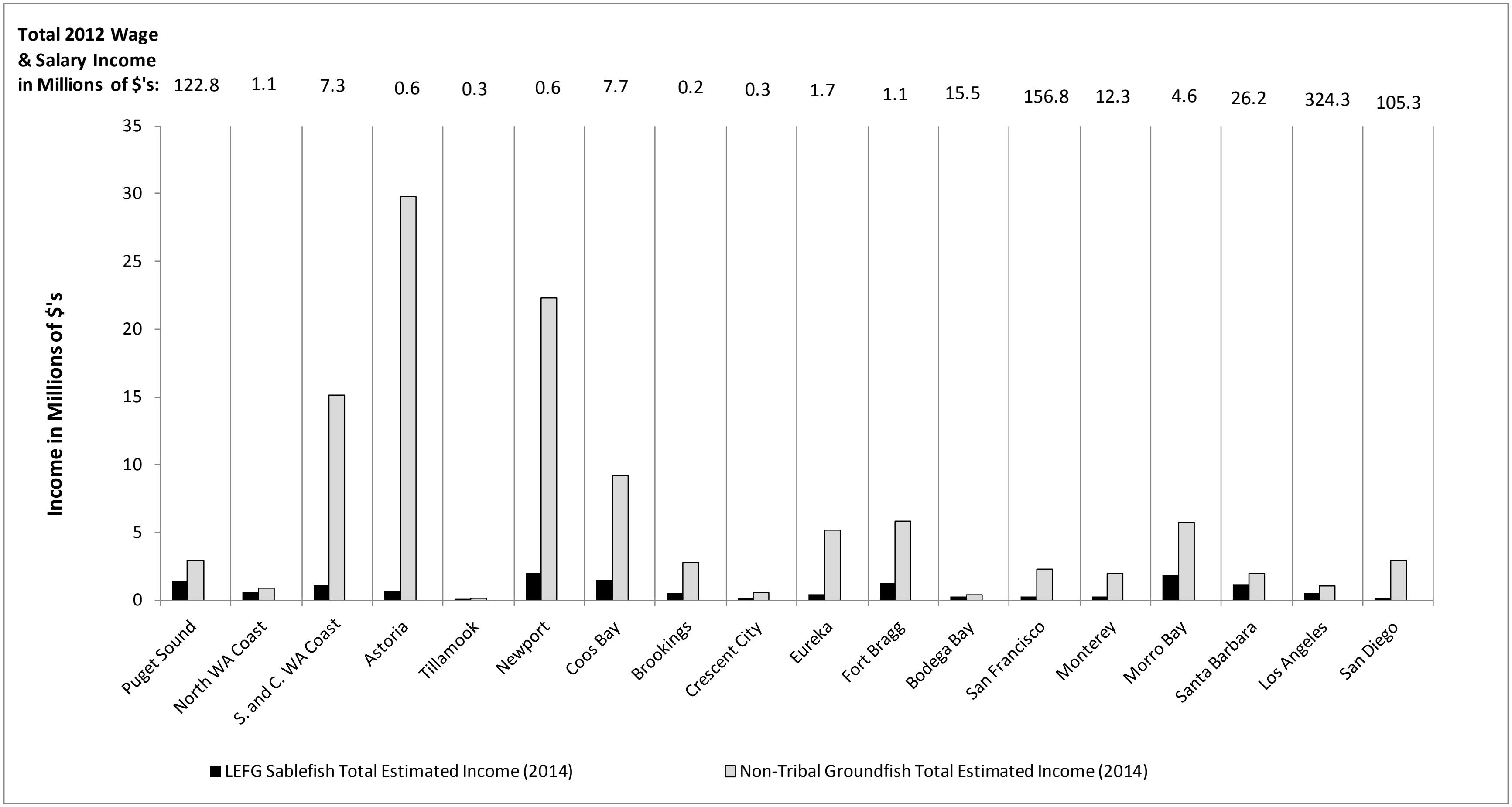

Figure 3-16. West Coast port dependence on the LEFG sablefish fishery in terms of income (wage and salary data for 2014) in comparison to income for the total non-tribal groundfish fishery (2014) and the total port area income (2012 data).

Table 3-7. Summary of landings in selected years by vessels participating in the primary sablefish fishery and operating under permits that were exempt from the owner-on-board requirements.

Year	Vessel Count	Share of Total Vessels	Landings (mt)	Share of Total Landings
2000	131	92.3%	1,160	65.7%
2004	72	78.3%	1,223	62.4%
2008	43	51.2%	687	46.1%
2012	44	45.4%	579	43.2%

3.3 Prevent Excessive Concentration of Harvest Privileges

3.3.1 Background

This objective relates to NS 4 on allocation and NS 8 and FMP Objective 16 on fishing communities. In the Council's effort to reduce capacity in the fishery, did they provide an environment for excessive concentration of the remaining harvest privileges among a few individuals or entities? Such concentration could lead to significant changes in the distribution of fishery benefits among participating communities.

3.3.2 Assessment

One source of insight into whether the sablefish program has prevented excessive concentration of harvest privileges is to examine if there is any apparent pattern to the changes in the ownership or control of permits and vessels in the fishery.

Figure 3-17 displays the Gini coefficients for permit and vessel ownership in the LEFG sablefish fishery for selected years prior to (1998 and 2000) and following (2002-2012) implementation of the permit stacking program. Gini coefficients are indicators of the deviation from an equal distribution. In this case, a Gini coefficient of zero would imply an equal distribution of the ownership of permits and vessels, while a value of 1 indicates that a single participant owns all of the permits or vessels. The range of Gini coefficient values in this case indicates very little change in the concentration of ownership and control of the LEFG sablefish vessels and permits following implementation of the permit stacking program. Comparing the averages of Gini coefficient values for the 2 years prior to the program with the averages of the 4 years post-program indicates increases of less than 5 percent and 10 percent in permit ownership and vessel ownership concentrations, respectively.

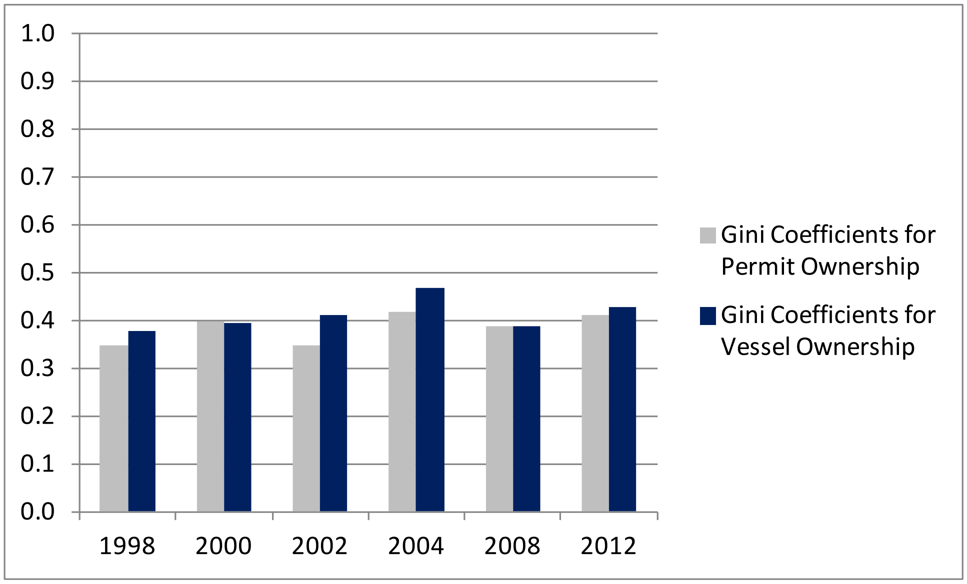

Figure 3-17. Gini coefficients for the concentration of landings in the LEFG primary sablefish fishery by permit and vessel owning entities for selected years before and after implementation of the permit stacking program in 2002.

[Note: A Gini coefficient of 0 implies a perfectly even distribution among all participants, while a coefficient of 1 indicates one owner landed all of the fish.]

3.4 Mitigate the Reallocational Effects of Policies just prior to this Program (e.g., the Three Tier System and Equal Limits)

3.4.1 Background

This very specific objective can really be categorized as a subset of the broader objective of promoting overall equity which is covered in Section 3.5. Both objectives relate to National Standard 4 on allocation, FMP Objective 12 on equitable allocation, and FMP Objective 14 on minimizing disruption.

The regulatory regime prior to Amendment 14 had included a series of partial and short-term policies and actions in an attempt to end the derby fishery during a time when new IQ programs were prohibited by Congress (Table 3-1). In 1997, the regulations substantially flattened the distribution of harvest among vessels in the fleet by giving equal cumulative limits to fishery participants who qualified for LEFG sablefish endorsements. These limits were substantially higher than the maximum landings ever made by many of the lower-level participants and substantially lower than historic landings of the high-liners. The flattening effect of the equal limits in 1997 can be seen by comparing the shapes of the annual lines in Figure 3-7.

3.4.2 Assessment

To assess how well the sablefish program mitigated the effects of the temporary policies used to modify the derby fishery requires comparing the vessel harvests prior to the 1997 equal cumulative limit management regime with harvests following full implementation of the stacking program. The first step toward restoring the prior distribution was the implementation of tiered cumulative limits in 1998. Each sablefish-endorsed permit was assigned to one of three tiers based on its landing history. Tier 1 permits received cumulative limits 3.85 times that of Tier 3 permits, and Tier 2 permits received cumulative limits 1.75 times that of Tier 3 permits. The lines for 1998 and 2000 shown in Figure 3-7 are fairly close together and illustrate some movement away from the 1997 equal cumulative limits line and convergence toward the harvest distributions that occurred during the 1996 derby fishery. Landings during the derby year reflect a typical distribution that occurs when all vessels are on an equal footing with respect to speed of harvest. The final step in mitigating the reallocation effects was implementation of the permit stacking program in August 2001 with its allowance for up to three tier-endorsed permits and their associated tier limits to be stacked on a single vessel. The effectiveness of this policy is illustrated in Figure 3-7 by the trend of the annual vessel harvest distribution lines for the years following program implementation to converge ever closer to the 1996 line. In general, under the derby system, vessels competed on the basis of how quickly and effectively they could fish. The tier system replaced speed of harvest with other economic factors in determining the competitive outcome, resulting in a somewhat similar distribution of harvest concentration.

3.5 Promote Equity

3.5.1 Background

Promoting equity is an overarching objective that includes the objective of the previous section (3.4). Both objectives relate to NS 4 on allocation, FMP Objective 12 on equitable allocation, and FMP Objective 14 on minimizing disruption. The issue of compliance (with the regulations) also bears heavily on this objective. If some fishermen are not complying with the program, they are often viewed as gaining an unfair advantage over other fishermen.

3.5.2 Assessment

Much of this objective was addressed through the re-establishment under permit stacking of the opportunity to achieve a distribution of harvest among vessels similar to the distributions prior to imposition of equal cumulative limits in 1997, and similar to what is seen in many other fisheries (Figure 3-7).

Regarding compliance with regulations, data on the number of permits that were estimated to have had sablefish landings exceeding the permit limit from 2008 through 2013 are shown in Table 3-8. For all tiers taken together, the number of permits fished between 2008 and 2012 ranged from a high of 162 in 2011 down to a low of 158 in 2012[5]. During that time, the number of permits estimated to have landings exceeding their permit limits ranged from a low of 25 in 2012 to a high of 41 in 2009; or a range of 16 percent to 25 percent of total permits in the fishery. A cursory review of data for individual permits did not indicate that it was the same permits that were consistently over (or under) their limits. Also, the amount (percentage) of the overage has generally been quite small over that range of years, as shown in Figure 3-18. These data would tend to support the conclusion that noncompliance is not a significant equity issue for the fishery, and has also not been a significant target of industry comments to the Council. Table 3-8 also shows the percent of pounds landed short of the permit quotas (i.e., the underage) . It is noteworthy that in each year shown in the table the total underage is significantly larger than the total overage, thus resulting in consistent under-harvest of the total allowable quotas in each year of the period (Figures 3-4 and 3-5).

3.6 Resolve or Prevent New Allocation Issues from Arising

3.6.1 Background

This objective relates to NS 4 on allocation and FMP Objectives 12 on equitable sharing and 14 on minimizing disruption.

3.6.2 Assessment

Since implementation of the permit stacking program in 2002, there have been few calls for any changes to the allocations within the fixed gear sector. Most discussion and concern has been with intersector allocations. However, while there was some brief discussion of the intersector sablefish allocation during the Council's formal consideration of its groundfish allocations for Amendment 21, it was decided that, relative to other workload concerns at that time, there was not a sufficient need to reconsider intersector allocations of sablefish.

Within the LEFG sector, 15 percent of the sablefish is set aside for a DTL fishery. There has been some suggestion that this allocation and its management might be revisited, but up until the time this program review was initiated, the interest in modifications has not been sufficient to bring the topic onto the Council agenda.

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[5] The year 2013 was excluded from this comparison since the fishery in that year was not complete at the time of the data query and consequently may be artificially low.

Table 3-8. Comparison of tier quotas to landings in the LEFG primary sablefish fishery, 2008-2013.

				Overage				Underage			
Tier	Number of Permits Fished	Total Tier Quota (lbs)	Tier Limits (lbs)	Percent of Pounds Landed over the Tier Quota	Number of Permits Over	Maximum Overage (lbs)	Avgerage Overage (lbs)	Percent of Pounds Landed under the Tier Quota	Number of Permits Under	Maximum Underage (lbs)	Avgerage Underage (lbs)
All Tiers											
2008	161	3,419,500	-	+0.1%	40	562	111	-4.1%	114	-11,457	-1,217
2009	161	4,335,303	-	+0.2%	41	1,847	199	-5.8%	113	-31,739	-2,232
2010	158	3,911,903	-	+0.2%	36	1,984	172	-5.3%	112	-23,313	-1,860
2011	162	3,385,864	-	+0.6%	28	3,409	671	-7.0%	124	-18,533	-1,904
2012	161	3,270,288	-	+0.4%	25	6,433	538	-10.0%	134	-28,346	-2,452
2013[a/]	131	1,997,251	-	+0.3%	19	1,701	358	-27.1%	112	-27,838	-4,839
Tier 1											
2008	28	1,358,000	48,500	+0.1%	8	194	90	-1.4%	20	-9,599	-926
2009	28	1,716,288	61,296	+0.2%	11	1,847	298	-5.3%	17	-31,739	-5,400
2010	28	1,570,268	56,081	+0.0%	10	115	53	-2.0%	16	-23,313	-1,974
2011	28	1,335,516	47,697	+0.0%	2	93	62	-3.8%	26	-11,330	-1,944
2012	28	1,294,664	46,238	+0.6%	11	6,433	652	-9.9%	17	-28,346	-7,518
2013[a/]	23	793,799	34,513	+0.1%	2	629	438	-31.2%	21	-27,838	-11,810
Tier 2											
2008	42	924,000	22,000	+0.2%	9	562	175	-4.7%	32	-8,250	-1,364
2009	42	1,170,204	27,862	+0.2%	11	872	193	-6.8%	29	-14,427	-2,744
2010	41	1,045,172	25,492	+0.1%	10	441	110	-6.7%	29	-11,234	-2,400
2011	42	910,560	21,680	+1.2%	8	3,409	1,390	-9.5%	28	-18,533	-3,090
2012	42	882,714	21,017	+0.3%	5	2,924	607	-9.0%	36	-17,449	-2,213
2013[a/]	35	549,080	15,688	+0.4%	6	1,701	410	-23.2%	29	-12,654	-4,384
Tier 3											
2008	91	1,137,500	12,500	+0.2%	23	560	94	-6.7%	62	-11,457	-1,235
2009	91	1,448,811	15,921	+0.2%	19	783	145	-5.6%	67	-11,553	-1,206
2010	89	1,296,463	14,567	+0.4%	16	1,984	285	-8.3%	67	-11,430	-1,599
2011	92	1,139,788	12,389	+0.7%	18	1,948	420	-8.7%	70	-9,975	-1,415
2012	91	1,092,910	12,010	+0.3%	9	2,416	361	-11.1%	81	-10,287	-1,495
2013[a/]	73	654,372	8,964	+0.5%	11	1,271	315	-25.5%	62	-8,256	-2,691

a/ On the query date (11/04/2013), data were 90 percent complete in PacFIN--through: August for Washington Department of Fish and Wildlife, September for Oregon Department of Fish and Wildlife, and July for California Department of Fish and Wildlife data.

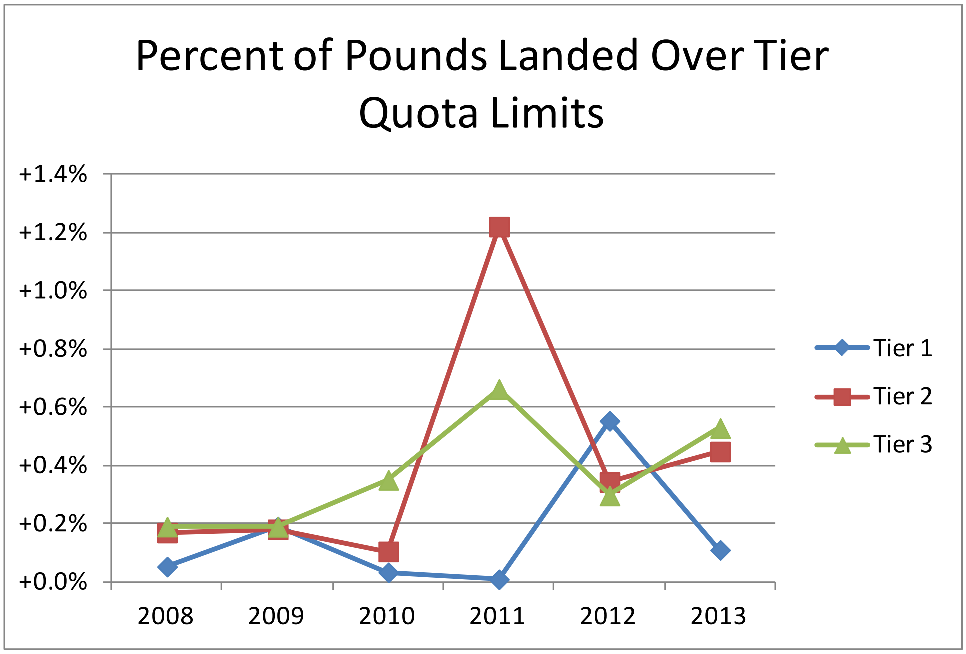

Figure 3-18. Total overage for all vessels with overages as a percent of pounds allocated by tier limit category for 2008-2013. Data for 2013 is incomplete.

3.7 Promote Safety

3.7.1 Background

This objective relates to NS 10 and FMP Objective 17 on safety. Before Amendment 14 was implemented, the LEFG sablefish fishery had become a classic derby fishery, lasting only 5 days in 1996. Such classic derby fisheries are well-known for creating safety hazards. The short seasons provide a strong incentive to fish regardless of the weather in order to get an adequate share of the catch and also encourage taking risks with overloading the capacity of the vessel or to skip important maintenance at inopportune times (National Resarch Council, Marine Board, Committee on Fishing Vessel Safety, 1991).

3.7.2 Assessment

The elimination of the derby fishery through the extension of the season to seven months could be expected to have a positive effect on reducing the pressure to fish under unsafe conditions. Support for this assumption could be inferred from the fact that following implementation of Amendment 14, there has been an absence of anecdotal reports on safety problems associated with the primary fishery, particularly in comparison to the volume of concerns expressed during the derby fisheries of the mid-1990s. However, explicit information on significant safety incidents that might be useful in evaluating the safety record of the fleet before and after implementation of the fixed gear permit stacking program is not readily available.

While the United States Coast Guard (USCG) keeps safety incident statistics, it is only possible to isolate those statistics by date, geographic area, and broad fishery categories (e.g., groundfish, salmon, etc.). Available data bases of past incidents do not provide direct information on the fishery in which a vessel involved in an incident was participating (particularly when events prevented a vessel from making a landing). However, the incident report required (of the vessel operator and any insurance company) in current Federal law (Title 46 Part 28.80) now includes information on the specific fishery, intended catch, and length of fishery opening. This may help to make more fishery-specific data available in the future.

Table A.3 in the Council's Fishery Ecosystem Initiatives Appendix to the Pacific Coast Ecosystem Fishery Plan (PFMC, 2013) uses USCG vessel incident data to display recorded vessel incidents by FMP (e.g., groundfish, salmon, etc). However, the data do not identify the specific season or fishery in which the incidents occurred. The available data primarily cover a time period after implementation of the permit stacking program.

The Northwest Fisheries Science Center is currently conducting an assessment that examines fishery and permit data, available incident report data from the USCG, and certain weather information in an attempt to provide more specific insights into the safety effects of the LEFG sablefish permit stacking program within the primary sablefish fishery. The preliminary results of the assessment have been made available as a working paper (Pfeiffer & Gratz, 2014) with the intent of issuing the final report as a NMFS technical publication. The authors used USCG incident databases filtered by location, timing, and vessel and permit information to try to isolate reported incidents which are likely to have occurred during the primary sablefish fishery from 1994 through 2012 (Figure 3-19). While the number of incidents appears to have generally declined after the permit stacking program, the number of reported incidents is small (four or fewer per year) and, as such, random events may appear significant. Figure 3-20, also from the working paper, shows that the proportion of trip starts under high wind advisories appears to have declined and remained consistently smaller than during the pre-program period.

Figure 3-20 also shows that the proportion of trip starts under high wind advisories in the mop-up fishery was lower than it was for the initial short (derby) seasons in years prior to the program.[6] The results of the assessment would seem to help confirm an improvement in safety following initiation of the permit stacking program. The report authors hope to continue working to discern the safety effects from various other factors that would influence these statistics, such as vessel size, expected costs and revenues, and alternative fishery opportunities.

[6] Mop-up fisheries provided IQ to the permit holders and thus were similar to the current permit stacking program.

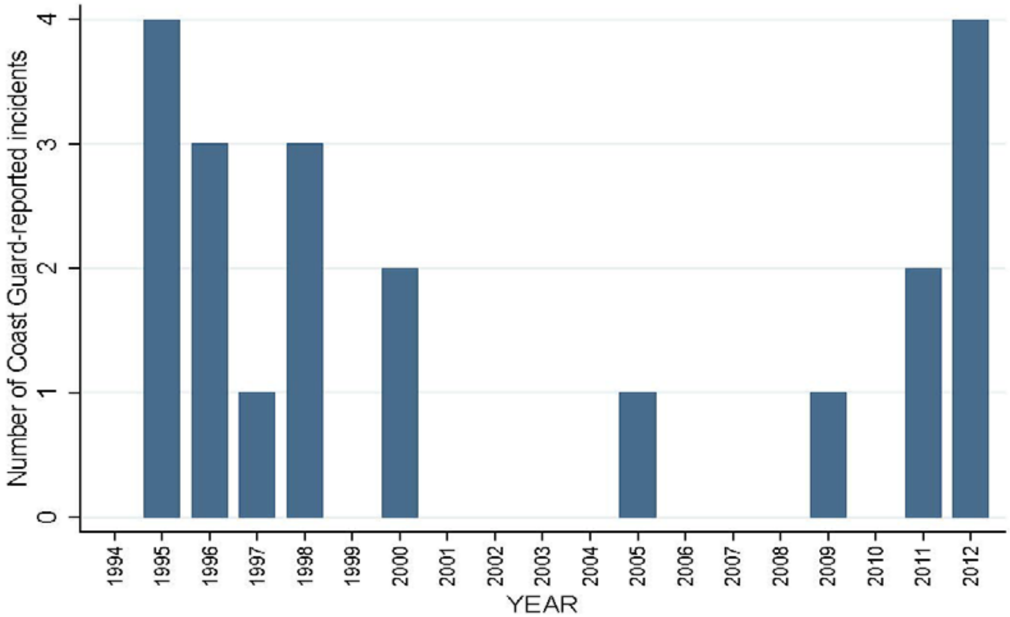

Figure 3-19. Number of USCG-reported incidents in the LEFG primary sablefish fishery (from Pfeiffer and Gratz, 2014).

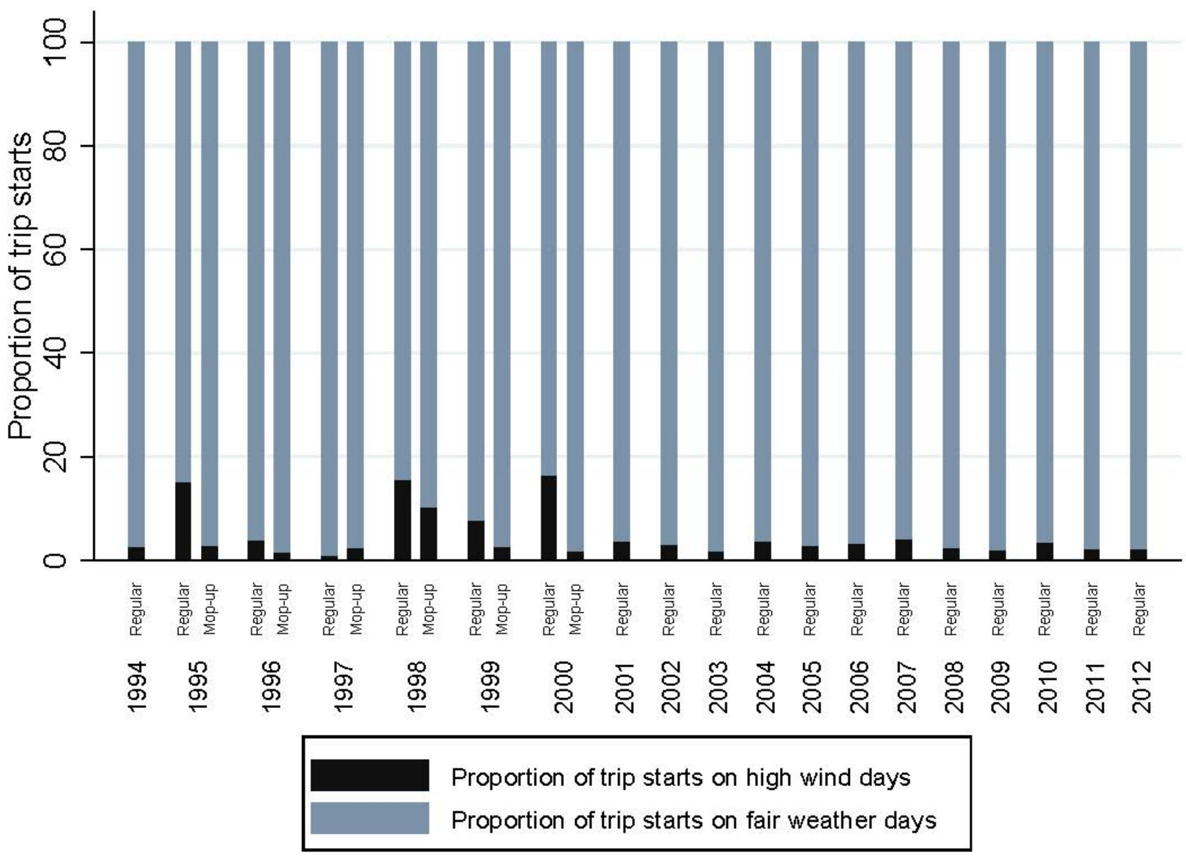

Figure 3-20. Proportion of trip starts on high wind days and fair weather days (from Pfeiffer and Gratz, 2014).

3.8 Improve Product Quality and Value

3.8.1 Background

This objective relates to NS 5 on efficiency and FMP Objective 6 on net national benefits. Determining achievement of this objective could be reflected by changes in the sales price and volume of sablefish after implementation of Amendment 14. However, changes in exvessel price (the most readily-available data) are strongly driven by market conditions which might overshadow any effects resulting from a change in product quality. For example, sales volumes and prices for some species have been influenced by shifts in fuel prices which affect transportation costs, and also by the recent worldwide recession because species like sablefish are essentially luxury goods. An analysis of the difference between exvessel prices for fixed-gear-caught and trawl-caught sablefish during the derby years, compared with the price differential between these gears after implementation of the permit stacking program could provide some limited insight. A widening gap might indicate an improvement in the quality of fixed gear-caught sablefish. Larger fish generally bring higher prices and might be considered a higher quality. Size of fish landed may also be increased by gear selectivity or high-grading, which the longer season may facilitate. However, unfortunately, there is no consistent and reliable fish ticket information on the size of fish landed.

3.8.2 Assessment

Figure 3-21 displays average annual exvessel sablefish prices (revenue per round weight pound) by gear type in inflation-adjusted 2013 dollars. The longline and pot gear prices are heavily weighted by, but not exclusive to, landings in the LEFG primary sablefish fishery. Relative to trawl landings, the size of the price differential for longline and pot gear landings does not seem to show any significant change after the permit stacking program was initiated and, as stated above, is likely to be influenced by market conditions and other factors to a greater extent than by events in the West Coast sablefish fishery. There may be some stabilization of the price differential between gear types following the implementation of the permit stacking program in 2002 through 2010 (Figure 3-22). This stabilization may reflect harvesters' increased ability to tailor deliveries to meet market demand and thereby garner better prices, rather than being solely at the mercy of whatever prices prevailing market conditions happened to present during the relatively short seasons prior to 2002. Between 2009 and 2011, exvessel prices for all three gear types showed a rapid upward trend to reach their highest levels in inflation-adjusted terms since the beginning of the time series, before falling in 2012 (Figure 3-21). Figure 3-22 also shows a dramatic departure since 2010 in the price differential for longline gear-caught sablefish compared to the price differential earned for pot-gear landings. ***At this time the drafting team does not have an explanation of the reasons for the recent price trends.***

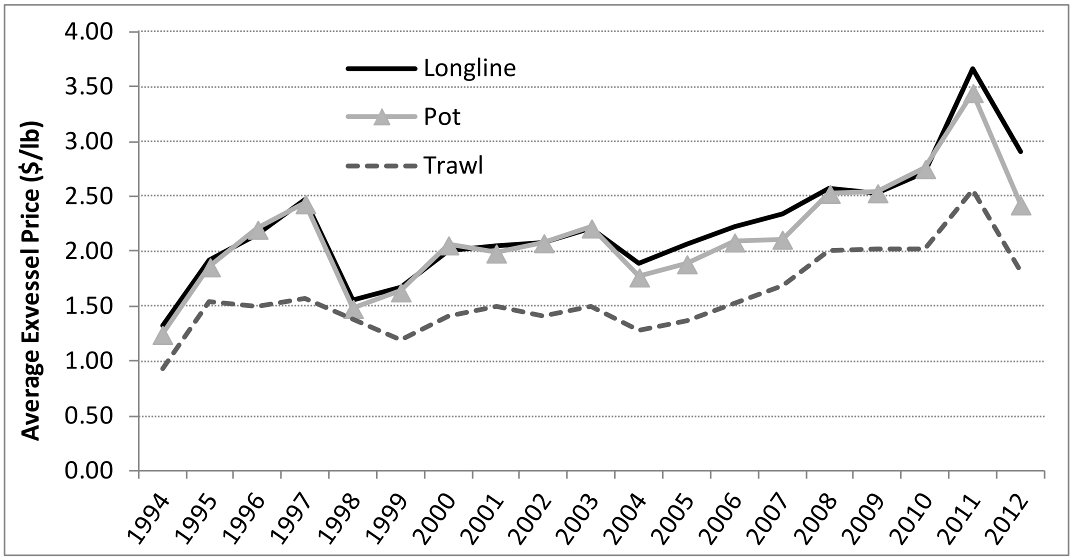

Figure 3-21. Average annual exvessel sablefish prices by gear type in inflation-adjusted 2013 dollars per pound (1994-2012).

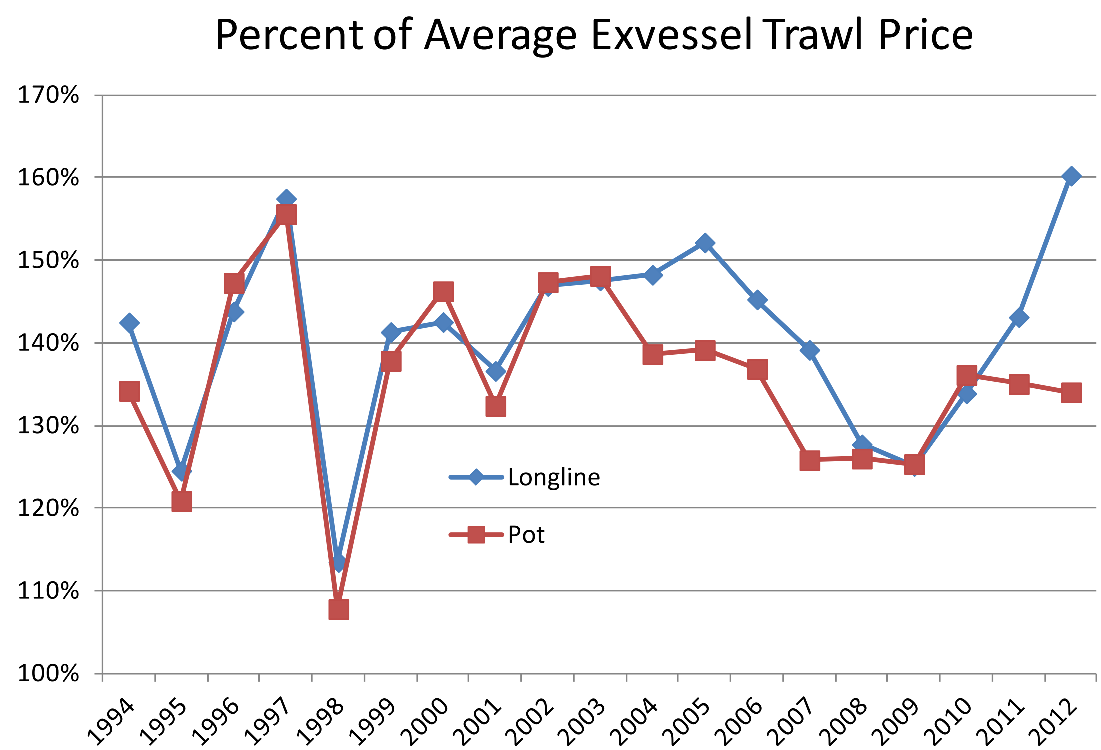

Figure 3-22. Average annual exvessel prices received for sablefish caught by longline and pot gear expressed as a percent of prices received for trawl-caught sablefish: 1994-2012 (inflation-adjusted 2013 dollars per pound).

3.9 Avoid Creating Substantial New Disruptive Effects

3.9.1 Background

This objective relates to FMP Objective 15 that directs the Council when considering alternative management measures to choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and environment. The Council moved toward the permit stacking program because the existing derby fishery and initial limited steps available to deal with it were a significant cause of disruption to the historical fishery.

3.9.2 Assessment

The derby fishery and equal cumulative limit management system that the permit stacking program replaced were extremely disruptive. The Council and industry were mostly in accord with moving to the permit stacking program. When the new program was proposed for implementation, only seven entities provided formal comments on the proposed rule (two state agencies, one commercial organization, and four individuals). Public comment generally included overall positive comments about the program. Dissent generally concerned specific issues relating to a few individuals (e.g., permit allocation, ownership or control, and owner-on-board requirements). The comments were generally split between support or opposition to the owner-on-board requirement, the limit on the number of permits that could be stacked, and the restrictions on processing at sea.

Not only did the permit stacking program avoid new disruption, it replaced the ongoing disruption of a derby fishery and equal cumulative limits with a much more efficient program that was more compatible with the existing fishing industry stakeholders. The objective was achieved with program implementation that allowed for a longer, more reasonable fishing season, and by allowing fishermen to acquire and stack permits rather than directly changing the allocation among permits. Given that permit caps (tier limits) were already in place, the creation of a longer season allowed participants to have more flexibility in when they went fishing. At the same time, the allowance for tiers based on fishing history and the capability to stack permits limited disruption of former practices and provided sufficient flexibility to meet the different and changing needs among the fishermen. In the 12 years the program has operated, the Council has received little, if any, complaint about disruption caused by the program.

3.10 Create a Program that Will Readily Transition to a Multi-month IQ Program

3.10.1 Background

The type of program created for the sablefish fishery assists in attaining capacity reduction recommendations in the Groundfish Strategic Plan and responds to NS 6 (take into account variations and contingencies). Individual harvest quotas that are transferable provide the fleet with substantial flexibility to respond to changing conditions in the fishery or to changes faced by individual fishermen. The properties of transferability and divisibility also address NS 5 (efficiency) and FMP Objective 6 (achieving the best possible net economic benefit).

3.10.2 Assessment

At the time it was implemented, the permit stacking program transitioned to a multi-month catch share program with a season that is seven months long. To date, there have been no moves to consider allowing the sablefish tiers to be separated from permits or divided into smaller units, such that the permit stacking program would resemble a more typical IFQ program. While such divisibility could be added to the program, this might diminish achievement of other standards and objectives. Net effects would have to be assessed during consideration of such a change.

While there have been no Council actions or discussions regarding a transition to a more typical IFQ program, the objective of Amendment 14 was to create a program that could readily make such a transition, not necessarily to make the transition. The existence of an already-implemented allocation among permits addresses one of the major challenges for new catch share programs (the initial allocation). On that basis, this objective might be considered to have been met.

3.11 Management Costs and Cost Recovery

The MSA requires LAPPs to develop a methodology and means to identify and assess cost of management, data collection and analysis, and enforcement programs that are directly related to and in support of the LAPP. Further, the Secretary of Commerce is authorized to establish and collect fees paid by holders of limited access privileges that will cover the costs of management, data collection and analysis, and enforcement activities; not to exceed 3 percent of the ex-vessel value of the fish harvested under the program. The LEFG sablefish program was established prior to the addition of these requirements in the MSA and, to this point, a means to identify costs or policies to establish a cost recovery program have not been developed.

Prior to the program review, incremental costs associated with this LAPP were likely minimal, although at this time no quantitative assessment of incremental costs has been done. However, certain actions being considered during this review process would implement an electronic fish ticket and modify the control rules. Also, the Council has taken action to allow trawl and LEFG-endorsed permits to be registered to the same vessel at the same time. These actions may introduce additional incremental administrative costs. For example, implementation of modified control rules could require collection of additional information on the vessel ownership interest form (or a new form), as well as new database programming requirements that would take time and would require additional funding to implement. These are examples of additional incremental costs that could be tracked and partially recovered through implementation of a cost recovery program for the LAPP.

4.0 RESEARCH NEEDS

At the Council's April 2014 meeting, the SSC recommended the following future research to add further insight into the LEFG sablefish tier permit fishery.

1. Routine collection of permit sale prices to indicate the market value of the fishery.

2. Collect information about crew, captains, and owners of vessels. Information about the county of residence and participation in the fishery is necessary to understand the regional economic impacts of the fishery (for models such as IO-PAC), and to estimate the number of people who directly work in the fishery. This information will also assist in an evaluation of the community effect of the owner-on-board requirement.

5.0 PRELIMINARY CONCLUSIONS AND QUESTIONS

5.1 Preliminary Conclusions

Overall, this review supports the conclusion that the LEFG sablefish permit stacking program, adopted under Groundfish FMP Amendment 14, has been mostly successful in achieving a significant majority of the goals and objectives intended by the Council. The work group drafting this review believes that sufficient information and data are available to classify eight of the Council's ten objectives as significantly achieved. Two objectives could not be adequately assessed to sufficiently indicate a probable result. However, existing data and anecdotal information suggests that the Council's actions were at least neutral in regard to these two objectives. Table 5-1 summarizes the work group's conclusions.

Table 5-1. Preliminary conclusions of the work group on the success of the Council's LEFG sablefish permit stacking program.

Objective	Assessment Summary and Preliminary Conclusions
1. Rationalize Fleet and Promote Efficiency (Significantly Achieved)	• Significantly lengthened seasons and ended derby fishery (Table 3-1 and Figure 3-1). • Reduced number of participating vessels (Figure 3-2) while: ◦ Improving the ability of the fleet to achieve, without exceeding, the overall harvest allocation (Figures 3-4 and 3-5); ◦ Allowing appropriate flexibility in how permits are stacked and fished (Tables 3-2 through 3-4); and ◦ Allowing a similar concentration of landings as the original fishery (Figures 3-6, 3-7, and 3-8).
2. Maintain or Direct Benefits toward Fishing Communities (Limited Assessment; Likely Neutral Effect)	• Appears to be a possible decrease in involvement of Puget Sound in recent years and an increase in Brookings and Morro Bay. Landings data are extremely variable and program effects cannot be clearly separated from other sources of variation (Figures 3-11 through 3-14).

Objective	Assessment Summary and Preliminary Conclusions
3. Prevent Excessive Concentration of Harvest Privileges (Significantly Achieved)	• Gini coefficients indicate little change in the concentration of permit and vessel ownership after implementation of the permit stacking program. Comparing the averages of the years prior to the program with the averages of the years post-program indicates increases of less than 5 percent and 10 percent in permit and vessel ownership concentrations, respectively (Figure 3-17).
4. Mitigate the Reallocational Effects of Policies just prior to this Program (Significantly Achieved)	• Maintained a similar concentration of landings as the original fishery (Figures 3-7 and 3-8).
5. Promote Equity (Significantly Achieved)	•Maintained a similar concentration of landings as the original fishery (Figures 3-7 and 3-8). • Estimates of landings exceeding tier quota limits are very small and there does not appear to be a consistent pattern of offending permits over time (Figure 3-18 and Table 3-8).
6. Resolve or Prevent New Allocation Issues from Arising (Significantly Achieved)	• Few calls for any changes to the allocations within the fixed gear sector. • During formal consideration of groundfish allocations for Amendment 21, Council decided that there was not a sufficient need to examine reallocations of sablefish among sectors.
7. Promote Safety (Significantly Achieved)	• Significantly lengthened season and eliminated the derby fishery (Table 3-1 and Figure 3-1). • USCG incident data and estimates of trip starts under high wind conditions indicate generally safer vessel operations (Figures 3-19 and 3-20).
8. Improve Product Quality and Value (Limited Assessment)	• Changes in exvessel prices do not indicate a significant change in product value and are driven by numerous variables outside the scope of this study. However, since the inception of the program there may have been stabilization in the relative price differential between fixed gear and trawl-caught sablefish (Figures 3-21 and 3-22).
9. Avoid Creating New Disruptive Effects (Significantly Achieved)	• Created season of reasonable length without changing allocations, by allowing flexibility with permit stacking.
10. Capability to Readily Transition to a Multi-Month IQ Program (Significantly Achieved)	• Allocations are already established (a difficult first step in an IQ program) and could be transitioned to a more typical IQ program (with divisible quota freely transferable separate from the limited entry permits) if the need arises. Thus far the program is working well enough that there has been no call for a transition.

5.2 Questions for Constituent Comment

The data examined in this review raised some questions that were not readily explainable. The drafting team encourages fishermen, stakeholder, and industry input on any of the following questions that they may be able to answer or share some insights on.

1. The number of Tier 3 permits stacked with two other permits increased consistently from the initiation of the program through 2008, but declined thereafter. What may have caused the significant decrease that occurred from 2008 to 2012? During that time the occurrence of Tier 3 permits that were triple stacked dropped from 43 down to 22, almost as low as in the first full year of the program (Table 3-4).

2. What may have caused the apparently significant drop in fixed gear sablefish landings and dependence for Puget Sound ports since 2008 (Figure 3-14)?

3. Is other fishery or processor information available concerning improvement in product quality or size of fish under the stacking program (e.g., targeting by location or depth, different product forms, etc.)?

4. What might be the cause of the rapid increase in longline-to-trawl exvessel price differential for sablefish since 2010 that is not shared by the pot gear landings (Figure 3-22)?

6.0 COUNCIL RECOMMENDATIONS

[To be developed at the Council's June 2014 meeting and included in the final review document released following Council consideration.]

Some examples of potential recommendations would be:

1. Consider the possibility of making the following program changes for Phase 2 of the review (beyond the two already under consideration in Phase 1, i.e., ownership and control limits and electronic reporting):
    a. ?
    b. ?

2. Schedule another review within the next 7 years required for LAPPs.

3. Other

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ATTACHMENT

Net Revenue Earned in the West Coast Limited Entry Fixed Gear Groundfish Fishery and Primary Sablefish Fishery During 2010

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May 2014

I. Introduction

This paper provides estimates of total cost net revenue earned by commercial catcher vessels in the West Coast limited entry fixed gear groundfish fishery, West Coast limited entry fixed gear sablefish fishery, and the West Coast primary sablefish fishery. Estimates of total cost net revenue are based on 2010 cost earnings data collected by the Northwest Fisheries Science Center (NWFSC) in cooperation with the Pacific States Marine Fisheries Commission (PSMFC).

Since the cost earnings survey collected cost data at the vessel level and most of the vessels considered in this paper participate in multiple fisheries, producing estimates of total cost net revenue at the fishery level requires allocating joint costs to individual fisheries. This paper allocates the costs incurred by catcher vessels responding to the cost earnings survey to individual fisheries. After cost data has been allocated to individual fisheries, it is used to calculate the total cost net revenue derived from operations in individual fisheries.

II. Data Requirements and Cost Earnings Survey Data

A. Defining Revenues and Costs Directly Related to Commercial Fishing Vessel Operation

Estimating total cost net revenues earned by operating a commercial fishing vessel requires data on vessel revenues and costs. Since the same entity that owns a commercial fishing vessel may also be engaged in any number of other fishing related or non-related activities, it is important to define which revenues and costs are included in the measurement of net revenue.

The NWFSC economic data collection program focuses on collecting revenue and cost information directly related to the operation of a commercial fishing vessel. There are a variety of costs that are associated with running a catcher vessel that are not requested on the form because it is difficult to determine the share of the cost associated with the vessel. These costs include items that can be used for activities other than fishing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, pickup trucks, storage of equipment, professional fees, and marketing. In general, the data collection forms attempt to capture costs that are directly related to vessel maintenance and fishing operations, and not costs that are related to activities or equipment off the vessel. For these reasons, the aggregated measures of costs (variable costs, fixed costs, and total costs) underestimate the true costs of operating a business.

Since most vessels considered in this paper operate in multiple fisheries, much of the available cost data pertain to multiple fisheries. While some of the costs, such as vessel repairs and maintenance, are joint costs, other costs, such as fuel, are not necessarily joint costs but are not reported separately by fishery in the survey[7] While it is not necessary to disaggregate costs in order to analyze net revenue for all vessel operations, it is necessary in order to analyze net revenue associated with operations in the West Coast limited entry fixed gear groundfish fishery, the West Coast limited entry fixed gear sablefish fishery, and the West Coast primary sablefish fishery.

B. Data Sources

Data on ex-vessel revenue, landings, and number of active vessels in each fishery considered in this analysis was obtained from the Pacific Fisheries Information Network (PacFIN). Cost information for catcher vessels was obtained from a voluntary cost earnings survey conducted by the NWFSC in cooperation with the PSMFC. Survey responses were obtained from 67 of the 142 (47%) vessels participating in the limited entry fixed gear groundfish fishery during 2010 and 53 of the 90 vessels (59%) participating in the primary sablefish fishery during 2010. Table 1 provides a list of the cost categories collected from catcher vessels by this survey.

C. Testing and Correcting for Non-response Bias

A two sample t-test was used to determine whether the differences observed between survey respondents and non-respondents were statistically significant. The two sample t-test is based on a null hypothesis that the mean value of the variable being tested is the same for respondents and non-respondents. Variables considered when testing for non-response bias were vessel length, engine horsepower, West Coast sablefish revenue, and West Coast landings revenue from all species.

Tests for non-response bias indicated that non-response bias was statistically significant at the 91% confidence level for the limited entry fixed gear fleet. Therefore, the responses to the limited entry fixed gear survey were weighted in order to reduce non-response bias. Survey weights were based on the species that accounted for the most vessel landings and the dollar value of West Coast landings. Non-response bias for the limited entry fixed gear fleet resulted from higher response rates for vessels that participate in the primary sablefish fishery (and have a higher level of landings) than vessels that participate in other groundfish fisheries (such as the live thornyhead fishery).

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[7] Joint costs are production costs incurred by the firm when two or more outputs are jointly produced. Joint costs can occur when the cost of an input is a fixed cost and when that input is used to produce multiple outputs either concurrently or consecutively. In the case of concurrent outputs, a variable cost can be a joint cost. Repair and maintenance costs that prepare the vessel for use in all fisheries are joint costs. If a single trawl tow harvests both sablefish and Dover sole, the fuel used to harvest the sablefish and Dover sole from the same tow is a joint cost. However, fuel costs incurred to harvest sablefish in July and crab in December would not be a joint cost even if fuel expense is reported on an annual basis.

III. Calculating Fishery Costs

This section presents the methodology used to allocate costs reported on the 2010 cost earnings survey for vessel operations to individual fisheries. Because cost data collected from the limited entry groundfish fixed gear fleet covers vessel operations in all fisheries, it is necessary to allocate reported cost data to individual fisheries for vessels participating in multiple fisheries in order to obtain cost data for individual fisheries. Allocating costs to individual groundfish fishery is necessary to calculate the total cost net revenue earned by participants in the fishery.

Terry et al. (1996) identify three properties any cost allocation method should satisfy. First, a cost allocation method should be the same for all fisheries in which a commercial fishing vessel participates. Second, the cost allocation method should be simple and easy to understand (in order to promote trust in the analysis). Third, the cost allocation method should be equitable. They recommend the use of facilities method (UFM) of cost allocation, which allocates costs to fisheries in proportion to the use of common facilities by each fishery. Three methods of implementing the UFM method of cost allocation are (i) by days at sea in each fishery, (ii) by revenue earned in each fishery, and (iii) by pounds harvested in each fishery. For information on the method used to allocate each cost category to individual fisheries, see Appendix A of Steiner, Harley, and Lee (2014).

IV. Net Revenue

Table 2 presents estimates of total revenue, total costs, and total cost net revenue derived from survey respondents participating in the limited entry fixed gear groundfish fishery, the West Coast limited entry fixed gear sablefish fishery, and the West Coast primary sablefish fishery. The 67 survey respondents participating in the West Coast limited entry fixed gear groundfish fishery earned revenue of $109,801 per vessel, incurred $95,271 in costs, and earned $14,530 in total cost net revenue. When the per vessel total cost net revenue of $14,530 for survey respondents is multiplied by the population of 142 vessels in the fishery, an estimate of $2,063,260 total cost net revenue earned in the West Coast limited entry fixed gear groundfish fishery is obtained.

The average survey respondent earned $94,380 revenue in the West Coast limited entry fixed gear sablefish fishery (which includes both the primary sablefish fishery and the daily fishery). The average vessel incurred $81,338 in costs from operations in this fishery, and earned $13,042 in total cost net revenue from these operations. When the per vessel total cost net revenue of $13,042 is multiplied by the 139 vessels participating in this fishery, an estimate of $1,812,838 is obtained for total cost net revenue earned by all fishery participants.

Among the 53 survey respondents who participated in the primary sablefish fishery, the average revenue earned in the primary sablefish fishery was $123,362. The average vessel incurred costs of $105.203 from operations in the primary sablefish fishery and earned total cost net revenue of $18,159. When the per vessel total cost net revenue of $18,159 is multiplied by the 90 vessels participating in the fishery, an estimate of $1,634,310 in total cost net revenue is obtained for the primary sablefish fishery during 2010. During 2010 the primary sablefish fishery earned 90% of the total cost net revenue earned in the limited entry fixed gear sablefish fishery and 79% of the total cost net revenue earned in the limited entry fixed gear groundfish fishery.

V. Variations by Vessel Size and Geography

The data reported in Table 2 provides an estimate of total cost net revenue across all vessels operating in each fishery. This section examines how total cost net revenue earned by survey respondents varied by length of vessel and state in which the vessel made the most West Coast landings. This comparison is provided for the limited entry fixed gear groundfish fishery and the primary sablefish fishery.

Table 3 classifies each survey respondent as having a vessel less than 35 feet in length, 35 to 50 feet in length, or over 50 feet in length. Within the limited entry fixed gear groundfish fishery, total cost net revenue per vessel rises from $4,811 for vessels under 35 feet to $14,881 for vessels between 35 and 50 feet in length and $18,715 for vessels over 50 feet in length. For vessels under 35 feet in length, total cost net revenue is a smaller share of revenue than for vessels over 35 feet in length. Within the limited entry fixed gear groundfish fishery, survey respondents in Oregon had the highest revenue and total cost net revenue while survey respondents in California had the lowest revenue and total cost net revenue. Total cost net revenue as a share of revenue was slightly higher in Oregon than Washington, and slightly higher in Washington than California.

Within the primary sablefish fishery, results are not reported for vessels under 35 feet in length because the number of survey respondents was not sufficient to protect data confidentiality. Total cost net revenue as a percentage of revenue increases as vessel length increases --- from 14% for vessels between 35 and 50 feet in length to 16% for vessels over 50 feet in length. Vessels in Oregon and Washington earned higher total cost net revenue as a percentage of revenue (15%) than vessels in California (12%). . .

Table 1
Cost Categories Collected by Limited Entry
Fixed Gear Catcher Vessel Survey

Cost Category

Variable Cost Categories
- Bait
- Captain
- Communications
- Crew
- Fishing association dues
- Food
- Freight
- Fuel and lubrication
- Ice
- License fees
- Observers
- Offloading
- Supplies
- Travel
- Trucking

Fixed Cost Categories (Capitalized and Expensed Collected Separately)
- Fishing gear
- Processing equipment
- Vessel and on-board equipment

Other Fixed Cost Categories (Expensed)
- Insurance premium payments
- Lease of vessel
- Moorage

Data for 2010 was collected in 2010 dollars. All cost, revenue, and total cost net revenue figures reported in this document are reported in 2010 dollars.

Table 2
Total Cost Net Revenue Earned in Three Limited Entry Fixed Gear Fisheries

Fishery	Revenue Per Vessel	Total Cost Per Vessel	Total Cost Net Revenue Per Vessel	Total Cost Net Revenue Fishery
Limited Entry Fixed Gear Groundfish	$109,801	$95,271	$14,530	$2,063,260
Limited Entry Fixed Gear Sablefish	$94,380	$81,338	$13,042	$1,812,838
Primary Sablefish	$123,362	$105,203	$18,159	$1,634,310

Table 3
Variation in Total Cost Net Revenue with Vessel Length and State

Fishery	Revenue Per Vessel	Cost Per Vessel	Total Cost Net Revenue Per Vessel
Limited Entry Fixed Gear Groundfish	$109,801	$95,271	$14,530
< 35 feet	$58,212	$53,401	$4,811
35 to 50 feet	$107,627	$92,746	$14,881
➢ 50 feet	$144,229	$125,514	$18,715
California	$83,123	$73,823	$9,300
Oregon	$121,199	$103,766	$17,433
Washington	$107,168	$93,940	$13,228
Primary Sablefish	$123,362	$105,203	$18,159
< 35 feet	---	---	---
35 to 50 feet	$108,274	$93,127	$15,147
➢ 50 feet	$152,139	$128,317	$23,822
California	$81,222	$71,100	$10,122
Oregon	$150,470	$127,261	$23,209
Washington	$118,298	$100,777	$17,521

Revenue, Costs, and Total Cost Net Revenue not reported for vessels < 35 feet in the primary sablefish fishery because the number of observations was not sufficient to protect respondent confidentiality

References:

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Agenda Item F.6.a
Attachment 2
June 2014

Action to the Fixed Gear Sablefish Fishery Managed under the Pacific Coast Groundfish Fishery Management Plan, Including Measures to:

- **Implement electronic fish tickets for sablefish landings;**
- **Modify the own/control limit**

Including an Environmental Assessment and Regulatory Impact Review

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June 2014

This document has not been reviewed or cleared by General Counsel Northwest or by the National Marine Fisheries Service National Environmental Policy Act (NEPA) Coordinator.

Table of Contents

Chapter 1 Background, Proposed Action, Purpose and Need for the Action

1.1 Proposed Action

The proposed action is to: (a) implement an electronic fish ticket requirement for the sablefish fishery, (b) modify the control rules for the Limited Entry Fixed Gear Sablefish Permit Stacking Program (program), and (c) implement joint registration (allow limited entry fixed gear and trawl permits to be registered to the same vessel at the same time).

1.2 Purpose and Need

The purpose of the electronic fish ticket measure is to consider the implementation of a Federal requirement for an electronic fish ticket to capture essential fishery catch data for non-trawl groundfish fisheries. This measure is needed to improve catch accounting and to enforce sablefish tier limits in the primary fishery such that the integrity of the catch share program is maintained. In addition, there is a need to improve the timeliness of the data for management and enforcement of the fixed gear fisheries.

The purpose of the own/control limit measure is to modify the vessel ownership threshold used to evaluate the control limit on the number of limited entry fixed gear permits owned or held by a single entity. The need for this measure is to accommodate fishing enterprises that participate in both the Alaskan fixed gear sablefish and halibut IFQ program (Alaska IFQ program) and the West Coast primary sablefish fishery, as well as West Coast fishing enterprises in which a person's minor financial interests in a vessel may disrupt its business unnecessarily by preventing full attainment of the tiers.

The purpose of the joint registration measure is to allow limited entry trawl permits and limited entry fixed gear permits to be registered to the same vessel at the same time. While joint registration is prohibited under existing regulations it may no longer be necessary given improved catch accounting and monitoring under the Pacific coast groundfish trawl rationalization program and considering the proposed improvements to catch accounting under the electronic fish ticket measure analyzed in this document. The need for this measure is to provide for increased flexibility for fishermen that participate in both the trawl and fixed gear fisheries.

1.3 Background

1.3.1 Summary of Past Management Actions

Sablefish (*Anoplopoma fimbria*) is one of the most valuable species in the groundfish fishery off Washington, Oregon, and California, and is managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). Because of its high ex-vessel value per pound, sablefish is a desirable target species for many West Coast fisheries and gear groups. The Pacific Fishery Management Council (Council) made several sablefish allocation decisions over the 15 years prior to implementation of Amendment 14 in 2001 establishing the limited entry fixed gear sablefish permit stacking program, which is a type of individual fishing quota (IFQ). The limited entry fixed gear sablefish permit stacking program was structured to increase safety and efficiency, while maintaining the small, owner-operator character of the fleet.

In 1987, an allocation of sablefish was established between trawl and non-trawl gear groups. Industry representatives of vessels participating in the non-trawl sablefish fisheries expressed their desire that the fishery be managed on a seasonal basis (as opposed to the year-round policy the Council pursued for most sectors of the groundfish fishery). The pursuit of seasonal management for the non-trawl segment of the sablefish fishery was a key decision that, when combined with a decline in sablefish abundance, ultimately impacted safety, efficiency, and allocational issues that the permit stacking program was meant to address.

The vast majority of the trawl and non-trawl sablefish harvest was placed under a license limitation program in 1994 (Amendment 6). Of the non-tribal commercial optimum yield of sablefish, 90.6% was allocated to the limited entry fishery and 9.4% was allocated to the open access (OA) fishery. The limited entry sablefish allocation was then allocated 58% to the limited entry trawl sector and 42% to the limited entry non-trawl (fixed gear) sector.

Management for the fixed gear fleet was, and continues to be, divided at the 36º N. lat. line with separate annual catch limits (ACLs) for the northern and southern fisheries. While the coastwide trawl fishery took sablefish as part of its year-round cumulative trip limit fisheries, the northern fixed gear fleet landed 85% of its allocation in a directed sablefish season, and 15% of its allocation in daily trip limit fisheries. The southern fixed gear fleet landed all of its allowed harvest in daily trip limit fisheries. The directed season north of 36ºN. lat. became increasingly tense over the years, as vessel capacity and competition for landings increased and amounts of fish available for harvest decreased. Through 1996, the directed (or "primary") season for the limited entry fixed gear fleet was managed as an open competition derby ("derby"). Derby duration shortened each year, until the fishery was just five days long in 1996.

Concern for the safety of participants in the sablefish derby led the Council to develop Amendment 9 to the FMP. In 1997, NMFS implemented Amendment 9, the sablefish endorsement program. Limited entry permit holders were eligible for sablefish endorsements based on their permit history. Permits without sufficient sablefish landings history were not endorsed for future participation in the primary season, but they could still be used in the daily trip limit fisheries.

Even with the sablefish endorsement, the fishery season remained short (nine days in 1997). To lengthen the season and improve safety, equal limits were imposed on all qualified participants (sablefish endorsement holders). However, the season still had to be limited to keep the fishery from being classified as an IFQ program. A fishery with a limited class of participants each with an amount of fish they are allowed to harvest is an IQ. In its 1996 re-authorization of the Magnuson-Stevens Fishery Management and Conservation Act (MSA), Congress had included a moratorium on implementing new IFQ programs through October 1, 2000. The moratorium was interpreted to cover any program that would allow a vessel ample time and opportunity to catch a limit allocated specifically to that vessel. The moratorium forced the Council to manage the primary season to a short duration that prevented many participants from fully taking their vessel-specific limits (a "modified derby"). To further assure that the cumulative limits would not be categorized as an IFQ program, regulations were established to set a maximum season length of 10 days. Equal cumulative limits were viewed by the Council as being extraordinarily reallocative in nature, but for 1997, equal limits were the only option available to lengthen the season and to begin to address safety issues.

The inequitable allocation system created by the equal cumulative limits was partially resolved with a “three-tier” system, which was established by regulatory amendment for 1998 and beyond. Under this “three-tier” system, sablefish endorsement holders were ranked into three different tiers based on their permit histories, with the lowest tier (Tier 3) having the lowest qualification requirements. Annual management of the three-tier cumulative limit system required that the allocation for this fishery be divided such that there were three different cumulative limits for the different tiers. While somewhat more equitable than the equal cumulative limit system, the three-tier system still required some fishermen to make large cutbacks in their harvest levels while allowing others to expand. The system provided little flexibility to operators to determine the manner in which their sablefish catch is harvested or to scale their harvest upward to match their pre-existing levels of capital investment. This lack of flexibility undoubtedly reduced efficiency, resulting in a lower net value for harvest.

Even under the three-tier system, the fishery still had to be managed as a modified derby to keep from being considered an IFQ, and the seasons were still too short (between 6-9 days) to allow fishermen to operate with care and safety. Short derby seasons are believed to result in accidents due to fatigue and financial pressure to fish and transit under unsafe conditions.

The MSA moratorium on new IFQ programs expired on October 1, 2000. On December 21, 2000, Public Law 106-553, an appropriations bill for NOAA, contained a continuation of the IFQ moratorium through October 1, 2002 and an exception to that moratorium for a permit stacking program in the West Coast fixed gear sablefish fishery. On August 2, 2001, Amendment 14 implemented a permit stacking program, in which up to three sablefish-endorsed permits could be registered for use with a single vessel and that vessel could then have access to the primary season sablefish cumulative limits associated with each of those permits. Most importantly, the exception to the IFQ moratorium for the fixed gear sablefish fishery as implemented through Amendment 14 allowed longer seasons (April through October), so that each vessel could fish against its limits at its own speed.

Portions of Amendment 14 were implemented for the 2001 primary sablefish season. The extended sablefish season was fully implemented in 2002. In 2006, NMFS implemented additional regulations for Amendment 14, many of which were intended to keep the fishery a small, owner-operator fleet. It was decided that, in the future, NMFS would implement a permit stacking program fee system (cost recovery program) as required by the MSA.

Beginning in 2001, NMFS implemented the initial permit stacking provisions (66 FR 41152, August 7, 2001). The following provisions were put in place in 2001:

(1) up to 3 sablefish-endorsed permits may be registered for use with a single vessel;
(2) the limited entry, primary sablefish season is from August 15 - October 31, 2001;
(3) a vessel may fish for sablefish during the primary season with any of the gears specified on at least one of the limited entry sablefish-endorsed permits registered for use with that vessel;

(4) no person may own or hold more than 3 sablefish-endorsed limited entry permits unless that person owned more than 3 permits as of November 1, 2000;
(5) no partnership or corporation may own a sablefish-endorsed limited entry permit unless that partnership or corporation owned a permit as of November 1, 2000;
(6) cumulative limits for species other than sablefish and for the sablefish daily trip limit fishery remain per vessel limits and are not affected by permit stacking; and
(7) the limited entry daily trip limit fishery for sablefish is open during the primary season for vessels not participating in the primary season.

Beginning in 2002, NMFS extended the fishing season to April 1 - October 31 as part of the Pacific Coast groundfish final specifications and management measures (67 FR 10490; March 7, 2002).

Beginning in 2006, NMFS implemented further permit stacking regulations that include the following provisions (71 FR 10614, March 2, 2006):
(1) permit owners and permit holders are required to document their ownership interests in their permits to ensure that no person holds or has ownership interest in more than 3 permits;
(2) an owner-on-board requirement for permit owners who did not own sablefish-endorsed permits as of November 1, 2000;
(3) an opportunity for permit owners to add a spouse as co-owner;
(4) vessels that do not meet minimum frozen sablefish historic landing requirements are not allowed to process sablefish at sea;
(5) permit transferors are required to certify sablefish landings during mid-season transfers; and
(6) a definition of the term "base permit."

1.3.2 Current State of the Program

The current permit stacking program applies to the sablefish primary fishery, which occurs north of 36º N. lat. Under this program, vessels registered to at least one limited entry permit, with either a gear endorsement for longline or trap (or pot) gear, and an endorsement for sablefish, fish a specified tier limit during a seven-month primary fishery season (April through October).

Under the permit stacking program, each fixed gear sablefish-endorsed, limited entry permit is assigned to one of three tiers. Tiers are permanently affixed to the sablefish endorsed permit and cannot be transferred separately from the permit. The permit's tier level determines the poundage of sablefish which can be landed by that permit each season while participating in the primary sablefish fishery. For sablefish-endorsed, limited entry permits, the NMFS Regional Administrator biennially or annually announces the size of the cumulative trip limit for each of the three tiers associated with the sablefish endorsement such that the ratio of limits among the tiers is approximately 1:1.75:3.85 for Tier 3:Tier 2:Tier 1, respectively. Up to three permits can be stacked onto (registered to) a single vessel, allowing that vessel to land up to the sum of the three tier limits in aggregate. Because each vessel is assigned a proportion of catch based on its tier limit, the stacking program is considered an IFQ, or catch share program.

Vessels with sablefish-endorsed permits are also eligible to fish in the daily-trip limit (DTL) fishery before the primary season (i.e., January through March) and after their aggregate tier limit on the vessel has been harvested, or the primary season has ended, whichever comes first. All landings made starting on April 1 by a vessel registered to a sablefish-endorsed permit(s) are debited against the tier amount until the tier amount remaining is below the daily trip limit amount. Because each vessel has its own primary fishery limit, vessels often transition from the primary to DTL fisheries sometime during the sablefish primary season.

The program also includes other provisions, including a prohibition on the ownership of permits by corporations or other business entities, a permit owner-on-board requirement, a limit on the number of permits any individual or entity (individually and collectively) can own or hold, and a prohibition on at-sea processing. A grandfather clause was provided for each of these provisions, allowing the continuation of situations in place prior to Council action. For non-grandfathered permits, the permit owner must be on board the vessel during the primary season when that permit's tier amount is being fished. If landings from a trip will be attributed to multiple tiers, then all permit owners of those tiered permits being fished must be onboard. However, there are limited[1] medical and death exemptions from this requirement.

Currently, there are 164 sablefish-endorsed permits of which 131 are endorsed for longline only; 27 are trap/pot endorsed only, and 6 have two gear endorsements. The number of permits by tier levels is as follows: Tier 1 -28 permits; Tier 2 – 42 permits, and Tier 3 – 94 permits. As of August 2013, approximately 40 vessels have stacked (multiple) permits (either 2 or 3 permits).

Electronic Fish Tickets

The first measure covered by this EA considers changing landing reporting requirements to implement a Federal requirement for an electronic fish ticket. Background on landing reporting requirements and reasons for considering modifications are provided in this section.

When a sablefish fixed gear tier delivery is made, the delivery is recorded on a state fish ticket. Landings recorded on this one fish ticket may count against multiple permits with varying tier endorsements. If the vessel operator does not specify which permit/tier the catch should be counted against, the delivery is apportioned to the individual tiers (up to 3) by an even split until the tiers are reduced to a point where they are equal to or less than the daily-trip limits (DTL). All of this tabulation is done by the state agency(s) and then sent to the Pacific States Marine Fisheries Commission (PSMFC) for entry into the Pacific Fishery Information Network (PacFIN).

At the September 2013 meeting of the Council, the Enforcement Consultants (EC) report outlined several concerns with the existing reporting requirements. Their primary concern was that the opportunity for underreporting is extremely great under the current regulations, which defer to the states to report catch data and permit numbers on State fish tickets (which are recorded on paper), and enforcement agents often have little access to data that is often times

[1] These exemptions can only be given for three years maximum (consecutive or cumulative) to a permit owner or to the surviving spouse of a permit owner.

outdated. This creates a situation where at-sea boarding or dockside inspection can do little besides checking the permit status, because no real-time information on the actual status of the tier(s) being fished is available. In addition, with current landing reports, enforcement of the owner-on-board requirement is difficult without having real-time permit and landing information. During an at-sea boarding or dockside inspection, enforcement must determine which owner, if any, is supposed to be onboard the vessel during that trip.

Since inception of the tier program, NMFS has requested that the state agencies list the Federal permit number on the state ticket (see 71 FR 10614, March 2, 2006, response to comment 1). Washington requires the tier permit number be listed on the State fish ticket, and Washington enforcement and management personnel have ready access to the Washington State landing data. In 2013, Oregon enacted state regulations that require documentation of the permit number on the state fish ticket. Unlike Washington and Oregon, in California there are no state regulatory requirements for the tier permit number to be listed on the state fish ticket.

Although Federal or state enforcement personnel may request information from their individual states or from PacFIN, the information process is laborious, time consuming, dated, and most importantly, does not lend itself to making information available to an agent or officer working in the field performing patrol-related activities.

The Department of Commerce, Office of the Inspector General recently released a report highlighting these issues and finding, in part, that the sablefish permit stacking program does not have adequate data and that NOAA is not monitoring to determine whether individual permits are exceeding their allowed landings (Final Report No. OIG-14-019-I, May 1, 2014). The OIG report recommends, in part, that NMFS (1) develop a process to ensure that accurate landings information is obtained by individual permit in a timely manner, and (2) develop controls to monitor landings on an individual permit basis to ensure overage violations are adequately addressed. This action seeks to address these catch accounting issues.

Own/Control Limits

The second measure covered by this EA considers changing the criteria used to determine the number of permits an entity controls, for purpose of assessing compliance with the three-permit own/control limit. Background on the control rule and criteria, and reasons for considering a modification, are provided in this section.

Control occurs when a person owns or holds a permit. Thus, a person can control a permit by directly owning the permit or by owning a vessel to which a permit is registered (i.e., “holding” a permit). In this latter situation, the permit registered to the vessel may be owned by someone else. The current own/control regulations limit participants (permit owners and/ or vessel owners) in this program to owning or holding no more than three permits (a three-permit control limit). This limit was intended to prevent concentration of harvest privileges. For the purpose of determining the number of permits a person controls, ownership of any percentage of a permit counts as 1 permit. Additionally, persons who have any percentage ownership interest in a vessel are considered to hold any permit associated with that vessel, i.e. to control the permits associated with the vessel (see regulations at 660.25(b)(3)(iv)(C)(2)). The regulations were implemented in this way, under Amendment 14, with the intention of moving the program towards an owner-operator fleet.

While the own/control limit has been in place since 2001 without any issues being raised by the majority of the fleet, two examples have come forward highlighting barriers the own/hold limit causes. The two examples brought to the Council's attention pertain to (1) sablefish permit stacking participants that also harvest Alaska fixed gear halibut and sablefish IFQ program[2] (Alaska IFQ) and (2) vessel/permit purchase transactions. These situations are described briefly here and in detail in the impacts section of Chapter 4.

The first example is for participants in the sablefish permit stacking program that also harvest Alaska IFQ. The way the West Coast sablefish permit stacking program counts permits registered to a vessel (for purposes of the three-permit control limit) constrains Alaska IFQ participants that are grandfathered. Grandfathered participants are exempt from Alaska owner-on-board requirements and Alaska limitations on individuals owning IFQ[3]. Unlike the West Coast sablefish permit stacking program, the Alaska IFQ program requires that, under certain circumstances, an entity acquire at least 20 percent ownership interest in the vessel that will fish its Alaska IFQ. If the vessel which is hired also participates in the West Coast sablefish permit stacking program (is a West Coast and Alaska vessel), there may be West Coast limited entry fixed gear (LEFG), sablefish-endorsed permits (i.e., LEFG permits) registered to the vessel. When an entity acquires an ownership interest to hire the vessel to participate in the Alaska IFQ program, any LEFG permits that happen to be registered to the vessel would also count against that entity's West Coast LEFG 3-permit limit. If that entity already controls some LEFG permits (e.g. owns a different vessel which participates in the West Coast fishery) then its ability to hire another West Coast vessel to fish its permits may be limited.

There are two circumstances under which an entity is required to acquire a 20-percent ownership interest in the vessel which will be hired to fish its IFQ. Both involved grandfathered participants. The first involves those individuals grandfathered in with an exemption from the IFQ owner-on-board requirement. Regulations for the Alaska sablefish IFQ program require that individual owners of catcher vessel quota shares (QS) (Alaska QS, vessel categories B, C, or D) be onboard the vessel during all IFQ fishing. An exemption to the owner-on-board requirement allows an initial recipient of catcher vessel Alaska QS to employ a hired master to fish his or her IFQ, but only if the initial recipient owns a minimum of 20 percent interest of the vessel on which they hire a master to fish their IFQ. The second involves those entities (corporations, partnerships, etc.) grandfathered in with an exemption to provisions which limits IFQ ownership to individuals. To operationalize the owner-on-board provision, acquisition of Alaska IFQ by entities was prohibited, except for those entities that already existed and were eligible for an initial allocation. Over time and similar to the West Coast fishery, individuals and entities eligible for these two exemptions will leave the fishery, and there will no longer be any remaining grandfathered entities. Like the West Coast sablefish fishery, the regulations were

[2] The North Pacific Fishery Management Council (NPFMC) managed IFQ Program for fixed-gear Pacific halibut and sablefish fisheries in and off of Alaska.
[3] The West Coast sablefish permit stacking program also has owner-on-board requirements and a requirement that only individuals own LEFG, sablefish-endorsed permits, unless grandfathered. However, these West Coast provisions are not constraining participation in Alaska IFQ.

structured in this way to maintain a predominantly owner-operator fishery. Alaska regulations have recently been modified to further encourage more rapid movement toward a solely owner-operated fishery in Alaska.

The second example is for vessel or permit purchase transactions. The other barrier to fishermen cooperation created by the criteria used to determine ownership of West Coast LEFG permits comes into play as part of sale transactions. A typical business practice in West Coast fisheries is for the seller of a vessel to finance the buyer's purchase of the vessel. When this is done, the seller will often retain at least partial ownership interest in the vessel until all payments have been made, at which time the seller will sign over entire interest in the vessel. If, for example, the seller of a West Coast fixed gear vessel is upgrading to a different fixed gear vessel and the buyer of the vessel wants to continue to use the vessel in the LEFG fishery, then by retaining partial ownership, the seller would be counted as controlling all the LEFG permits on the vessel he or she sells, plus any permits on the new vessel. Thus, the criteria for counting permit control may be interfering with this method of financing vessel transactions among West Coast fishermen.

Chapter 2 Description of Alternatives

2.1 Electronic Fish Ticket Alternatives

For the electronic fish ticket measure, there are the No Action alternative and three action alternatives, which are summarized here and described in more detail in the following sections.

> Alternative 1: (No Action) There are currently no Federal regulations requiring electronic fish ticket documentation for sablefish landings in the primary (tier) sablefish fishery, within the larger limited entry fixed gear (LEFG) fishery or within the OA fishery, which are managed under daily, weekly, and bimonthly trip limits.
>
> Alternative 2: A Federal requirement that **all tier** deliveries be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.
>
> Alternative 3: A Federal requirement that **all limited entry permit sablefish deliveries (primary/tier and DTL)** be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.
>
> Alternative 4: A Federal requirement that **all sablefish deliveries (primary/tier, DTL, and OA)** be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

2.1.1 No Action Alternative

> Alternative 1: (No Action) There are currently no Federal regulations requiring electronic fish ticket documentation for sablefish landings in the primary (tier) sablefish fishery, within the larger limited entry fixed gear (LEFG) fishery or within the OA fishery, which are managed under daily, weekly, and bimonthly trip limits.

Catch accounting in the LE and OA fisheries is based on landed catch derived from state landing receipts. Total catch is derived by combining landed catch values from state landing receipts with discard ratios derived from observer sample data. Current regulations at 50 CFR 660.3[4] and 50 CFR 660.13 require vessels to adhere to applicable state laws for recordkeeping and reporting. However, State landing receipts do not consistently include the Federal groundfish permit number associated with the landing, which can be problematic, particularly when multiple permits are registered to a single vessel. Electronic fish ticket regulations at 50 CFR 660.15 apply only to first receivers in the Shorebased Trawl IFQ program and not to the LE and OA fisheries first receivers. Landings data are available in the PacFIN database for management and enforcement purposes several months after the date of landing.

At the time of implementation of Amendment 14, no Federal regulations requiring fish ticket documentation of the groundfish permit number associated with sablefish landings in the primary (tier) sablefish fishery were enacted. Documentation of catch against tier limits and

[4] § 660.3 Reporting and recordkeeping. Any person who is required to do so by applicable state law or regulation must make and/or file all reports of management unit species landings containing all data and in the exact manner required by applicable state law or regulation.

documentation of permit numbers was left to the states to implement. In the Amendment 14b final rule (71 FR 10614, March 2, 2006), comment and response section, Washington Department of Fish and Wildlife (WDFW) and Oregon Department of Fish and Wildlife (ODFW) committed to requiring Federal permit numbers to be recorded on state fish tickets by 2007. At that time California Department of Fish and Game, now California Department of Fish and Wildlife (CDFW), had already added a line for a Federal permit number on their state ticket and entered that information into PacFIN. Washington requires the tier permit number be listed on the state fish ticket, and Washington enforcement and management personnel have ready access to the Washington State landing data. The State of Oregon has recently changed their regulations to require that the permit number be documented on the state landing receipt. As of 2014, Federal permit numbers are not being recorded consistently on state landing receipts associated with sablefish landings.

Under the current system, when a sablefish fixed gear tier delivery is made, the delivery is recorded on a state paper fish ticket in accordance with state law. One to three tiers may be delivered and recorded on this one trip ticket. If not specified by the operator, the delivery is apportioned to the individual tiers (up to three) by an even split until the tiers are reduced to a point where they are equal to or less than the DTL. All of this tabulation is done by the state agency(s) and then sent to PSMFC for entry into PacFIN. Under the No Action Alternative, the requirements for sending in paper landing receipts varies among states with Washington requiring the paper landing receipts to be received within six working days, Oregon requiring the landing receipts to be received within five working days, and California requiring the landing receipts to be received by the first and sixteenth of the month. It is a considerable time after the tickets are prepared and submitted that the data are entered into a state database, edited, and forwarded to the PacFIN database; depending on the state, it may take several months.

2.1.2 Action Alternatives

Each of the Alternatives 2-4 would implement a Federal requirement that nontrawl commercial sablefish landings to U.S. West Coast ports be recorded on an electronic fish ticket. The action alternatives differ from each other in the fleets that they address: Alternative 2 would affect participants in the primary, tiered limited entry fixed gear (LEFG) sablefish fishery; Alternative 3 would expand upon Alternative 2 to add participants in the LEFG DTL fishery; and Alternative 4 would expand upon Alternative 3 to add participants in the OA DTL sablefish fishery. Under each of the action alternatives, the electronic tickets already in use by the Shorebased IFQ Program would be used to record sablefish landings. The electronic ticket could easily accommodate nontrawl sablefish landings with little to no revision to the existing electronic ticket. Any dealer required to fill out an electronic ticket would need to request a free PSMFC dealer account, then fill out an electronic ticket online, and submit that electronic ticket to PSMFC within 24 hours of landing. The catch data recorded on the electronic ticket is then made available to state and Federal management and enforcement agencies, and later entered into PacFIN along with other catch data. Table 1 of this document, below, summarizes some of the potential differences between the No Action Alternative and Alternatives 2-4.

Electronic fish ticket means a software program or data files meeting data export specifications approved by NMFS that is used to send landing data to PSMFC. Electronic fish tickets are used to collect information similar to the information required in state fish receiving tickets or landing receipts, but they do not replace or change any state requirements. However, the State may use the electronic fish ticket to satisfy their State requirements. The electronic fish ticket system was designed and is managed by the PSMFC, with funding from NMFS. The electronic fish ticket system has been used for the Pacific whiting shoreside fishery since 2007 (see 72 FR 50906, September 5, 2007). In 2011, the electronic fish ticket system was expanded to include not only the Pacific whiting shoreside fishery but all groundfish delivered shoreside by vessels participating in the Shorebased IFQ Program under Amendment 20 (the Trawl Rationalization Program). The current electronic fish ticket system is software-based; however, PSMFC is in the process of moving to a web-based electronic fish ticket system. This change would affect the requirements associated with using the electronic ticket. Electronic fish ticket regulations at 50 CFR 660.15 explain the current software and hardware requirements associated with using the electronic ticket. These regulations currently apply only to first receivers[5] in the Shorebased Trawl IFQ program and not to the LEFG and OA fisheries. The existing electronic fish ticket varies slightly by state such that each form records the information necessary for compliance with state landings regulations. Although the form is currently used for the Shorebased IFQ Program, it could easily accommodate landings in the commercial nontrawl groundfish fleet, and also provides unique reporting functions, such as preparation of tax information, that may be beneficial to first receivers.

> Alternative 2: A Federal requirement that **all tier** deliveries be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

Sablefish landings made against sablefish endorsed (tier) permits during the primary season for the limited entry fixed gear fishery north of 36ºN (April 1 through October 31, or until the permit holder's tier limit has been reached, whichever occurs first), would be required to be recorded on a Federal electronic fish ticket that documents the associated federal groundfish permit number. The existing electronic ticket already has the appropriate fields and drop down boxes necessary to accommodate this fishery and would be expanded to include sablefish landings. State landings receipts would still be required per state landings regulations; the electronic ticket would be separate from and in addition to state landing requirements. After a landing was made to a first receiver, all necessary landing and catch information would be recorded on the electronic ticket provided by the first receiver. This electronic ticket would then be uploaded to PSMFC within 24 hours of the landing, made available to all interested parties (i.e. the state agencies, enforcement, NMFS, and permit owners), and the data would be processed and entered into PacFIN.

> Alternative 3: A Federal requirement that **all limited entry permit sablefish deliveries (primary/tier and DTL)** be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

Sablefish landings made against sablefish-endorsed (tier) permits during the primary season and sablefish landings made by vessels registered to limited entry fixed gear permits, before and after the primary season, and subject to the restrictions and limits of the limited entry daily and/or weekly trip limit (DTL) fishery for sablefish, would be required to be recorded on a Federal electronic fish ticket that documents the associated Federal groundfish permit number. The existing PSMFC electronic ticket already has the appropriate fields and drop down boxes

[5] First Receiver means a person who receives, purchases, or takes custody, control, or possession of catch onshore directly from a vessel.

necessary to accommodate this fishery and would be expanded to include sablefish landings. State landings receipts would still be required per state landings regulations; the electronic ticket would be separate from and in addition to state landing requirements. After a landing was made to a first receiver, all necessary landing and catch information would be recorded on the electronic ticket provided by the first receiver. This electronic ticket would then be uploaded to PSMFC within 24 hours of the landing, made available to all interested parties (i.e. the state agencies, enforcement, NMFS, and permit owners), and the data would be processed and entered into PacFIN.

> Alternative 4: A Federal requirement that **all sablefish deliveries (primary/tier, DTL, and OA)** be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

Sablefish landings in the primary/tier and LEFG, and OA DTL fisheries that exceed a poundage threshold, would be required to be recorded on a Federal electronic fish ticket that documents the associated Federal groundfish permit number. The existing PSMFC electronic ticket already has the appropriate fields and drop down boxes necessary to accommodate this fishery and would be expanded to include sablefish landings. State landings receipts would still be required per state landings regulations; the electronic ticket would be separate from and in addition to state landing requirements. After a landing was made to a first receiver, all necessary landing and catch information would be recorded on the electronic ticket provided by the first receiver. This electronic ticket would then be uploaded to PSMFC within 24 hours of the landing, made available to all interested parties (i.e. the state agencies, enforcement, NMFS, and permit owners), and the data would be processed and entered into PacFIN.

Table 2.1 Benefits of the electronic fish ticket action alternatives over the no action alternative.

Issues	No Action Alternative	Electronic Ticket Alternatives
Timely reporting of catch	• Electronic ticket not required. • Paper reports required by state of landing. • May take 2-4 months for NMFS to have access to landings by permit	• Federal requirement for electronic fish tickets. • Submission of electronic fish tickets within 24 hours of the date of landing. • Paper reports required by state of landing.
Accurate reporting of catch	• In-season data available for monitoring is a combination of paper ticket data and estimates • NMFS unable to obtain real-time, accurate landings data (permit number not consistently recorded on ticket) • Paper tickets are subject to compromise and error	• Data electronically entered into the system can be verified and validated at the time of entry by buyer personnel • Provides a tool for processors and buyers to capture and track fish tickets, generate tax reports, and summary data
Enforce landing overage violations	• In-season estimates are not sufficient for enforcement purposes • Data delays prevent real-time, in-season enforcement of tier overages and the owner on board requirement	• Accurate, real-time tracking of landings against cumulative limits will allow enforcement to monitor and enforce tier limits and DTLs

2.1.3 Alternatives Considered But Rejected From Further Analysis

Action Alternatives 2-4 each included a suboption to require sablefish deliveries be recorded on state paper fish tickets, rather than on Federal electronic fish tickets. Under these suboptions, NMFS would implement a Federal requirement that sablefish landings and the Federal groundfish permit number associated with the landing(s) be recorded on the state paper fish tickets.

Although the paper fish ticket suboptions would cause the least disruption to the existing landings process, adding new requirements to the state paper fish ticket system would fail to address the Purpose and Need for this action because doing so would not improve the timeliness of catch accounting and enforcement capabilities in the fishery. Adding new requirements to the state paper fish ticket system would also cause several logistical challenges in managing the sablefish fishery: sablefish landings data would not be uploaded into the Pacific Fisheries Information Network (PacFIN) database at a faster than current rate, there would continue to be a lag time of several months between when the landings occur and when the data are available, and further augmenting paper fish ticket recording requirements would be disruptive to state data collection and management practices. Therefore, this suboption has been considered but rejected from further analysis.

The action alternatives originally included language that spoke to how the catch data recorded on the electronic tickets would be used on the back end ("That Tier Permits be loaded into the IFQ Vessel Account System with deductions made as appropriate when a tier delivery is made and recorded on the E Fish Ticket"). This language was premature and overly restrictive; how the data are processed and made available to end users is largely an implementation issue and it may be premature to discuss such implementation issues this early in the process. Therefore, this portion of the action alternatives has been considered but rejected from further analysis.

2.2 Own/ Control Limit Alternatives

For the permit counting criteria for the own/control limit, the alternatives are No Action and two action alternatives, which are summarized here and described in more detail in the following sections. For all alternatives, the own/control limit is 3 permits. The criteria for counting a permit toward that limit varies among the alternatives.

<u>Alternative </u>1: (No Action) The control limit to own and hold is 3 permits. Any level of permit ownership would count as 1 permit towards the limit of 3 permits. Additionally, any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit. Select permit owners are grandfathered in with more than 3 permits based on what they owned as of November 1, 2000. Any group ownership interest in the permit results in a permit count of 1 being attributed to each group member. Permits acquired after November 1, 2000, can only be owned by an individual.

<u>Alternative 2a (Preliminary Preferred Alternative)</u>: No Action for permit ownership (any percentage ownership in a permit is a count of 1); however, holding a permit is counted only if the vessel owner has a greater than 20% share. Partial vessel ownership is capped at two vessels, i.e. the 20% or less ownership in a vessel exemption could only be used twice. **After this two-permit exception is reached, then any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit, as described under No Action**.[6]

Bolded text is a staff recommended addition to clarify the alternative and requires Council approval before becoming part of the formal option.

<u>Alternative 2b</u>: No Action for permit ownership (any percentage ownership in a permit is a count of 1); however, holding a permit is only counted if the vessel owner has a greater than <u>30%</u> share. Partial vessel ownership is capped at two vessels, i.e. the 30% or less ownership in a vessel exemption could only be used twice. **After this two-permit exception is reached, then any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit, as described under No Action**.6

Bolded text is a staff recommended addition to clarify the alternative, requiring Council approval before becoming part of the formal option.

Under the action alternatives, the 20 and 30 percent vessel ownership is a threshold for determining whether the permits registered to that vessel should count against the vessel owner's

[6] Unless modified by the action alternative, all other provisions of No Action would continue, including the three-permit limit, grandfather provisions for permit owners with more than 3 permits as of November 1, 2000, and rules for attributing permit control to individuals who participate in group ownership of a permit.

own/control limit. The 20 percent threshold was chosen because this would allow vessels that also participate in the Alaska sablefish fishery to maintain 20 percent ownership in vessels that also participate in the West Coast primary fishery without triggering the control limit. The thirty percent threshold was chosen for comparison purposes. A percentage threshold above thirty percent was not added to the range of alternatives because the advisory bodies and Council felt that a higher threshold went beyond addressing the scope of the issue and could potentially result in unwanted consolidation within the West Coast fishery. A percent threshold lower than 20 percent was not considered because a lower threshold would not adequately address the need for this measure (to accommodate overlap between the Alaska sablefish fishery and the West Coast primary fishery). For Alternatives 2a and 2b, staff has provided some new strawman suboptions for Council consideration; a more detailed description of the alternatives follows.

2.2.1 No Action Alternative

Alternative 1: (No Action) The control limit to own and hold is 3 permits. Any level of permit ownership would count as 1 permit towards the limit of 3 permits. Additionally, any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit. Select permit owners are grandfathered in with more than 3 permits based on what they owned as of November 1, 2000. Any group ownership interest in the permit results in a permit count of 1 being attributed to each group member.

Under No Action, the criteria for determining permit control are: (1) any share in the ownership of a permit and (2) any share in the ownership of a vessel to which a permit is registered. Any shares of ownership in these two situations cause the involved permits to count against an individual's permit limit. Unless grandfathered, a permit must be owned by an individual. In contrast to permit ownership requirements, vessel ownership (i.e., permit holder) was not grandfathered and may be owned by an individual, partnership, or corporation. As an example: the partnership of Mary and Mike Smith own a tier permit (Permit 1 in Figure 2-1) and have registered it to the fishing vessel Fairweather which they also own. As a result, each of them would be considered to have individually incurred a count of one permit towards the 3 permit limit, and the partnership also has a count of one towards the limit. Similarly, Group Z (owned by John Doe and his partners) has 20% ownership of the fishing vessel Fairweather registered to the permit owned by Mary and Mike Smith. Group Z accrues a count of one permit held towards the three-permit limit AND John Doe and each of his partners accrue a count of one permit held towards the three permit limit. Note that if Group Z owned another permit and vessel (Permit 2 and the vessel Foulweather in Figure 2-2), that permit would not count against the Smith's since the Smiths do not have an ownership interest in Group Z, Permit 2, or the vessel Foulweather.

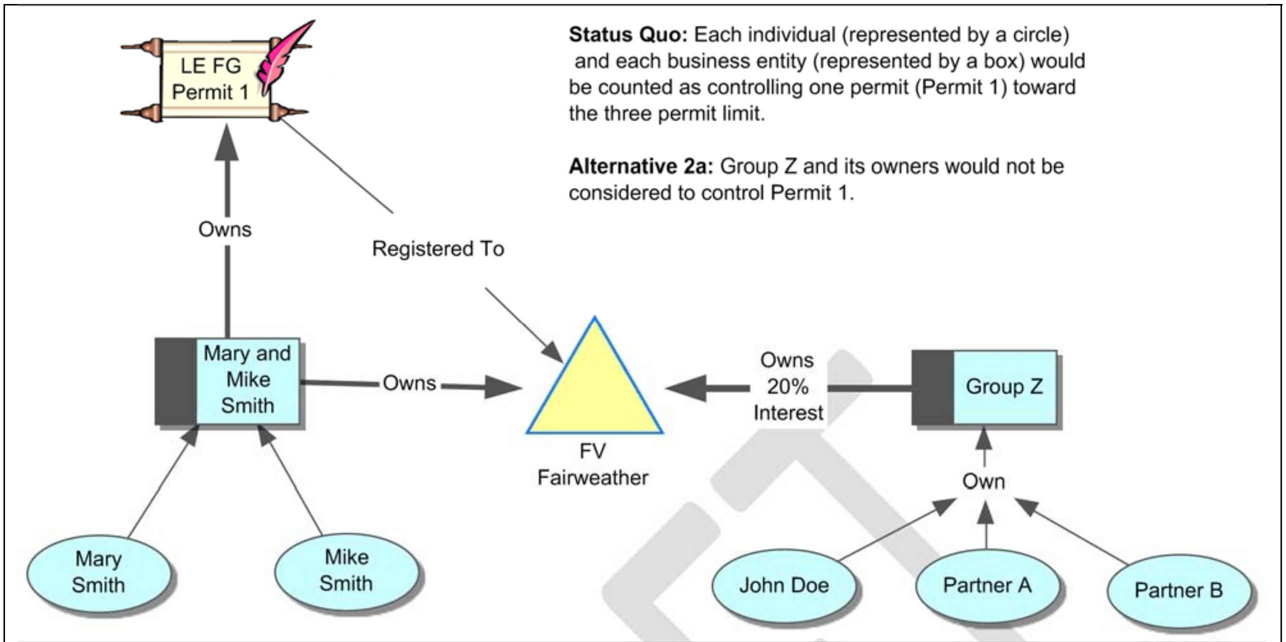


Figure 2-1. Permit counting under No Action and Alternative 2a with two business entities, one vessel, and one permit.

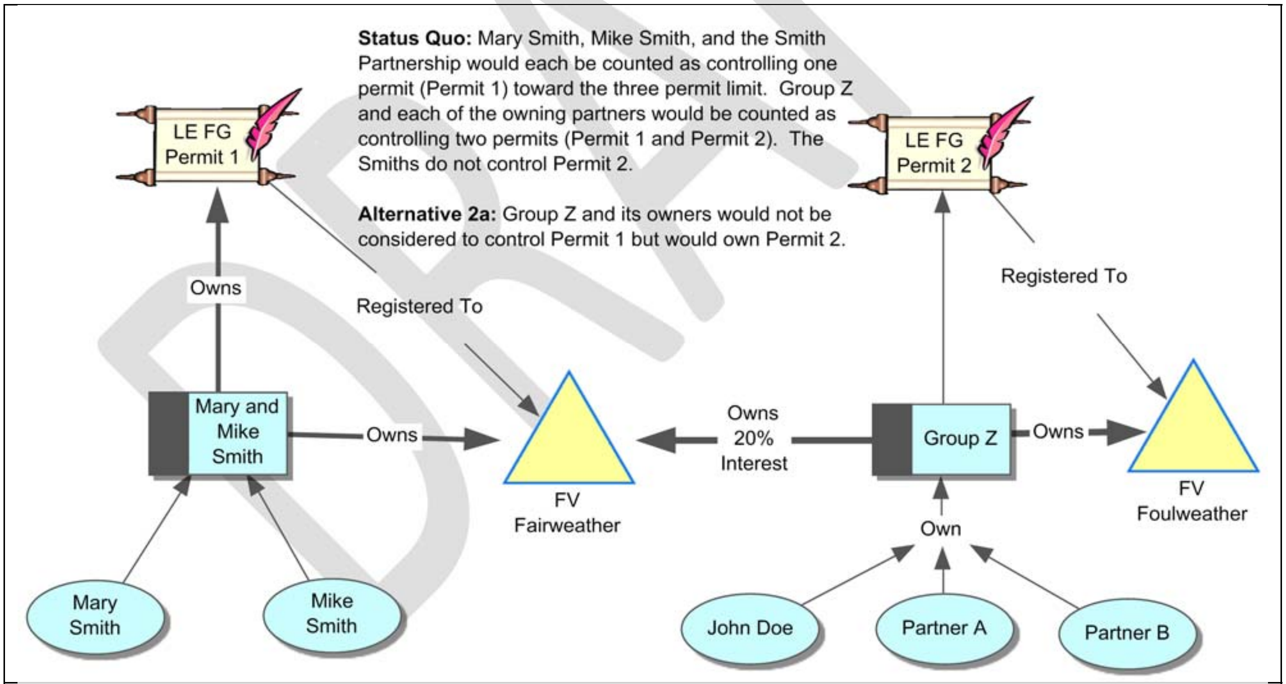


Figure 2-2. Permit counting under No Action and Alternative 2a with two business entities, two vessels, and two permits.

2.2.2 Action Alternatives

Alternative 2a (Preliminary Preferred Alternative): No Action for permit ownership (any percentage ownership in a permit is a count of 1); however, holding a permit is counted only if the vessel owner has a greater than 20% share. Partial vessel ownership is capped at two vessels, i.e. the 20% or less ownership in a vessel exemption could only be used twice. **After this two-permit exception is reached, then any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit, as described under No Action**. 6

Bolded text is a staff recommended addition to clarify the alternative, requiring Council approval before becoming part of the formal option.

At its April 2014 meeting, the Council selected Alternative 2a as its preliminary preferred alternative (PPA). The staff recommended addition was not provided at that time, nor were the suboptions provided below.

Under Action Alternative 2a, the criteria for determining permit control are: (1) any share in the ownership of a permit (i.e. same as No Action), and (2) more than a twenty percent share in the ownership of a vessel to which a permit is registered. Whereas under the No Action example in Figure 2-1, Group Z and all of the owners of Group Z would each accrue a count of one permit held toward the 3 permit limit, under Alternative 2a neither Group Z nor any of its owners would incur a count for Permit 1 because their ownership of the vessel Fairweather is only 20% (i.e. is less than the vessel ownership threshold at which the associated permit would count). If Group Z owned 21% of Fairweather, then the Group would incur a count of one. The count incurred by each individual would depend on the method for assessing individual and collective counts, i.e. the method used to count percent interest which accrues to an individual when that interest accrues through a legal entity such as a corporation. For example, if Group Z is a corporation in which three individuals equally share in ownership, would the interest that Group Z has in a vessel pass through in whole to the individuals, or would a *pro rata* rule apply under which the individuals' share in ownership of the vessel would be determined by their share in ownership of Group Z. If it passes through in whole, then if Group Z owns 20 percent of a vessel, each individual would be considered to own 20 percent of the vessel If the *pro rata* rule applies, then each individual would be considered to own 6.66 percent of the vessel (one third of 20 percent).[7]

Individual and Collective Suboptions

As just described, there are at least two approaches for determining how the ownership interest held by an entity such as a corporation or partnership accrues to the individual owners of that entity. Strawman suboptions for Council consideration are as follows:

Strawman Suboption (1) Entire Ownership Interest Passes Through – If an entity owns a vessel, any individuals with a share in the ownership of that entity are counted as having the same share in ownership of the vessel as the entity has (e.g., if an entity owns 50 percent of a vessel, then for purposes of evaluating the three permit control limit all

[7] As with No Action, no permits owned by Group Z would be counted against the Smith partnership, collectively or individually, because Group Z has no ownership in the Smith partnership.

individuals who own that entity are counted as having 50 percent ownership in that vessel).

Strawman Suboption (2) Pro-Rata Ownership Interest Passes Through – If an entity owns a vessel, any individuals with a share in the ownership of that entity are counted as having a share in ownership of the vessel proportional to their actual share in ownership of the entity (e.g., if a corporation owns 50 percent of a vessel, and two individuals each own 50 percent of the corporation then for purpose of evaluating the three permit control limit those two individuals are each counted as having 25 percent ownership in that vessel). [This approach is the same as that used in the Trawl Rationalization Program.]

Coordinated Ownership

Under Action Alternative 2a, the three owners of Group Z could each individually own up to 20% of the Fairweather (60% in total) without incurring a count for controlling Permit 1, so long as Group Z itself did not have any ownership. This situation is illustrated in Figure 2-3. The Council may wish to consider a suboption to limit this means of control.

Strawman Suboption on Coordinated Ownership: If individuals participating in the ownership of an LEFG entity (an entity which controls an LEFG permit) collectively own more than 40% of a particular vessel (i.e. their individual shares of ownership in a vessel sum to more than 40%), then any LEFG permits registered to that vessel will count against their three-permit control limits, regardless of the provision that exempts from the permit count ownership amounts of less than 20 percent for up to two vessels.

Other versions of this suboption could replace the 40% limit with some other limit.

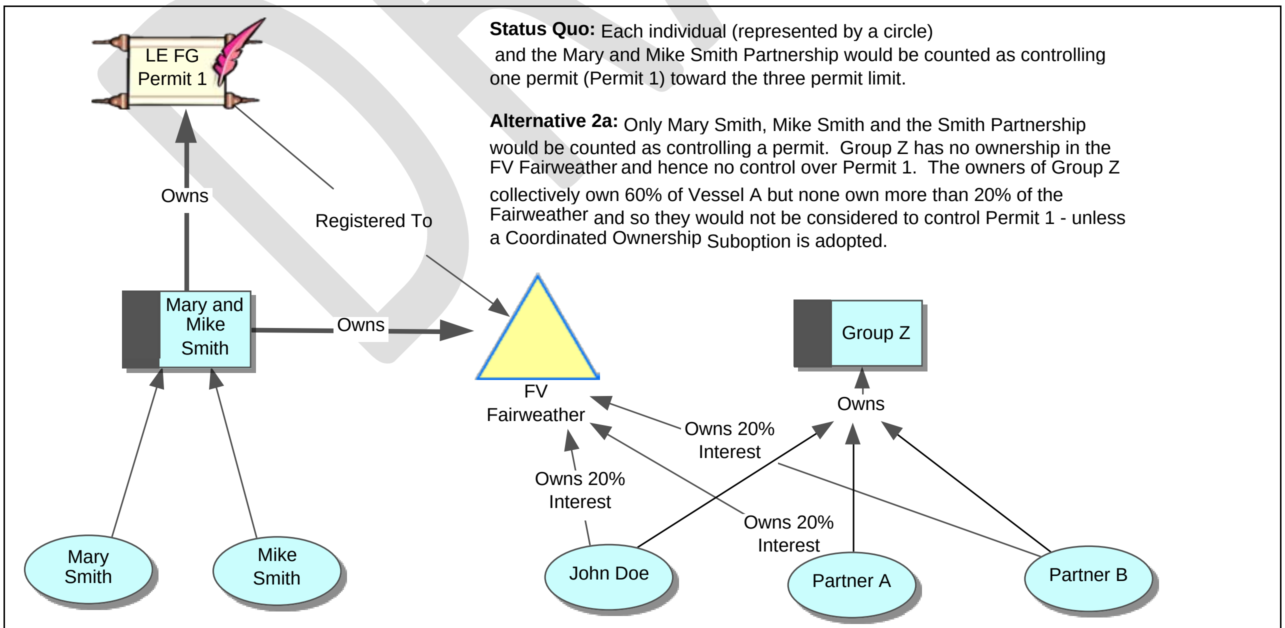


Figure 2-3 Permit counting under No Action and Alternative 2a when vessel owners participate in ownership of a business entity but hold vessel ownership outside that business entity.

Alternative 2b: No Action for permit ownership (any percentage ownership in a permit is a count of 1); however, holding a permit is only counted if the vessel owner has a greater than 30% share. Partial vessel ownership is capped at two vessels, i.e. the 30% or less ownership in a vessel exemption could only be used twice. **After this two-permit exception is reached then any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit, as described under No Action**.[6]

Bolded text is a staff recommended addition to clarify the alternative, requiring Council approval before becoming part of the formal option.

Alternative 2b would perform the same as Alternative 2a but with a 30% threshold. Similar suboptions could be considered.

2.2.3 Alternatives Considered But Rejected From Further Analysis

The following alternatives were considered but have been rejected from further analysis because they are administratively burdensome to implement and track (Alternative 3), or because they weaken the control limits beyond what is needed to address the purpose and need for this action (Alternatives 4, 5, and 6). If the control limits were revised to the extent that Alternatives 4 through 6 would allow, this could undermine the purpose of having control limits in place, namely to maintain the owner-operator nature of the fleet.

Alternative 3: Maintain a three permit limit but calculate control based on percentage ownership of permits and vessels. Total ownership (permit ownership and holdership) is capped at 300%. 1st and 2nd generation owners would be limited to a total of 300 percent. (The intent being to limit total ownership to 3 permits which is status quo.)

For example, John Doe wholly owns GF0001 and 20% of the vessel Fairweather. Fairweather is registered to GF0001 and GF0002. John Doe has a count of 120%. Another possible example: The partnership of Mike and Mary Smith own 3 permits. As such, Mike and Mary Smith, as a partnership, have 300% of total ownership, which is the limit. However, Mike as an individual has 150%, as does Mary.

Alternative 4: Increase the own and hold limit to 6 permits. Partial or any percent ownership or holdership is a count of 1 towards the limit of 6. (Permit counts are determined as under No Action.)

For example, John Doe owns GF0001, GF0003, and 20% of the vessel Fairweather. Fairweather is registered to GF0001, GF0002, and GF0004. John Doe owns 2 permits and holds 2 additional permits due to partial ownership of Fairweather for a total count of 4.

Alternative 5: No Action on permit owner (no one may own more than 3 permits unless grandfathered in). Cap the number of tier permits an entity may register to a vessel at 3 permits. Cap the number of limited entry fixed gear tier vessels an entity can own at three. The maximum own and hold limit is effectively increased to 12 permits (an entity could own 3 permits and have partial or total ownership of three vessels each of which are registered to three different permits owned by others).

For example, John Doe owns GF0001, GF0002, and GF0003. Mr. Doe also owns 20% of the vessel Alpha, 10% of the vessel Beta, and 30% of the vessel Gamma. Alpha is registered to GF0004, GF0005, and GF0006; Beta is registered to GF0007, GF0008, and GF0009; and Gamma is registered to GF00010, GF00011, and GF00012. John Doe owns 3 permits and has partial ownership of 3 vessels that each hold 3 permits; his total count is 12. In this example, Doe could not register his own permits to any other vessels he owns beyond Alpha, Beta, and Gamma, but he could lease the additional permits out to other vessels. He has maxed out on the number of vessels he has an ownership interest in and they are in the primary fishery. Also, Alpha, Beta, and Gamma are at the limit of 3 permits registered to them during the primary season; they cannot remove a permit mid-season and add a 4th permit.

Alternative 6: No Action on 3-permit limit, but the calculation is based only on ownership of permits; holding or leasing a permit/ ownership in the vessel would not count towards the 3 permit limit. A person could own 3 permits and hold any number of additional permits by registering the vessel(s) they own to permits owned or leased by other persons.

For example, John Doe owns GF0001, GF0002, and GF0003, and 20% of the vessel Fairweather. Fairweather is registered to GF0004, GF0005, and GF0006. John Doe owns 3 permits and his partial ownership of a vessel registered to other permits does not affect his own and hold limit; his total count is 3.

Chapter 3 Affected Environment

3.1 Physical Environment

This section describes the current condition of the physical environment that may be affected by this action. The effects of implementation of the action alternatives on the physical environment are presented in Chapter 4.

Sablefish (*Anoplopoma fimbria*) is a component of the groundfish fishery managed under the FMP that occurs in the United States Exclusive Economic Zone (US EEZ) from three to 200 nautical miles off the coasts of Washington, Oregon, and California. The offshore ocean is comprised of many diverse habitats, including rocky and non-rocky shelf regions, deep submarine canyons, and continental slopes and basins. Sablefish are primarily caught in commercial fisheries with trawl, longline, and pot gear. Longline gear in the groundfish fisheries has been shown to have little impact on habitat, and the primary sablefish fishery is shorter in duration and in geographic scope than the groundfish fishery. The longline and pot gear used by this fishery may come in contact with the bottom habitat.

Physical topography off the U.S. West Coast is characterized by a relatively narrow continental shelf. The 200 m depth contour shows a shelf break closest to the shoreline off Cape Mendocino, Point Sur, and in the Southern California Bight, and widest from central Oregon north to the Canadian border as well as off Monterey Bay. Deep submarine canyons pocket the EEZ, with depths greater than 4,000 m common south of Cape Mendocino.

Sablefish are abundant in the North Pacific, from Honshu Island, Japan, north to the Bering Sea, and southeast to Cedros Island, Baja California. Large adults are uncommon south of Point Conception. In the North Pacific, sablefish is considered an inner-continental shelf-bathybenthal species. Adults are found as deep as 1,900 m, but are most abundant between 200 and 1,000 m. Survey data for the North Pacific indicate that almost all sablefish were taken at depths <700 m. However, off southern California, sablefish were abundant to depths of 1,500 m.

3.2 Biological Environment

This section describes the current condition of biological resources that may be affected by these actions. The effects of implementation of the action alternatives on the biological resources are presented in Chapter 4.

3.2.1 Groundfish Stocks

The current status of the groundfish stocks managed under the FMP was most recently analyzed in the Proposed Harvest Specifications and Management Measures for the 2013-2014 Pacific Coast Groundfish Fishery (2013-14 Specifications EIS); that document is incorporated by reference here. For the purposes of this document, this section will be limited to information regarding sablefish and co-occurring groundfish species.

Sablefish was last assessed in 2011 and is described as a precautionary zone stock in the 2013-14 Specifications. The estimated spawning biomass in 2011 is 60,957 mt (95 percent interval ranges broadly from 16,418 mt to 105,495 mt). The relative spawning biomass is estimated to be at 33 percent of unfished biomass levels in 2011 (~95 percent intervals range from 18-49 percent). It seems that large 1999 and 2000 year classes briefly slowed the rate of stock decline between 2002 and 2005. An above-average 2008 cohort is currently moving through the population; however, it has yet to mature, and therefore is not currently contributing to the trend in spawning biomass.

The available data for sablefish are largely uninformative about the absolute size and productivity of the stock. Uncertainty in the properties of current ageing methods (both potential bias and imprecision), as well as relatively sparse fishery sampling, affect the reliability of age data. Because sablefish grow very rapidly and reach near asymptotic length in their first decade of life, length-frequency data are not particularly informative about historical patterns in recruitment. The patterns observed in historical sablefish recruitment suggest that stock trajectory (via shifts in recruitment strength) is closely linked to productivity regimes in the California Current. Uncertainty in future environmental conditions should be considered a large source of uncertainty in all projections of stock status. More detailed information on the stock status can be found in the stock assessment document (Stewart, *et al.* 2011b).

Based on the 2012 groundfish mortality reports, darkblotched rockfish was the most frequently discarded bycatch (that is also an overfished stock/ rebuilding species) in the coastwide limited entry fishery at 8.23 mt of bycatch. In the limited entry trawl fishery, sablefish are targeted as part of a deepwater complex with Dover sole and thornyheads (also called DTS for Dover-

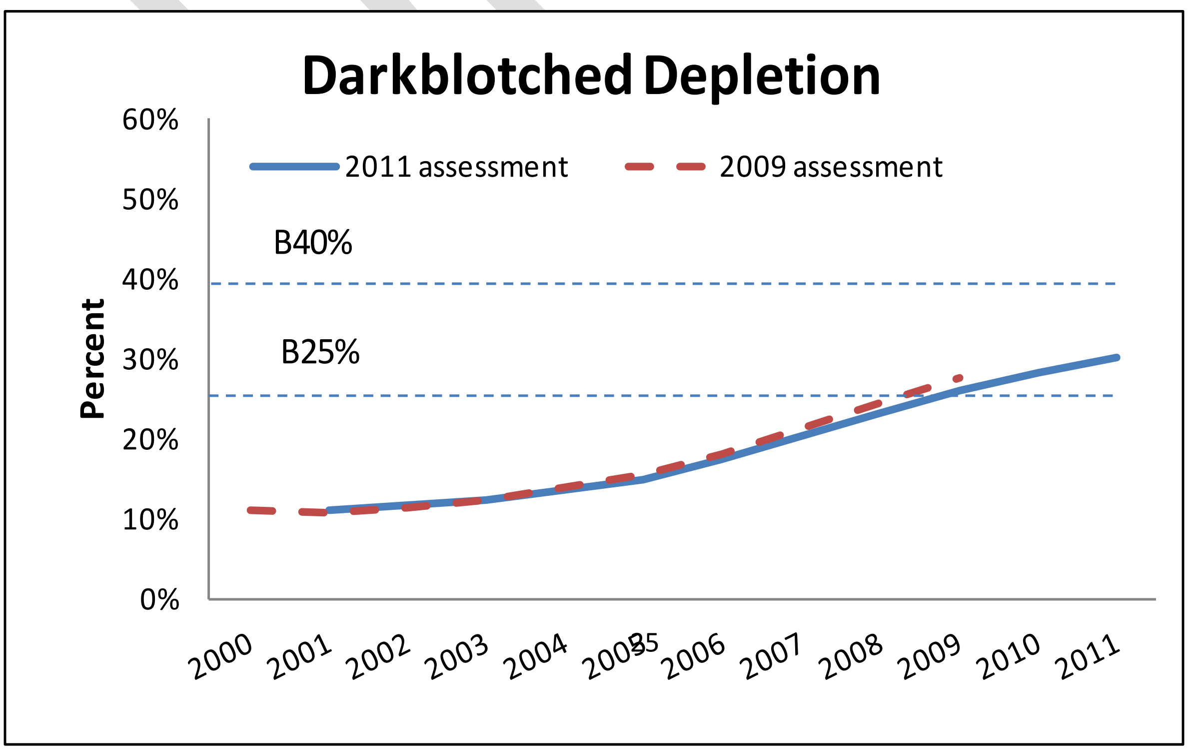
Thornyheads-Sablefish).The following description of the status of the stock is taken from the 2013-14 Specifications.

Darkblotched Rockfish, Dover Sole, and Thornyheads
Stephens et al. (2011) prepared a stock assessment update for darkblotched rockfish in the U.S., Vancouver, Columbia, Eureka, and Monterey areas using the Stock Synthesis model version 3.21d. The darkblotched rockfish population in these areas was modeled as a single stock. The information presented in this section was summarized from the 2011 stock assessment update.

The biomass (1+ age fish) in 2011 was estimated to be 13,926 mt. The recruitment pattern for darkblotched rockfish is highly variable among years. With the exception of the 1999, 2000, and 2008 year classes, recruitment levels (age-0 recruits) between the 1980s and 1990s were generally poor when compared with historical average recruitment levels. Darkblotched rockfish continues to show an increasing trend with the point estimate for the depletion of the spawning output at the start of 2011 at 30.2 percent of its unfished biomass. The assessment suggests that the west coast darkblotched stock is above the overfished threshold, but below the management target of $B_{40\%}$. The spawning output seems to have increased steadily over the past 10 years. Since 2003, overfishing is estimated to have occurred once, with estimated catch exceeding the acceptable biological catch (ABC) (now referred to as the overfishing limit (OFL)) by 1 mt in 2004.

The major sources of uncertainty in the updated darkblotched assessment are the estimated natural mortality and the assumed steepness of the stock-recruitment relationship. Sources of uncertainty not addressed in the model include the degree of connection between the populations of darkblotched rockfish off British Columbia and the U.S. West Coast; the effect of climatic variables on recruitment, growth, and survival of darkblotched rockfish; and gender-based differences in survival. More detailed information on the stock status can be found in the stock assessment update (Stephens, *et al.* 2011).

Figure 3-1 Darkblotched Depletion.



Dover sole, as well as longspine and shortspine thornyhead, were listed as healthy stocks in the 2013-14 Specifications EIS.

3.2.2 Non-groundfish Species

A thorough description of non-groundfish species including Pacific and California halibut, coastal pelagic species, Dungeness crab, highly migratory species, pink shrimp, and other species may be found in the 2013-14 Specifications EIS.

3.2.3 Protected Species

Protected species are species listed under the ESA, the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA), and EO 13186. A thorough description of protected species including ESA-listed salmon and steelhead, green sturgeon, eulachon, marine mammals, seabirds, and other species may be found in the 2013-14 Specifications EIS.

3.2.4 The Marine Ecosystem and Essential Fish Habitat

In the North Pacific Ocean, the large, clockwise-moving North Pacific Gyre circulates cold, sub-arctic surface water eastward across the North Pacific, splitting at the North American continent into the northward-moving Alaska Current and the southward-moving California Current. Along the U.S. West Coast, the surface California Current flows southward through the U.S. West Coast EEZ. The California Current is known as an eastern boundary current, meaning that it draws ocean water along the eastern edge of an oceanic current gyre. Along the continental margin and beneath the California Current flows the northward-moving California Undercurrent. Influenced by the California Current system and coastal winds, waters off the U.S. West Coast are subject to major nutrient upwelling, particularly off Cape Mendocino (Bakun, 1996). Shoreline topographic features such as Cape Blanco, Point Conception and bathymetric features such as banks, canyons, and other submerged features, often create large-scale current patterns like eddies, jets, and squirts. Currents off Cape Blanco, for example, are known for a current "jet" that drives surface water offshore to be replaced by upwelling sub-surface water (Barth, et al, 2000). One of the better-known current eddies off the West Coast occurs in the Southern California Bight, between Point Conception and Baja California (Longhurst, 1998), wherein the current circles back on itself by moving in a northward and counterclockwise direction just within the Bight. The influence of these lesser current patterns and of the California Current on the physical and biological environment varies seasonally (Lynn and Simpson, 1987) and through larger-scale climate variation, such as El Nino-La Nina or Pacific Decadal Oscillation (Longhurst, 1998).

The effects of climate on the biota of the California Current ecosystem have been recognized for some time. Climate change and ocean acidification pose major additional stresses to managed fisheries on top of fishing mortality (IPCC 2007; IPPC 1995; WBGU 2006). Heat stress from warming waters and changes in the timing and magnitude of upwelling and associated nutrients and prey are just two examples. As climate change proceeds, there will likely be greater departure from historic population trends and increased uncertainty and risk in fisheries management. In addition, the effects of fishing pressure may unexpectedly magnify the effects of climate change and vice-versa (Harley and Rogers-Bennett 2004; Hsieh, *et al.* 2008; IPCC 2001).

EFH has been described within the project area for highly migratory species, CPS, salmon, and groundfish. The MSA defines EFH to mean "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802 sec. 3(10)). Regulatory guidelines elaborate that the words "essential" and "necessary" mean EFH should be sufficient to "support a population adequate to maintain a sustainable fishery and the managed species' contributions to a healthy ecosystem." The regulatory guidelines also establish authority for Councils to designate Habitat Areas of Particular Concern (HAPC) based on the vulnerability and ecological value of specific habitat types. Councils are required to minimize, to the extent practicable, the adverse effects of fishing on EFH, when information indicates that fishing activities may adversely affect EFH. NMFS works through a consultation process to minimize adverse effects of nonfishing activities (50 CFR 600 subpart J). Refer to Volume 1 of the Council's 2008 groundfish SAFE document for more information. Groundfish EFH is currently undergoing an EFH review.

3.3 Socio-economic Environment

This section describes the current socio-economic environment that may be affected by these measures. The effects of implementation of the action alternatives on the socio-economic environment are presented in Chapter 4.

3.3.1 Participants in the Fixed Gear Sablefish Fishery

Participants in the fixed gear sablefish fishery (LE or OA) that are likely to be affected by these measures fall into one of several groups:

- Owners of LEFG permits, a subset of which would be owners of LEFG permits that have a sablefish endorsement for pot or longline gear (i.e. participants in the primary sablefish fishery north of 36ºN latitude);
- Owners of vessels registered for use with LEFG permits that participate in the LEFG sablefish fishery;
- Participants in the DTL OA fishery;
- Buyers, processors, and first receivers of sablefish landings in the primary and DTL sablefish fishery; and
- Crew that work on vessels that fish in the sablefish fishery.

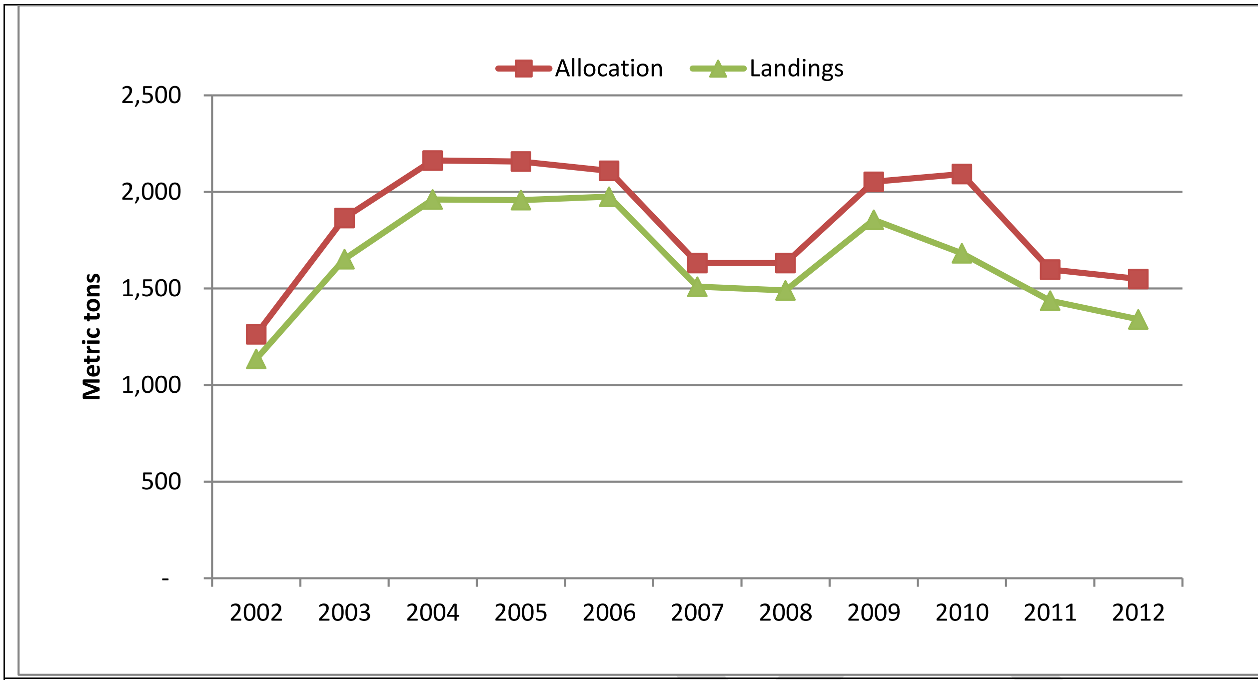


Figure 3-2. The LEFG sablefish primary season allocation and landings (2002 through 2012).

3.3.2 Participants in Other Fisheries (Shorebased Trawl IFQ and Alaska Program)

As mentioned previously, the other two fisheries whose participants may be affected by these actions are the Shorebased Trawl IFQ fishery and the Alaskan fixed gear sablefish and halibut IFQ program (Alaska program). Participants in these fisheries fall into one of several groups:

- Owners of trawl endorsed limited entry permits that participate in the shorebased IFQ program (not mothership or catcher/ processor endorsed trawl permit owners);
- Owners of vessels registered to limited entry trawl permits that harvest IFQ species with trawl or fixed gear for delivery to shorebased first receivers;
- Owners of quota share (QS) permits;
- Shorebased IFQ first receivers with a first receiver site license eligible to receive IFQ landings;
- Initial recipients of Alaska sablefish IFQ that qualify for the owner on board exemption by owning partial interest in a vessel that is also used to fish LEFG permits on the West Coast; and
- Owners of vessels that harvest both sablefish in the Alaska program, as well as sablefish in the West Coast LEFG sablefish fishery.

3.3.3 Communities

The groundfish fishing communities of Washington, Oregon, and California are described in detail in the 2013-14 Specifications EIS at 3.2.2. Fishing communities specific to the LEFG sablefish fishery are described in the Pacific Coast Groundfish Limited Entry Fixed Gear Sablefish Permit Stacking Program Review document which will be incorporated by reference here following final adoption by the Council.

3.3.4 State and Federal Management and Enforcement Agencies

The state agencies in Washington, Oregon, and California are currently responsible for tracking sablefish landings through collection of paper landing tickets. State and Federal enforcement agencies are responsible for ensuring compliance with existing and future regulations. NMFS is responsible for tracking allocations and for implementing any administrative requirements associated with these fisheries and as such will incur any costs associated with implementation.

Chapter 4 Environmental Consequences - Impacts of the Proposed Action Alternatives on the Affected Environment

4.1 Impact Mechanisms

In Section 4.1 impact mechanisms are discussed, and in following sections the effects of the impact mechanisms on each resource of concern are identified, including physical, biological, and socio-economic. Impact mechanisms are the first level expected instrumental effects of the action with only such interpretation of meaning as is necessary to explain the mechanism. The instrumental impacts mechanisms are given their full policy meaning as the effects on each resource area are described in each subsequent section. As a simple example, consider as an impact mechanism an event in which a vessel strikes a reef, a crewman nearly loses his life, oil is spilled and coral damaged. These are the instrumental impact mechanisms. Having described the event in a single comprehensive fashion, the meaningful impacts of concern can then be discussed such as the loss to the economy and a business of the capital asset of a fishing vessel; the physical and emotional trauma to the crew member, his family, and rescue personnel; the effect of the mechanical damage to the reef and oil spill on stock productivity, future harvests, and ecosystem services. The boundary between impact mechanism and impact to the resources can be fuzzy, particularly where the impact mechanisms primarily operates through the human system as in the case of the actions considered in this EA. However, particularly where issues are complex, it is useful to provide the reader with a single concise starting point and initial understanding of the expected dynamics associated with the events to be evaluated, from which the reader can then evaluate the conclusions drawn with respect to the impact on each resource. This approach reduces the need for partial repetitive and piecemeal explanations which sometimes result when discussion of the impact mechanisms is more dispersed through the document, leaving the reader without really ever having achieved a comprehensive understanding of the dynamics being evaluated. The impact mechanism section provides a clear opportunity for the reader to evaluate for him or herself the premises which underlie the entire analysis before proceeding with consideration of the evaluation of the impacts on each individual resource.

4.1.1 Electronic Fish Ticket

The action alternatives would implement a Federal requirement that an electronic fish ticket be used to document sablefish landings in either the primary LEFG sablefish fishery, the primary and LEFG DTL fisheries, or in the primary and LEFG and OA DTL fisheries. This would be in addition to the existing state reporting requirements. The impacts from this action may be divided into two types of categories: the physical and biological, and the socio-economic. These are discussed further in 4.2.1, Effects on the Physical and Biological Environment, and in 4.3.1, Effects on the Socio-economic Environment.

4.1.2 Own/Control Limits

The action alternatives would change the criteria by which it is determined whether an entity controls a limited entry fixed gear (LEFG) permit. Currently, entities are considered to control any permit with which they have some share in the direct ownership plus any permit registered with a vessel in which they have at least a partial ownership interest. For example, if a fisherman owns one vessel and owns two LEFG permits (Fisherman 2 in Figure 4-1), but also holds a partial ownership interest in another vessel (perhaps as security for a loan), then all the permits of the other vessel also count toward that fisherman’s total (in Figure 4-1, for Fisherman 2 a total of four permits, i.e. one in excess of the three-permit limit). Such a situation might also arise for a lender or any other person who takes part ownership in a vessel to secure a loan or other debt, rather than establishing a maritime lien (Figure 4-2). The current accounting rule might be conceptualized as an "all-or-nothing" rule: if an entity has any ownership interest in a vessel then all LEFG permits associated with the vessel count as being under that entity's control.[8] The action alternative would allow entities to have a small percent ownership interest in a vessel without being considered to also be in control of the permits attached to the vessel.

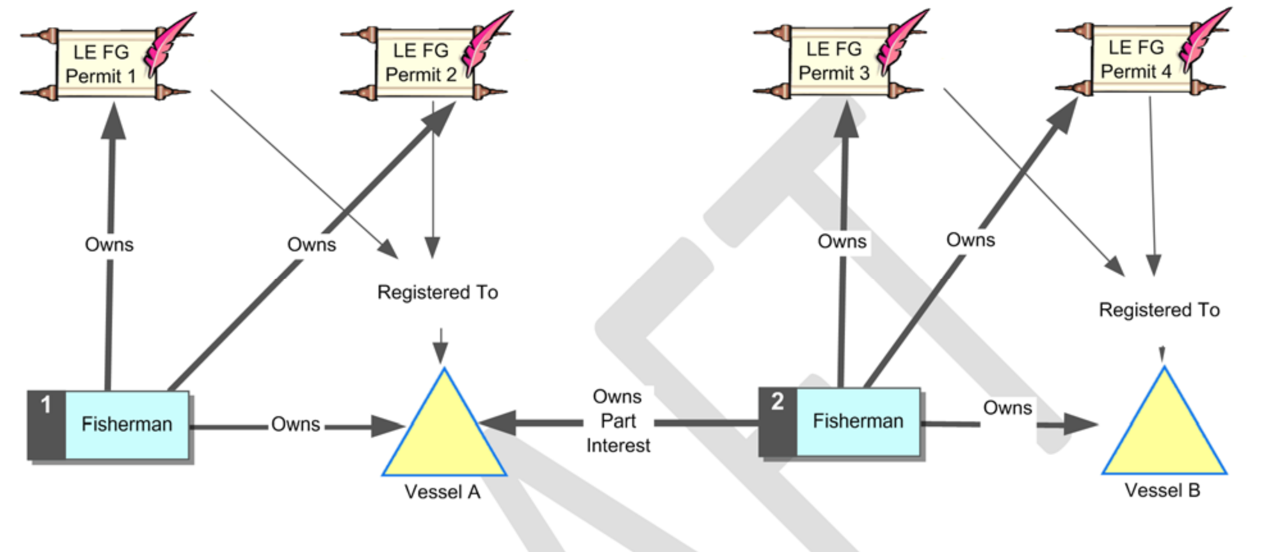


Figure 4-1. Fisherman example--full or partial ownership of a vessel implies control over the limited entry fixed gear (LEFG) permits associated with that vessel, potentially resulting in violation of the three-permit control limit (in this example, four permits for Fisherman 2).

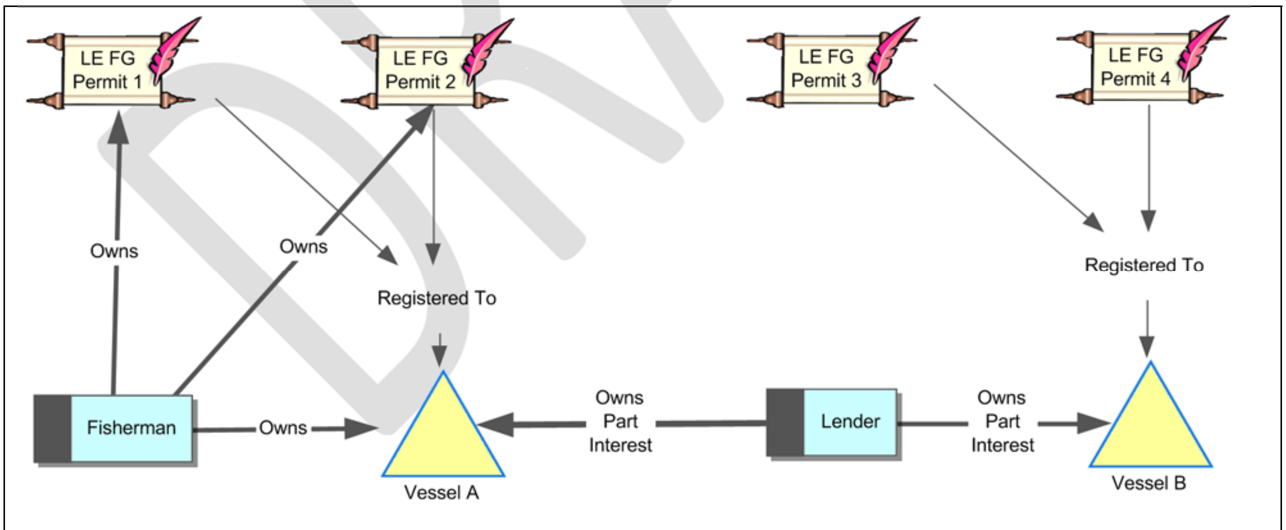


Figure 4-2. Lender example--full or partial ownership of a vessel implies control over the limited entry fixed gear (LEFG) permits associated with that vessel, potentially resulting in violation of the three-permit control limit (in this example, four permits for a lender that secures interest through vessel ownership rather than through a maritime lien).

[8] Direct ownership of a permit is counted in a similar fashion, i.e. any fraction of ownership counts as ownership of the entire permit.

While there are a number of imaginable situations constrained by the current “all-or-nothing” rule, there are primarily two types of situations that have been brought to managers’ attention. Because these are the situations which are currently bumping up against the all-or-nothing rule, they are the most likely indicators of how human activity would change with a change in the constraint. The first situation had to do with a family wanting to bring other members into the fishery by helping them purchase a vessel, essentially by acquiring the vessel and selling it to them. Whether within a family or among fishermen, a frequent practice is that a seller financing a vessel allows the buyer to operate the vessel (to virtually act as owner), but the seller retains an ownership interest until the vessel is fully paid for (at which time the transaction is completed and full vessel ownership transferred to the buyer). However, by maintaining that ownership interest in the vessel for security (regardless of how small), any LEFG permits the vessel buyer attaches to the vessel will also count against the control total for the seller, and potentially put the seller over the cap, if the seller owns another vessel with LEFG permit(s).

In the second situation, rather than to secure financing, the incentive for maintaining ownership in a limited entry fixed gear vessel relates to that vessel’s participation in the Alaskan fixed gear sablefish and halibut IFQ program (Alaska program). In the Alaska program, as in the West Coast sablefish program, there is an IFQ owner-on-board requirement with a grandfather clause exception. In Alaska, most partnerships, corporations, and other non-individual Alaska IFQ owners are required to hire skippers to fish their IFQ and individuals grandfathered in are allowed to hire skippers to fish in their stead. However, to hire a skipper an Alaska IFQ owner must have at least a 20% ownership interest in the vessel on which the IFQ will be fished (50 CFR 679.42). This creates a situation in which vessel ownership established to take advantage of the exception to the owner-on-board requirements of the Alaska program may push an entity over the West Coast LEFG permit control limits if that vessel also fishes in the West Coast sablefish fishery. For example, if an individual that owns a vessel that participates only in the West Coast fixed gear sablefish fishery also has ownership of Alaskan IFQ, then that person may desire to acquire part ownership in a vessel participating in the Alaskan IFQ fishery to take advantage of the Alaskan owner-on-board exception provision. Under such circumstances, any West Coast permits which are attached to the vessel that fishes in the West Coast limited entry fixed gear fishery and also fishes Alaskan IFQ would also count against the individual’s control limit for West Coast LEFG permits, as illustrated in Figure 4-3. In Figure 4-3, Fisherman 2 has a 20% ownership of Vessel A (owned by Fisherman 1) and as a result all permits registered to Vessel A count against Fisherman 2’s three-permit cap, even though Fisherman 2 has no ownership over Fisherman 1’s permits. Also note that while Fisherman 1’s permits registered to Vessel A count against Fisherman 2, Fisherman 2’s permits, registered to Vessel B, do not count against Fisherman 1 because Fisherman 1 has no ownership in Vessel B of Fisherman 2’s permits. A similar situation would pertain to corporations, partnerships, etc. In the Alaska program, these entities are required to hire a skipper to fish their initial allocations of Alaska IFQ.[9]

[9] The Alaska program grandfathered in corporations, partnerships, and other non-individual entities. Their grandfather status will expire with the addition of new owners or the sale of their IFQ. Similarly, the West Coast sablefish tier program grandfathered these entities in a similar fashion and has similar rules for the expiration of those grandfather exceptions.

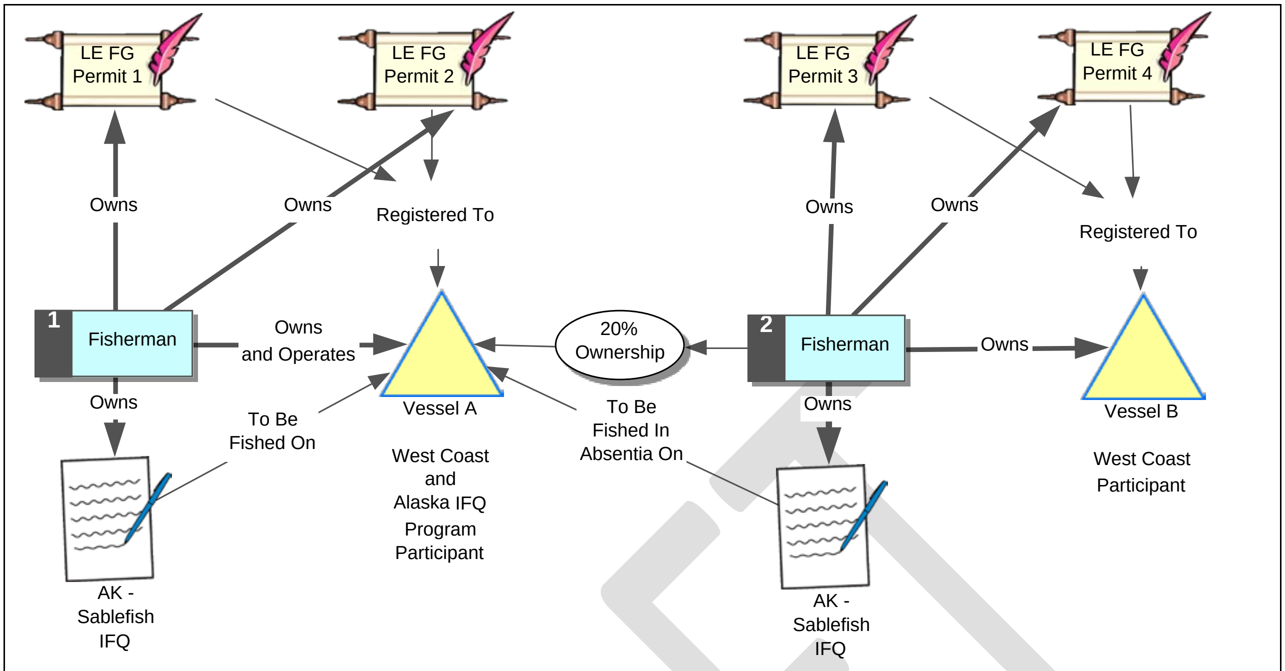


Figure 4-3. Alaska cross participation example--full or partial ownership of a vessel implies control over the limited entry fixed gear (LEFG) permits associated with that vessel, potentially resulting in violation of the three-permit control limit (in this example, four permits for Fisherman 2).

Thus, there seem to be two potential impact mechanisms of particular concern with the all-or-nothing criteria for counting permits toward the control limit:

1. an effect on arrangements that involve financial interests secured through vessel ownership, and
2. an effect on the distribution of limited entry privileges (both Alaska IFQ and LEFG permits) among fishing operations.

The latter of these two situations seem to be of most concern at this time, based on the content of public testimony to the Council.

In addition to these two mechanisms which operate through a change in participant behavior, a third mechanism operates on the administrative side of the program:

3. a change in effort required to comply with and administer the program (submission, collection, and tracking of additional information).

Impact Mechanisms Related to Lending

To date, institutional lenders have not expressed any concerns about financing and the all-or-nothing rule for assessing the three-permit control limit. An action alternative would only affect assessing the three-permit limit with respect to vessel ownership (i.e., it does not change how the control limit would be assessed with respect to direct permit ownership). Institutional lenders likely secure loans against vessels through a *preferred mortgage* and associated maritime lien.

> A preferred mortgage is a mortgage which is given status as a maritime lien. As such it enjoys a certain priority in the event of default. In addition, the Coast Guard is prohibited from making certain changes in documentation including, but not limited to, change of vessel ownership, name, and hailing port without consent of the mortgagee. For this reason, many financial institutions require vessels which are eligible for documentation to be documented and to have preferred mortgages recorded against them.
>
> USCG National Documentation Center (http://www.uscg.mil/nvdc/nvdcfaq.asp#18)

As discussed above, the main lending practice likely to be affected by an action alternative would be that which is reported to occur among industry members (as fishing operations and families secure loans they make to other fishermen by maintaining possession of the vessel being sold until such time as all payments have been made, as described above).

If such within industry arrangements are advantageous over working with an institutional lender, it is likely because it generates some economic advantages that would not be available through an institutional lender. For a vessel seller, providing a buyer direct financing may allow the seller to negotiate a better price. The buyer may gain either through access to financing that would otherwise not be available or through access at a lower cost. A seller's personal knowledge and social connections with the buyer may mean that the transaction is a lower risk than would be perceived by an institutional lender or the seller may have a social interest in the buyer's entry into the fleet. At the same time, the fleet has been operating for over 12 years under the current all-or-nothing control rule and in the interim may have found other ways to achieve similar private financing outcomes.

Thus, with respect to lending, the impact mechanism of an action alternative might be

- **a redistribution of risks, financing transaction costs, and related profits from institutional lenders toward the private parties involved in a transaction, and**
- **more social connections between buyers and sellers than might be the case if borrowers were qualified by institutional lenders.**

Impact Mechanism Related to Distribution of Fishing Privileges

To consider the impact mechanisms with distribution of fishing privileges we will look at three groups of participants:

1. West Coast and Alaska (WC&AK) participants,
2. Alaska only participants (AKO), and
3. West Coast only participants (WCO).

For purposes here: West Coast participation is participation involving control of a West Coast LEFG permit; and Alaska participation involves owning or fishing Alaska IFQ. An AKO participant is one that participates in the Alaska IFQ program and may own a vessel that is partially owned by a West Coast participant but the AKO participant does not have an ownership interest in a West Coast operation, i.e. fishing enterprise active in the West Coast limited entry sablefish fishery.

The WC&AK group can be further divided into

1. those who directly participate only on the West Coast (either with a permit or a vessel registered to permits), fishing their Alaska sablefish IFQ on an AKO vessel without traveling to Alaska (i.e. hiring a skipper to fish their Alaska IFQ for them), and
2. those who individually or with their vessel travel to Alaska to participate in the Alaska fishery in addition to fishing on the West Coast.

For the second subgroup to participate in the Alaska IFQ program, there is no requirement that they have ownership in the vessel that fishes in Alaska. Therefore, with respect to the WC&AK group, the impact mechanism operates directly through the first subgroup of WC&AK participants, those fishing under a grandfather exception to the Alaska owner-on-board provision, which allows them to participate without being present during fishing operations. As a result of the impact on the first subgroup members of the second WC&AK subgroup and AKO participants may subsequently be affected. The owners of approximately 87 percent (Table 4-1) of the West Coast limited entry fixed gear sablefish vessels (84 of 97) might fall in the first subgroup (their vessels do not go to Alaska) but would fall in the second category if they travel there individually or would not be affected if they do not own Alaska IFQ. The owners of the remaining 13 percent of vessels (13 of 97) fall in the second category (their vessels fish on the West Coast and in Alaska, Tables 4-1) and are impacted by a constraint on their ability to fish Alaska IFQ for members of the first group. The WC&AK vessels which travel to Alaska to fish Alaska IFQ could not be hired to fish Alaska IFQ by an entity that has an LEFG permit if the permits registered to that WC&AK vessel would put the hiring entity over its limit.

Tables 4-1. Number of vessels with LEFG permits that participate in Alaska fisheries in 2012.

	Number of Permits Stacked on a Vessel				
	3 Permits	2 Permits	1 Permit	Total	Percent
	Number of Vessels				
Number of Vessels Without Alaska Participation (owners might have Alaska IFQ) [a/]	18	16	50	84	86.6%
Number of Vessels With Known Alaska Participation	3	6	4	13	13.4%
Total	21	22	54	97	

a/ These data provide only a general indication of the magnitude of the number of entities potentially affected by the all-or-none accounting method and Alaska participation requirement. On the one hand, the number of entities affected may be greater than these numbers indicate because there may be more than one owner per vessel affected (if for a single vessel there are multiple owners that each individually own Alaska IFQ). On the other hand, the number may be smaller because: some of these owners may still travel to Alaska on their own, and therefore not need to take advantage of the grandfather clause; some may not qualify under the grandfather clause; and some (many) may not have Alaska IFQ.

The following discussion shows the impact mechanisms of the action alternative is likely to be some degree of increase in consolidation of harvest privileges both in West Coast and Alaska, including:

- **consolidation of Alaskan IFQ on vessels that also participate in the West Coast LEFG fishery (WC&AK participants),**
- **consolidation of West Coast LEFG permits on vessels that fish in both fisheries (WC&AK participants), and**
- **acquisition of West Coast LEFG permits by vessels that previously fished only in the Alaskan IFQ fishery (AKO participants).**

To simplify the discussion, we will first examine the effects with respect to WC&AK operations, starting with operations that have three permits. Then we will examine effects with respect to AKO participants.

Currently, a WC&AK vessel with three LEFG permits cannot hire another WC&AK vessel to fish its Alaska IFQ for it, but could hire an AKO vessel. For a WC&AK operation to participate in the Alaska IFQ fisheries, while taking advantage of the Alaska grandfather exception for the owner-on-board provision, it must acquire ownership in a vessel participating in the Alaska fishery (as indicated in Figure 4-3). If the WC&AK operation has three LEFG permits, it cannot fish its AK IFQ as an absent owner on another WC&AK vessel because acquiring an ownership interest in that vessel would put it over the three permit limit. Therefore, the Alaska IFQ owner with ownership in a WC&AK operation that has three permits would either have to fish its Alaska IFQ from an AKO vessel or participate in the fishery in person (forego use of the grandfather clause). This situation is illustrated on the left hand side of Figure 4-4 and characterized as a constraint on the opportunity of a WC&AK participant to hire a vessel to fish in its Alaska IFQ. .

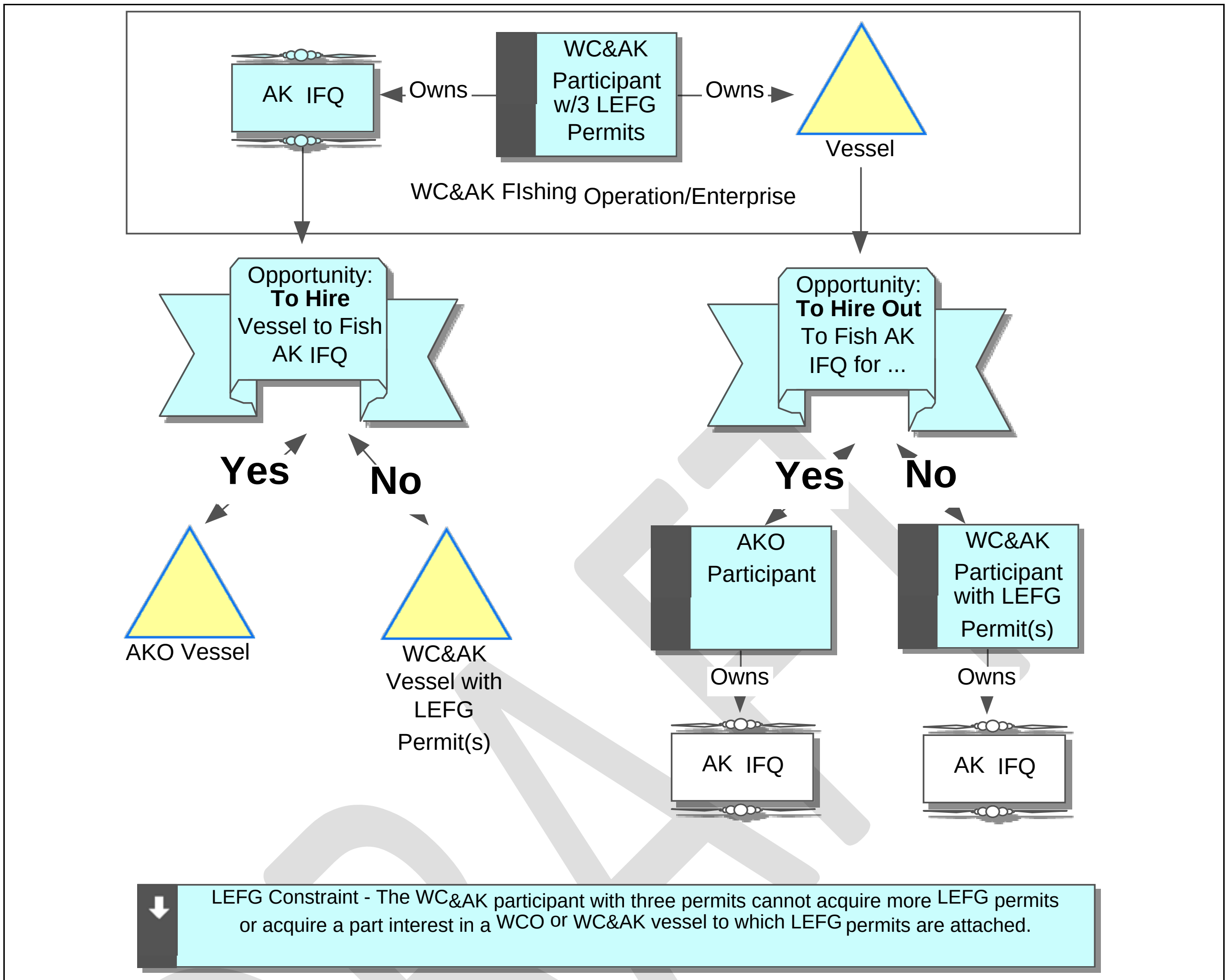


Figure 4-4. Ability of a West Coast and Alaska fishing operation to hire others to fish Alaska IFQ for it or hire out to fish Alaska IFQ for others.

Additionally, under current rules, a WC&AK vessel with three LEFG permits cannot hire out to fish IFQ for another WC&AK vessel. Vessels also have an opportunity to operate as a "hired skipper" in the Alaska IFQ fisheries, fishing the Alaska IFQ for other absent IFQ owners taking advantage of the Alaska grandfather exception to the owner-on-board provisions. A WC&AK vessel with three LEFG permits would not be able to hire out to fish Alaska IFQ for another WC&AK operation because that other operation would have to acquire an ownership in the WC&AK vessel with three permits, which would put it over the three permit limit. This is illustrated on the right hand side of Figure 4-4.

WC&AK participants with fewer than three LEFG permits would have more flexibility to hire, or hire out to other WC&AK vessels to fish Alaska IFQ, with the number of other vessels with which they could work depending on the number of permits owned by each party. Table 4-2 illustrates the combinations of WC&AK participants and AKO participants that would be allowed to operate and not operate together under No Action.

Tables 4-2. No Action: ability of WC&AK and AKO vessels to fish Alaska sablefish IFQ for the potential participant listed in the first column (to “hire out” to the participant listed in the first column) and number of additional LEFG permits that the owners of each entity listed in the columns might acquire.

	WC&AK Vessels			AKO Vessels
	Number of Permits Registered to the Vessel			
	3 Permits	2 Permits	1 Permit	
Participants Seeking to Hire Out Their AK IFQ (Hire a Skipper)	Able to Fish IFQ For Entity Listed to Left – Yes or No (Maximum Number of Additional Permits That Could Be Acquired, If Vessel is Able to Fish for Entity Listed to Left)			
WC&AK w/3 LEFG Permits	N (-)	N (-)	N (-)	Y (0)
WC&AK w/2 LEFG Permits	N (-)	N (-)	Y (0)	Y (1)
WC&AK w/1 LEFG Permits	N (-)	Y (0)	Y (1)	Y (2)
AKO (i.e. no LEFG Permits)	Y (0)	Y (1)	Y (2)	Y (3)

“N” means vessel in the column could not hire out to the participant listed in the row.
Numbers in parenthesis show the number of additional LEFG permits the vessel in the column could acquire without violating the three permit limit (a “-“ is displayed where the combination is impermissible).

This impact mechanism involves the creation of a new opportunity which participants may or may not take advantage of. While we cannot predict the degree to which participants will avail themselves of that opportunity we can describe the change in the opportunity. Under an action alternative, WC&AK operations would have more opportunity to both hire out to other WC&AK operations or to hire other WC&AK vessels to fish their Alaska IFQ, because the 20 percent ownership in a hired vessel needed to meet the requirements of the Alaska IFQ program would not be enough to cause associated LEFG permits to count against the three-permit cap. This increased opportunity to hire and hire out is reflected in the increased number of permissible combinations in Table 4-3 as compared to Table 4-2 (number of cells with a “Y”). All of the new opportunities are for WC&AK vessels with LEFG permits, **indicating that the action alternative would provide more opportunities for consolidation of AK IFQ on WC&AK vessels.**

Tables 4-3. Action alternative: ability of WC&AK and AKO vessels to fish Alaska sablefish IFQ for the potential participant listed in the first column (to “hire out” to the participant listed in the first column) and number of additional LEFG permits that the owners of each entity listed in the columns might acquire.

	WC&AK Vessels			AKO Vessels
	Number of Permits Registered to the Vessel			
	3 Permits	2 Permits	1 Permit	
Participants Seeking to Hire Out Their AK IFQ (Hire a Skipper)	Able to Fish IFQ For Entity Listed to Left – Y/N (Maximum Number of Additional Permits That Could Be Acquired, If Vessel is Able to Fish for Entity Listed to Left)			
WC&AK w/3 LEFG Permits	Y (0)	Y (1)	Y (2)	Y (3)
WC&AK w/2 LEFG Permits	Y (0)	Y (1)	Y (2)	Y (3)
WC&AK w/1 LEFG Permits	Y (0)	Y (1)	Y (2)	Y (3)
AKO (i.e. no LEFG Permits)	Y (0)	Y (1)	Y (2)	Y (3)

Numbers in parenthesis show the number of additional LEFG permits the vessel in the column could acquire without violating the three permit limit.

In addition to an increase in the opportunity for WC&AK participants to fish Alaska IFQ for each other (either hiring out or being hired), additional flexibility would be created for these vessels to acquire more LEFG permits without diminishing their opportunities in the Alaska IFQ fishery. In Table 4-2, values shown in parentheses are the number of additional permits the vessel represented in the column would be able to acquire without interfering with its ability to hire out to the types of vessels listed for each row. For example, the owner of a vessel with 1 permit (represented in the third column of numbers) could work with a WC&AK vessel with 1 permit and would still have the flexibility to acquire one additional permit without exceeding the 3-permit control limit. Under an action alternative, there are not only more permissible combinations of WC&AK vessels with other fishing operations, but the number of additional permits which could be acquired by vessels operating in those combinations increases in every column except for the vessels which already have three permits (first column of numbers). **Thus, an action alternative could lead to increased consolidation of West Coast LEFG permits on fewer West Coast vessels.**

Vessels that participate in Alaska but not the West Coast currently have flexibility to fish for multiple WC&AK operations. If an AKO participant is fishing Alaska IFQ for an absent WC&AK participant (i.e. the WC&AK participant has part ownership in the AKO vessel), each WC&AK participant must have some ownership interest in the AKO vessel but the AKO operation does not have to have an ownership interest in the WC&AK operations. Moreover, under the action alternatives, an AKO vessel might fish for several separately owned WC&AK operations, each with three LEFG permits, without violating the three-permit control limit. This situation is illustrated in Figure 4-5.

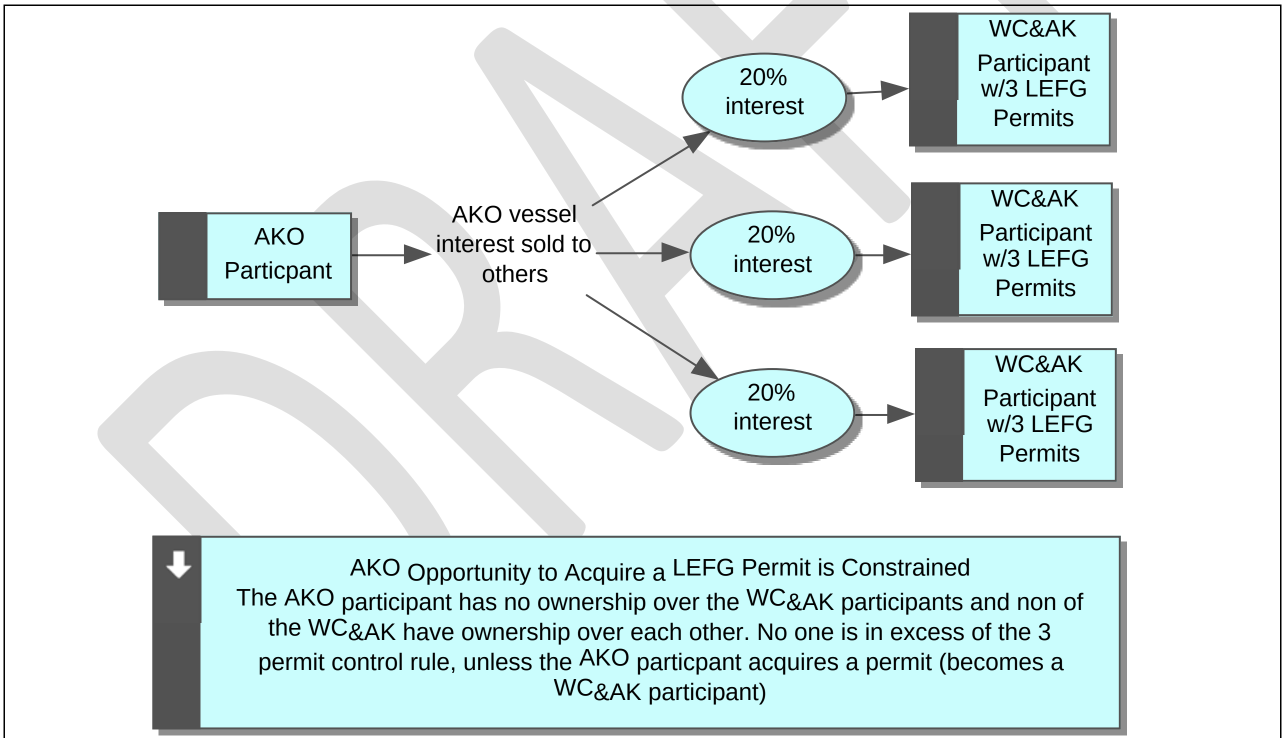


Figure 4-5. Opportunity for AKO participant to hire out to multiple WC&AK participants, each of which might be at the three-permit limit for control of FG Groundfish permts.

While AKO vessels can fish for multiple WC&AK operations (each with up to three permits), the AKO vessels may be constrained in their ability to acquire West Coast LEFG permits (i.e. to become a WC&AK vessel). The LEFG permits held by the WC&AK operations that an AKO vessel fishes Alaska IFQ for do not prevent an AKO vessel from acquiring its own LEFG permit but may provide a disincentive for such acquisitions. Since the WC&AK operations that the AKO vessel fish for are required to have an ownership interest in the AKO vessel, any permits the AKO participant acquires would count against the permit totals for the WC&AK entities. Thus, if the AKO participant acquires a LEFG permit(s) it could force the WC&AK operations it fishes for to find another vessel to hire, if that acquisition pushes one of the WC&AK operations over its three-permit limit. Figure 4-6 diagrams the opportunities present for the AKO operation, and the boxes at the bottom discuss the constraint on acquiring an LEFG permit. Comparison of the AKO vessel column in Table 3-2 to the AKO vessel column in Table 3-3 shows that under an action alternative there would be more situations in which AKO vessels could acquire up to the three-permit limit (i.e. become WC&AK vessels with three LEFG permits without sacrificing their ability to hire out to fish AK IFQ for other WC&AK vessels). **This could lead to some increased consolidation of LEFG permits on AKO vessels (movement of AKO vessels into the LEFG fishery).**

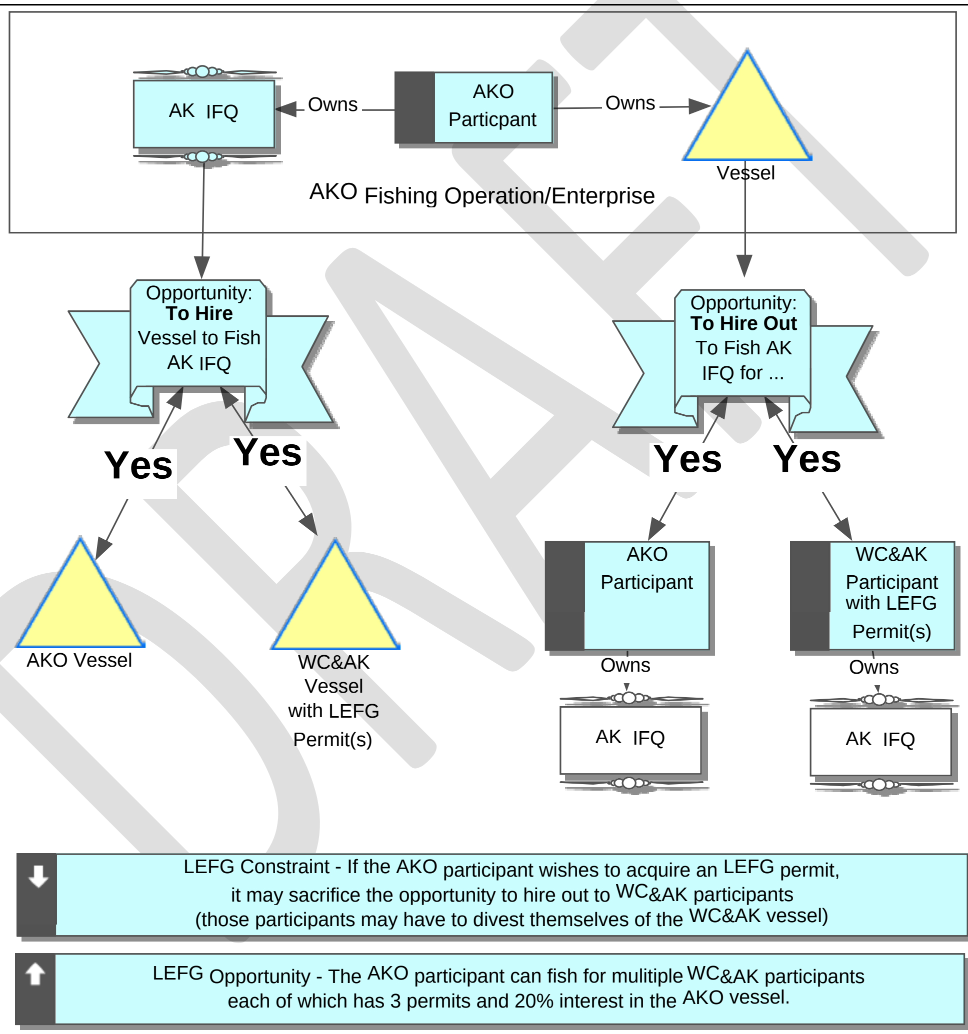


Figure 4-6. Ability of an Alaska only fishing operation to hire out to fish Alaska IFQ or to hire others to fish Alaska IFQ for it and constraints on acquiring a West Coast LEFG permit.

With respect to the new opportunities for consolidation, the situations affected may be somewhat limited. The impact mechanisms pertain only to those situations in which a WC&AK participant both qualifies for a grandfather exception to the Alaska owner-on-board provision and chooses (or would prefer to choose) to exercise that exception by hiring a vessel and skipper rather than travelling to Alaska to participate in the fishing activities. In those situations, both those entities that would hire a vessel to fish Alaska IFQ and the entities that would be hired are involved in the impact mechanism.

With respect to those entities that would hire a vessel to fish their Alaska IFQ, any of the owners of the 97 LEFG vessels (in 2012) and the 164 LEFG permits may be affected in their ability to hire but, in 2012, of 97 vessels (164 permits), 13 vessels (25 permits) participated in the Alaska fishery (Table 4-1). Of the vessels that did not participate in Alaska in 2012, the 18 owners of vessels with three permits could not hire any of the WC&AK vessels that travel to Alaska; the 16 owners of vessels with two permits could hire any one of the 4 of the WC&AK vessels that travel to Alaska; the owners of the 50 vessels with one permit could hire any one of the 10 of the WC&AK vessels that travel to Alaska (Table 4-4).[10] Under the action alternative, these owners could hire any of the 13 WC&AK vessels that travel to Alaska. The numbers provided here are only indicators since they are only for one year and do not take into account the possibility that for a single West Coast permit or vessel there may be multiple owners which each, independently of one another, own Alaska IFQ. Additionally, there are individuals that own multiple permits and vessels such that they may be at higher levels of consolidation (closer to the three-permit limit) than indicated here. The 164 LEFG permits are owned by only 112 unique owners. Therefore, the numbers provided here only indicate a rough order of magnitude of the potential impacts.

Table 4-4. Vessels that go to Alaska and are available for hire, as constrained by the number of permits held by the vessels that might hire them.

West Coast Vessels that Did not Go to Alaska (Owners might have Alaska IFQ to hire out)		WC&AK Vessels that Went To Alaska (Number of LEFG Permits)			
Number of Permits	Number of Vessels	3 Permits	2 Permits	1 Permit	Total
		Number of Vessels			
3 permits	18	-	-	-	0
2 permits	16	-	-	4	4
1 permit	50	-	6	4	10

Statistics on rate at which Alaska IFQ owners hire vessels in the Alaska IFQ fishery may provide some indication of the degree to which the hiring practice occurs and therefore, the degree to which West Coast entities with Alaska IFQ might be constrained by the current permit counting rule. In 2012, 39 percent (201) of all Alaska sablefish IFQ owners (511) hire out their IFQ to a vessel ("hire a skipper") (Table 4-5). This was 64 percent of those eligible or required to do so (315). Because of the geographic distances involved, it seems likely that the proportion of participants in the LEFG fishery that are Alaska IFQ owners and hire a vessel would likely be higher than the averages reported here.

[10] These values assume that the owners of the vessels do not also own other vessels or permits. If for example, one of the owners of a vessel with two permits also owned a vessel with one permit (or owned a permit and leased it to another vessel), then the number of entities at the three-permit limit would be higher than indicated by the count of vessels at the three-permit limit.

Tables 4-5. Participation in Alaska sablefish IFQ fishery (NOAA Fisheries Service, 2012 and 2014)

	1995	2012
Total number of vessels fishing.	616	362
Total Entities with sablefish quota	688	511
Individuals with sablefish quota	528	445
Individuals eligible to hire a skipper	496	239
Non-individuals with quota (corporations, partnerships etc.) - must hire a skipper [a/]	160	76
Total individuals or non-individuals who are eligible to or must hire skippers	656	315
Number (individuals and non-individuals) that do hire a skipper	82	201
Number of skippers hired by individuals	30	N/A
Number of skippers hired by non-individuals	51	N/A
Total number hired	N/A	193

a/ The requirement that non-individuals must hire skippers did not go into place until 1998.

On the other side of the transaction are owners of the vessels which would hire out to West Coast LEFG participants that own Alaska IFQ. Most directly impacted are those who have West Coast LEFG permits and take their vessels to Alaska. These are the entities which would have the opportunity to hire out their vessels but have LEFG permits which would add to the permit count of any entity that hires them. In 2012, there were 13 vessels with a cumulative total of 25 permits that are constrained under No Action and could potentially benefit under one of the action alternatives (Table 3-1). Vessels with three permits going to Alaska can only hire out to entities which have Alaska IFQ but do not participate in the West Coast LEFG fishery (presumed for purpose of this analysis to be Alaska only (AKO) participants. In 2012, there were three such vessels. Vessels with two LEFG permits can fish for AKO participants or the owners of one of the 50 vessels that only have a single permit (or the owners of single permits). In 2012, there were six such vessels. Vessels with one LEFG permit can fish for AKO participants or the owners of one of the 66 vessels that have one or two LEFG permits (or owners of one or two permits). In 2012 there were four such vessels. These vessel counts assume that the owners of the vessels do not also own other vessels or permits. To the degree that there is cross ownership, the constraints may be greater than indicated here for either the number of the 13 vessels at the three-permit limit or the number of vessels owners with which those vessels could work. Under the action alternatives, all 13 of the West Coast LEFG vessels that participate in Alaska would be able to hire out to the owner of any other West Coast LEFG vessel or permit.

The West Coast rule constrains AKO participants from acquiring a LEFG permit only if they hire out to an owner of one of the 18 vessels with three permits or some other three-permit owner. Not all of these, and potentially none, may own Alaska IFQ. Thus, the number of AKO-only entities that the three- permit limit inhibits from entering the West Coast fishery under No Action is probably small (particularly in the context of the total number of Alaska IFQ vessels and owners, Table 4-5). Therefore, the action alternatives would not be expected to result in a substantial increase in Alaska vessel participation in the West Coast LEFG fishery.

Impact Mechanism Related to Administrative Effort and Compliance Requirements

Currently, NMFS collects only a listing of the individuals with an ownership interest in LEFG permits and the vessels to which they are registered. Under the action alternatives, NMFS would have to collect information on percent of ownership interest in vessels, and those ownership interests would have to be updated with any change in the portions of ownership and with any permit transfer where the permit is registered to another vessel.[11] Additionally, depending on the policy guidance, ownership interests may have to be tracked through several levels of ownership – for example, if one partnership is part owner of a second partnership that owns a vessel. For any vessel that is owned by more than one individual or owned by a corporation or some other legal entity, the owners would have to submit a detailed vessel ownership interest form.

Changing Conditions

With respect to the impact mechanisms related to the Alaska IFQ program, the function of the mechanism and need for this action is expected to diminish over time as those who are grandfathered in with an exception to the owner-on-board requirement leave the fishery. Recent final and proposed rules for the Alaska halibut and sablefish IFQ fisheries are expected to expedite the shift of the fishery toward an all owner-on-board fishery in Alaska. NMFS, Alaska Region, recently published a final rule (79 FR 9995, February 24, 2014) that imposes a 12-month vessel ownership requirement on initial individual recipients of QS who wish to use an exemption from the owner-on-board requirement and use a hired master to harvest their IFQ. NMFS has also proposed a regulation that would prevent an initial recipient from using a hired master to harvest QS that an initial recipient acquired by transfer after February 12, 2010, with a limited exception for small amounts of QS (78 FR 24707, April 26, 2013).

Summary of Impact Mechanisms and Differences Between Alternatives 1 and 2

On the basis of the situations that regulations currently constrain, it is expected that the direct impact mechanisms of the action alternatives would be some increased flexibility in financing within the fishery (including an increase in personal connections between lenders and borrowers) and at most, some modest consolidation of both LEFG permits and Alaska sablefish and halibut IFQ on fewer vessels. Additionally, there may be some impact on program administrative costs. The effects of these changes on each of the resources is discussed in the following sections. In summary, the primary direct impact mechanisms for the action alternatives are expected to be as follows.

[11] This entails ownership interests of shareholders in a corporation and the relative ownership in partnerships. Example

Acme Inc. and Fish Inc. own a vessel
Acme Inc. and Fish Inc. each 50% ownership in the vessel
Acme Inc. is made up of John Doe and Mary Doe and each owns 50% of Acme
Fish Inc. is made up of Mark and Sarah Smith and each have a 50% interest in Fish.

1. A potential effect on arrangements that involve financial interests secured through ownership in vessels:
    a. a redistribution of risks, financing transaction costs, and related profits from institutional lenders toward the private parties involved in a transaction, and
    b. more social connections between buyers and sellers than would be the case if borrowers were qualified by institutional lenders
2. An uncertain but at most modest effect on the distribution of limited entry privileges among fishing operations:
    a. Some degree of increased opportunity for consolidation of Alaskan IFQ on vessels that also participate in the West Coast LEFG fishery,
    b. Some degree of increased opportunity for consolidation of LEFG permits on vessels that fish in both fisheries, and
    c. Some degree of increased opportunity for acquisition of LEFG permits by vessels that previously fished only in the Alaskan IFQ fishery.
3. An increase in the administrative effort required to track and enforce the control limits and an increase in compliance requirements for all participants.

Alternative 2a compared to Alternative 2b

Alternatives 2a and 2b vary from one another in terms of the threshold amount of vessel ownership which counts as ownership of the associated LEFG permits. Under Alternative 2a the amount (20 percent) is the minimum ownership required to take advantage of the grandfather exception provision to the owner-on-board clause for the Alaska IFQ program. The Alternative 2b threshold (30 percent) provides some additional leeway for agreements that may have been established to take advantage of the exception that, for one reason or another, provided somewhat more than the minimum ownership required. These percentages are well below the 50 percent threshold at which majority interest and control would be established. Both action alternatives represent a compromise compared to the No Action, under which any one holding even a fraction of a percent ownership of a vessel would meet the control threshold and be credited with complete control over all of the permits associated with the LEFG vessel. The primary impact mechanism at work in these alternatives is the LEFG permit owner and vessel owner response to the change in the rule for determining permit control through vessel ownership. The difference in the amplitude of the impact mechanism between the alternatives will depend on how those who own (or would like to own) between 20 percent and 30 percent of a vessel respond.

With respect to the lending situation, one might expect some difference in private individual's willingness to lend depending on whether they could maintain an ongoing 20 percent or 30 percent interest, with a greater willingness at 30 percent. However, as mentioned earlier, while a standard industry practice is to maintain ownership to secure a private loan financing the sale of a vessel there are alternatives ways to secure such an interest. Based on the absence of recent complaints about how the control rule restricts private lending it may be that industry has found a work-around with respect to the 3-permit control limit. Because of the alternative means of securing loans, industry's apparent adjustment and the relatively small difference between the two alternatives with respect to amount of security provided, it may be that there is little difference between these to alternatives with respect to the response in lending activities.

With respect to the situations of WC&AK participants, again the amplitude of the impact mechanism will depend on how those with (or who would like to acquire) between 20 percent and 30 percent ownership interest in a WC&AK vessel respond to a 20 percent limit. If they divest themselves down to 20% in order to take advantage of the exception created by Alternative 2a (or acquire only 20 percent rather than some greater amount to take advantage of that exception), then the degree of consolidation of LEFG permits and Alaska IFQ on WC&AK vessels would not vary between the action alternatives but there would be lower percent ownerships under Alternative 2a. If instead, they opted not to divest (or went ahead and acquire more than 20 percent), then they would not benefit from the exception and for these individuals there would be no difference between No Action and Alternative 2a. With respect to those who would choose not divest down (not acquire a smaller percent interest) Alternative 2b would provide opportunity for that higher percent ownership and would increase LEFG permits and Alaska IFQ on WC&AK vessels. Information is not available which would allow a prediction of the difference in response between these two alternatives. However, given only a 10 percent difference between the alternatives, given that the difference is well below that needed to establish majority interest control (50%), and given the relatively small number of operations that this provision is expected to impact, it appears unlikely that there will be a substantial difference in the size of the response to Alternative 2a or 2b.

4.2 Effects on the Physical and Biological Environment

4.2.1 Electronic Fish Ticket

Alternatives 2-4 consider implementing a Federal catch accounting requirement, an electronic fish ticket for nontrawl vessels landing sablefish into U.S. West Coast ports. None of the catch accounting action alternatives are expected to change where fishing vessels operate at sea or where they land their catch, because none of the action alternatives would constrain how much or how little gear fishery participants use, where they use the gear, or whether and how they interact with the ocean floor or essential fish habitat. Therefore, NMFS does not anticipate that any of the alternatives would have any effect on the physical environment, nor would the action alternatives result in the monitored fisheries having different effects on the physical environment from those experienced under the No Action alternative.

Effects on the biological environment resulting from fishery management actions primarily include changes in fishing mortality levels resulting from implementation of the alternatives. This particular action considers changes to a catch accounting system and record keeping and reporting requirements for fishery participants. No direct biological effects are expected to result from any of the action alternatives because none of the alternatives would change the allowable directed harvest or incidental catch levels allowed in the fishery. The Council considers allowable groundfish harvest levels under its specifications and management measures process and this action would not alter harvest levels set through that process, nor would it alter the fishing practices of vessels pursuing the allowable harvest. Indirect impacts from fishery management actions include changes in fishing practices that affect the biological environment, but are further away in time or location than those occurring as a direct impact. Indirect biological impacts could result if catch data were inaccurate or delayed such that fishery specifications could not be adequately monitored or the fishing was not stopped before a specification was exceeded. Exceeding a specification increases the risk of overfishing, may affect rebuilding times for overfished species, or result in a stock becoming overfished.

Accurate and timely data are needed to monitor total catch of all groundfish, including sablefish (a precautionary zone stock), to prevent overfishing and to maintain rebuilding schedules for overfished stocks. Since implementation of the permit stacking program in 2002, inseason management of the primary and DTL sablefish fixed gear fisheries has been based on two types of information: (1) paper landing receipts that typically have a two month time lag between the date of landing and when the landing data are available in PacFIN, and (2) the Quota Species Monitoring (QSM) Best Estimate Report, which fills in the three-month time lag based on estimates from the previous years' landings. Both of these data sources estimate which landings are attributed to the primary (tier) fishery and which are attributed to the DTL fishery. Thus, the current catch accounting system is subject to inaccuracy and time delays under the No Action Alternative and will continue to be if this alternative is selected.

Under the No Action Alternative, the requirements for sending in paper landing receipts varies among states with Washington requiring the paper landing receipts to be received within six working days, Oregon requiring the landing receipts to be received within five working days, and California requiring the landing receipts to be received by the first and sixteenth of the month. It is a considerable time after the tickets are prepared and submitted that the data are entered into a state database, edited, and forwarded to the PacFIN database; depending on the state, it may take several months. Extending the electronic fish ticket requirements to the non-trawl fisheries would result in fish tickets being submitted within 24 hours of landing. The requirement for daily submissions of electronic fish tickets, under Alternatives 2-4 provides for timely and efficient reporting of landing data such that species allocations and ACL can be effectively monitored and inseason adjustments for conservation purposes can be made as necessary. Electronic fish tickets would allow managers to use timely, accurate data to manage the fisheries inseason rather than having to rely on estimates and data from the previous year to supplement data from paper landing receipts as is currently the case under No Action. The electronic fish tickets would also provide daily landings estimates for all species landed, not just sablefish, providing improved inseason data for other species, including overfished species. Electronic fish ticket reporting is expected to expedite the receipt of catch data which are combined with observer data for total catch estimates. Timely reporting reduces the risk of indirect impacts on the biological resource.

The quality and accuracy of data could also be expected to improve with the use of electronic fish tickets. Paper landing receipts introduce two areas where data entry errors could occur, when the first receiver enters the data on the paper form and when the data are entered into the database weeks to months later by the state. The electronic fish ticket allows users to pre-load landings data into their account. For example, a first receiver that generally receives sablefish landings from five different vessels could enter each of the vessels identifying information into their user account. Then, at the time of landing, the first receiver would simply select information such as vessel I.D. and permit number from drop down menus in each field. The first receiver also has the ability to fill out an electronic fish ticket and save it and submit it at a future date, should any corrections need to be made. There are also numerous, built-in data checks that prevent entry errors and improve the quality of landings data for all species. These built-in data checks include pre-loaded lists of allowed gear types, current species, and area restrictions. Also, an electronic ticket would allow NMFS to specify the reporting groups consistent with Federal regulation. This could improve the quality of species-specific reporting (for example, when a stock is left in a complex, but NMFS requires reporting for conservation concerns). By reducing data entry errors, issues can be resolved in a timely manner by the first receivers and fishers, such that the resolution is likely to be more accurate and timely than errors found weeks to months after the landing occurred.

If catch accounting difficulties continue, delays in catch reporting may or may not have an effect on the biological condition of groundfish stocks. The severity of the impact caused by inaccurate or untimely landings data depends on how sensitive the groundfish stock is to changes in catch levels. For precautionary zone and healthy groundfish species or species groups, the risk to the stock is lower than it is for overfished species. If catch allocations of the most constraining overfished species are greatly exceeded due to delayed or inaccurate catch reporting, the risk of exceeding rebuilding based OYs is increased. Although there are many variables that affect the time it takes a stock to rebuild, exceeding the rebuilding-based OY could result in an extended rebuilding period for an overfished species. Additionally, since sablefish is a precautionary zone species that is usually fished to a high level of attainment, inseason monitoring and management is especially important when managers are trying to make decisions that may be impacted by exceeding or attaining sector ACLs, such as the annual issuance of carry over quota in the shorebased IFQ fishery.

In terms of improved catch accounting, Alternative 4 has the greatest beneficial indirect impacts in that it would require all sablefish and DTL landings in the LEFG and OA fisheries to be reported via electronic fish tickets. The scope of Alternative 3 is narrower than Alternative 4 in that it would not require DTL OA landings to be recorded on electronic tickets. Alternative 2 has the narrowest scope in that it would require only sablefish landings in the primary (tier) fishery to be recorded on electronic fish tickets and the least beneficial indirect impacts among the action alternatives.

4.2.2 Own/Control Limits

Summary: Under the no action and action alternative no substantial impact to the physical or biological environment would be expected relative to baseline conditions. The primary potential effect would result from a possible geographic shift in the area of harvest under an action alternative. Any such shift is expected to be modest (as described in Section 4.1.2). If that shift were to occur, the data collection and reporting system would alert managers to any substantial impacts and management tools authorized under the MSA and groundfish FMP (see Chapter 6 of the Groundfish FMP) are available for an appropriate response.

Section 3.1 and 3.2 describe the potentially affected physical and biological environment including:

- Groundfish stocks
- Nongroundfish Species

- Protected Species
- Essential Fish Habitat
- California Current Marine Ecosystem

Impacts on the physical and biological environment would depend on whether the changes in the control rule changed fishing behavior. Impacts to the physical and biological environment might change if there were:

- changes in total harvest,
- changes in the types of gear used,
- changes in the way gear is fished,
- changes in the amount of fishing effort required to take a given amount of harvest (CPUE), or
- changes in the distribution of harvest.

The limited entry fixed gear allocations are fully distributed among participants and nearly fully harvested under the limited entry fixed gear permit stacking program by vessels using longline and/or fishpot gear (Figure 3-X). There is no opportunity to increase total removals and no reason to expect that changing the control rule provision would result in a decrease of harvest. Any increase in attainment would be within the impact levels anticipated and analyzed in the NEPA document for the groundfish biennial harvest specifications.

Under the No Action alternative, the current regulatory environment would be maintained and there is no reason to believe that situations would worsen with respect to the conditions leading to the need for this action. In fact, as the number of those with a grandfather exception in the Alaska program diminishes, the situations in which individuals are constrained from either benefiting from Alaska IFQ or acquiring more limited entry permit, as described in Section 4.1.2, would diminish. The impacts of a control rule change under either action alternative would occur through the mechanism of changes in financing or consolidation (see Section 4.1.2). There is no reason to expect that consolidation of harvest on fewer vessels or increased financing opportunities (the two identified impact mechanisms identified in Section 4.1.2) would cause a substantial change in the type of gear used, the way the gear is fished, or the catch per unit effort (CPUE) in either the West Coast LEFG sablefish or Alaska sablefish and halibut IFQ fisheries.

If the changes result in some modest degree of consolidation on vessels that fish in both the West Coast and Alaska (see discussion in Section 4.1.2) and those vessels tend to fish in a different geographic distribution along the West Coast than the vessels from which the permits are acquired, then there could be a spatial shift in the distribution of effort and catch. The current program does not restrain redistribution of sablefish harvest and landings within the management area for the stock. Such redistributions may occur in response to local area CPUE, local fish marketing opportunities, and shifts of the permits between ports (through transfer or changing locations of fishing operations). To a certain extent, a natural rebalancing of effort would be expected from any substantial shifts. For example, if effort shifted enough to cause a CPUE decline in a particular area then, as a result of the increased fishing cost, effort would be expected to reshift to some other area. Biologists and managers have determined that the northern sablefish stock to which this program applies (roughly north of 36 degrees north latitude) is a unit that can be effectively managed as such, i.e. there are not issues of localized depletion that would require further subdivisions to ensure the productivity of the target species. All catch in the fishery (including sablefish and nontarget species) is assessed through an observer program, and landings are recorded on state fish tickets. Thus, if there is a geographic shift and if that shift leads to changes that are of management concern, a data collection and reporting system is in place to alert managers to the situation, and coordinated Federal, state, and tribal regulatory authority is available to mitigate such impacts.

Habitat impacts are limited to the possibility that there may be a redistribution of effort, redistributing gear impacts along the coast. The amount of any such redistribution would be expected to be small (see section on impacts on communities in Section 4.3.2). Amendment 19 to the groundfish FMP set aside essential fish habitat conservation areas and provided a process for five-year reviews which includes assessment of changes in the intensity and distribution of fishing effort (see NMFS, 2013 for an example of the type of information produced). This review process provides an opportunity for adaptive management in response to any substantial shifts in fishing effort that adversely impacts habitat.

4.3 Effects on the Socio-economic Environment

4.3.1 Electronic Fish Ticket

The action alternatives primarily affect fishermen, first receivers where non-trawl sablefish are landed (LE and OA), and state and federal enforcement and management agencies. This document deals with three inter-related measures: (1) implementation of a federal electronic fish ticket, (2) modification of the own/hold control rules, and (3) implementation of joint registration (allow a LEFG and trawl permit to be registered to the same vessel at the same time). The first measure would affect either only the sablefish permit stacking program (the primary sablefish fishery north of 36ºN latitude) or both the primary fishery and the daily trip limit (DTL) fishery north and south of 36ºN latitude. In the LEFG fishery (primary and DTL), sablefish is taken as directed catch and the only gear types allowed are longline or trap (or pot). Longline vessels harvest some other groundfish species, but for pot vessels, sablefish comprises the vessels' only significant commercial groundfish species harvest.
The second measure only affects the primary sablefish fishery north of 36ºN latitude.
The third measure affects both the LEFG fishery and the shorebased trawl individual fishing quota (IFQ) program. Participants in the shorebased trawl IFQ program typically use trawl gear to target sablefish as part of the DTS groundfish complex (Dover Sole/ Thornyhead/ Sablefish complex), in a near shore mixed groundfish species strategy, or when targeting slope rockfish.

Impacts to Sablefish Fishermen

It is likely that under the action alternatives regulations will require that sablefish landings be made to first receivers that have electronic fish ticket capabilities. To the extent that this limits the number of first receivers that may receive sablefish landings, fishermen may find a reduced number of first receivers capable of recording sablefish landings on electronic fish tickets. In order to be able to fill out and submit an electronic ticket, first receivers would need a computer with an internet connection and browser. The catch accounting issues previously discussed in this document (i.e. the time lag associated with landing data from state landing receipts and subsequent use of estimates for inseason management) affect the ability of state and Federal enforcement to accurately track sablefish landings on an individual permit basis. Overages in the primary fishery may impact sector specific allocations and introduce potential issues of intersector inequity. By implementing an electronic fish ticket, NMFS will be able to better track instances of tier overages and ensure that neither the tier limits nor the DTL limits are exceeded inseason, and will be better able to track compliance with the owner on board requirement.

Impacts to Sablefish First Receivers

The main burden of implementation of an electronic fish ticket would fall on sablefish first receivers that receive: (1) primary (tier) sablefish landings, (2) primary and LEFG DTL sablefish landings, or (3) primary (tier) and DTL (LEFG and OA) sablefish landings, and are not already licensed IFQ first receivers. This socio-economic group is estimated to be approximately 33 unique first receivers in the primary sablefish fishery and 53 first receivers in the primary and LEFG DTL fisheries, and 77 first receivers across the primary, DTL, and OA fisheries. These 77 additional first receivers account for approximately 34% of sablefish landings in these fisheries. Twenty-three sablefish first receivers are also IFQ first receivers and already use electronic fish tickets to record shorebased-IFQ trawl landings. The approximately 77 first receivers across the primary and DTL fisheries who do not already use electronic fish tickets would be most affected by the action alternatives (see Table 4-6 below).

Table 4-6: The number of additional first receivers required to use electronic tickets under each alternative, by state.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Washington	0	9	9	13
Oregon	0	4	4	11
California	0	20	40	53
Coastwide	0	33	53	77

Table 4-7. California first receivers affected by each action alternative.

		Number of First Receivers	Sablefish Landed (lbs)	Net Revenue (U.S. dollars)
Alternative 2	Total	32	1,387,692	3,411,552
	IFQ FRSL	12	867,800	2,067,447
	Net Addition	20	363,131	971,366
Alternative 3	Total	52	1,750,823	4,382,918
	IFQ FRSL	12	867,800	2,067,447
	Net Addition	40	883,023	2,315,471
Alternative 4	Total	65	2,010,479	5,009,163
	IFQ FRSL	12	1,034,673	2,380,376
	Net Addition	53	975,806	2,628,787

Table 4-8. Oregon first receivers affected by each action alternative.[12]

		Number of First Receivers	Sablefish Landed (lbs)	Net Revenue (U.S. dollars)
Alternative 2	Total	12	1,137,303	2,665,833
	IFQ FRSL	8	1,101,283	2,574,560
	Net Addition	4	36,020	91,273
Alternative 3	Total	12	1,137,303	2,665,833
	IFQ FRSL	8	1,101,283	2,574,560
	Net Addition	4	36,020	91,273
Alternative 4	Total	19	1,217,766	2,840,958
	IFQ FRSL	8	1,173,492	2,723,529
	Net Addition	11	44,274	117,429

Table 4-9. Washington first receivers affected by each action alternative.

		Number of First Receivers	Sablefish Landed (lbs)	Net Revenue (U.S. dollars)
Alternative 2	Total	12	667,954	1,742,888
	IFQ FRSL	3	389,292	1,019,784
	Net Addition	9	278,662	723,104
Alternative 3	Total	12	667,954	1,742,888
	IFQ FRSL	3	389,292	1,019,784
	Net Addition	9	278,662	723,104
Alternative 4	Total	16	754,991	1,955,541
	IFQ FRSL	3	423,849	1,100,681
	Net Addition	13	331,142	854,860

Table 4-10. Coastwide first receivers affected by each action alternative.

		Number of First Receivers	Sablefish Landed (lbs)	Net Revenue (U.S. dollars)
Alternative 2	Total	56	3,192,949	7,820,273
	IFQ FRSL	23	2,358,375	5,661,791
	Net Addition	33	677,813	1,785,743
Alternative 3	Total	76	3,556,080	8,791,639
	IFQ FRSL	23	2,358,375	5,661,791
	Net Addition	53	1,197,705	3,129,848
Alternative 4	Total	100	3,983,236	9,805,662
	IFQ FRSL	23	2,632,014	6,204,586
	Net Addition	77	1,351,222	3,601,076

The action alternatives would increase the amount of time first receivers spend recording sablefish landings. Action Alternatives 2-4 do not require that additional data be gathered, but do require additional time in the States of Washington and California, because the data would need to be recorded on both the paper forms provided by the state and entered into the electronic fish

[12] For the states of Washington and Oregon, Alternatives 2 and 3 affect the same number of first receivers because all first receivers that process primary sablefish landings also process LEFG DTL sablefish landings.

ticket forms. Entering the fish ticket information is expected to take eight minutes per ticket, including the time necessary to check for transcription errors. For first receivers in all three states, two minutes per response would be required to access the internet and send the data files.

There are approximately 639 primary (tier) landings each year, with approximately 373 of the deliveries occurring in Washington and California and the remaining 266 occurring in Oregon. The burden on first receivers in Washington to submit electronic fish tickets under Alternative 2 is estimated to be approximately 29 hours annually over the No Action Alternative. The burden on first receivers in California to submit electronic fish tickets under Alternative 2 is estimated to be approximately 34 hours annually over the No Action Alternative. For first receivers in Oregon, the additional burden is only the time it takes to send the electronic fish ticket, since state law already requires that the information be gathered and allows the submission of a printed and signed electronic ticket in lieu of a paper landing receipt. For processors in Oregon, it is expected to take a total of approximately 9 hours annually to submit electronic fish tickets. In total for all three states, 72 hours annually are estimated for preparing and submitting electronic fish tickets under Alternative 2.

Under Alternative 3, the number of landings in Washington and California would be expanded to 264 and 1,838 respectively, while the number of landings in Oregon would be expanded to 579. Therefore, under Alternative 3 the burden to first receivers in Washington and California would be expected to be 44 hours and 306 hours, respectively, over the No Action Alternative, while the burden to first receivers in Oregon would be 19 hours. In total for all three states, 369 hours annually are estimated for preparing and submitting electronic fish tickets under Alternative 3. Similarly, under Alternative 4, the number of landings in Washington and California would be expanded to 520 and 3,258, respectively, while the number of landings in Oregon would be expanded to 1,072. Therefore, under Alternative 4 the burden to first receivers in Washington and California would be expected to be 87 hours and 543 hours, respectively, over the No Action Alternative, while the burden to first receivers in Oregon would be 36 hours. In total for all three states, 666 hours annually are estimated for preparing and submitting electronic fish tickets under Alternative 4.

Table 4-11. Burden hour estimates for California first receivers.

	Number of sablefish landings[13] per year	Time to fill out and submit e-ticket (minutes per landing)	Burden hour estimate (hours)	Burden hour estimate using a 50 pound sablefish threshold (hours)
Alternative 1	3,258	0	0	0
Alternative 2	202	10	34	33
Alternative 3	1,838	10	306	234
Alternative 4	3,258	10	543	461

[13] The number of sablefish landings is an average of unique landings from 2008 through 2013 that contain greater than zero pounds of sablefish.

Table 4-12. Burden hour estimates for Oregon first receivers.

	Number of sablefish landings[14] per year	Time to submit e-ticket (minutes per landing)	Burden hour estimate (hours)	Burden hour estimate using a 50 pound sablefish threshold (hours)
Alternative 1	1,072	0	0	0
Alternative 2	265	2	9	9
Alternative 3	579	2	19	19
Alternative 4	1,072	2	36	35

Table 4-13. Burden hour estimates for Washington first receivers.

	Number of sablefish landings[15] per year	Time to submit e-ticket (minutes per landing)	Burden hour estimate (hours)	Burden hour estimate using a 50 pound sablefish threshold (hours)
Alternative 1	520	0	0	0
Alternative 2	171	10	29	28
Alternative 3	264	10	44	44
Alternative 4	520	10	87	82

Table 4-14. Burden hour estimates for coastwide first receivers.

	Number of sablefish landings[16] per year	Burden hour estimate (hours)	Burden hour estimate using a 50 pound sablefish threshold (hours)	Total number of first receivers submitting electronic tickets
Alternative 1	4,851	0	0	0
Alternative 2	639	72	70	56
Alternative 3	2,682	369	297	76
Alternative 4	4,851	666	578	100

[14] The number of sablefish landings is an average of unique landings from 2008 through 2013 that contain greater than zero pounds of sablefish.
[15] The number of sablefish landings is an average of unique landings from 2008 through 2013 that contain greater than zero pounds of sablefish.
[16] The number of sablefish landings is an average of unique landings from 2008 through 2013 that contain greater than zero pounds of sablefish.

It is assumed that all first receivers have access to a personal computer and internet access adequate to access the electronic fish ticket website developed by PSMFC. The electronic fish ticket requirements would require that the first receiver's personal computer be properly operating when accepting landings requiring electronic fish ticket reporting. Therefore, some first receivers may choose to have an additional personal computer or laptop computer as a back-up. To reduce the potential impacts on first receivers should there be a system failure, a waiver could be granted by NMFS that would temporarily exempt a processor from the reporting requirements and allow reasonable time to resolve the electronic fish ticket system problem. The duration of the waiver would be determined on a case-by-case basis. First receivers that are granted a temporary waiver from the requirement to submit electronic fish tickets must submit on paper the same data as are required on electronic fish tickets within 24 hours of the date received during the period that the waiver is in effect.

Table 4-14 above provides a comparison of coastwide burden hour estimates against the total number of first receivers required to fill out electronic tickets by alternative. The second column in Table 4-14 provides the estimated additional amount of time required to fill out an electronic ticket for landings that include any amount of sablefish. Since this is based on the time estimated to fill out and submit an electronic ticket multiplied by the number of unique sablefish landings in a given year, the resulting burden hour estimate is the additional time spent in a year for all first receivers. To put this in perspective, under Alternative 2, the 72 burden hours could be split out among the 56 first receivers. Divided up evenly, this results in approximately 1 hour and 20 minutes per first receiver over the course of a year, or roughly 7 additional minutes per month per first receiver spent filling out and submitting electronic tickets.

After Alternative 1 (the no action alternative), Alternative 2 places the least amount of burden hours on first receivers for all states, individually and coastwide (see Tables 4-11 through 4-14). For first receivers accepting both DTL LE and OA, Alternative 3 would introduce complexity by splitting the DTL fishery and only requiring electronic tickets for LE DTL sablefish landings. Alternatives 2 and 4 would not introduce this added regulatory complexity because Alternative 2 limits the electronic ticket requirement to the primary fishery and Alternative 4 includes the primary and LE and OA DTL sablefish fisheries. Additionally, Tables 4-11 through 4-14 include a column titled, "Burden hour estimate using a 50 pound sablefish threshold". The purpose of this column is to aid in the discussion of an implementation issue described in Agenda Item F.6.b NMFS Report 1, Issue 1, whether a poundage threshold or some other distinction should be made for OA DTL sablefish landings such that, for example, only OA DTL sablefish landings of 50 pounds or greater would be trigger the electronic ticket requirement. Omitting smaller sablefish landings from the electronic ticket requirement would have the most noticeable impact on burden hour estimates for California under Alternatives 3 and 4.

Impacts to State Agencies

As mentioned previously, implementation of a Federal requirement for an electronic fish ticket would be separate from, and in addition to, existing state reporting requirements. Under Alternatives 2-4, each sablefish buyer would be responsible for recording sablefish landings on an electronic fish ticket in addition to state (landing receipt) landing requirements. States may decide the extent to which they would like their landing receipt system to overlap with the electronic ticket. In the state of Oregon, a printed copy of the electronic ticket may be submitted in lieu of a paper landing receipt; however, in Washington and California, a hand-written landing receipt would likely be required in addition to the federally-required electronic ticket. Each state would have access to their state's electronic fish ticket landings data through the electronic ticket system. Currently, Oregon and Washington receive their state's PacFIN landings data every night, enabling them to check their state landing receipts for quality assurance and quality control. Because the electronic ticket is separate from, and in addition to, the state required landing receipts, it is unlikely that any burden due to implementation of a electronic ticket would be placed on state management and enforcement agencies.

Impacts to Federal Agencies

Section 6.10.1 of the Pacific Coast Groundfish Fishery Management Plan identifies some of the issues involved in managing enforcement risks. The primary goals of enforcement are to ensure a cost-effective way that all fishing is conducted in accordance with fishery regulations, while reducing management complexity, and ensuring that the monitoring methods used are sufficient to enforce existing regulations. As mentioned previously, there are several problems with the current system. The paper-based landing receipts are subject to compromise and typographical error, inconsistently record the Federal permit number, and are subject to a time lag of several months. Additionally, the use of inseason estimates for catch accounting purposes does not provide NMFS with sufficient evidence to enforce tier landing overage violations or the owner on board provision, either inseason or post-season.

Tier Catch against Tier Quotas by Permit

The *Review of NOAA Catch Share Programs* Final Report No. OIG-14-019-1 (published May 1, 2014) found that NOAA does not have adequate data and does not track or enforce landings overage violations in the Pacific Sablefish Permit Stacking Individual Fishing Quota (IFQ). Additionally, NOAA currently does not monitor Pacific Sablefish landings on an individual permit basis during a fishing season. Instead, it only monitors landings for the entire fishery as a whole, using a paper-based system that is subject to compromise and the multiple possibilities of error associated with any manual process. In addition, the report identified 189 instances where actual landings exceeded the allowed landings for individual permits from 2008 through 2013, as summarized in Table 4-15 below.

Table 4-15. Sablefish Tier Overages 2008-2013.

Amount of Overage (lbs)	Number of Permits	Total Overage (lbs)	Average Overage (lbs)
0–100	110	3,279	30
100–500	52	11,734	226
500–1,000	15	10,215	681
> 1,000	12	32,607	2,717
Total	**189**	**57,835**	

Source: Final Report NO. OIG-14-019-1, OIG from NOAA data. The total annual overages ranged from 0.13 to 0.56 percent of the total tier fishery, or 0.28% of the total tier fishery, from 2008 through 2013.

Implementation of an electronic fish ticket would improve the accuracy and timeliness of landings data and would provide managers with the real time data necessary to do inseason management of the primary and DTL fisheries. It would also provide enforcement with the permit specific landings data necessary to monitor landings overages in the primary (tier) and DTL sablefish fisheries and could also help aid enforcement of the owner on board requirement.

4.3.2 Own/Control Limits

Under the No Action alternative, the current regulatory environment would be maintained and there is no reason to believe that situations would worsen with respect to the conditions leading to the need for this action. In fact, as the number of those with a grandfather exception in the Alaska program diminishes, the situations in which individuals are constrained from either benefiting from Alaska IFQ or acquiring more limited entry permits, as described in Section 4.1.2, would diminish. All impacts discussed in this section are relative to the No Action alternative.

As described at the end of Section 4.1.2, Alternatives 2a and 2b vary from one another in terms of the threshold amount of vessel ownership which counts as ownership of the associated LEFG permits and the expected difference between the alternatives in terms of lending practices and consolidation of LEFG permits and IFQ (the primary impact mechanism) is expected to be minor. To the degree that the alternatives have impacts on lending or consolidation, Alternative 2b might possibly result in slightly more than Alternative 2a. The difference between the two alternatives may be substantial with respect to the opportunities for the few individuals it may affect but is likely to be negligible with respect to the aggregate impacts discussed in this section.

Summary: The following is a summary of the potential socio-economic impacts of either action alternative.

West Coast LEFG Harvesters.

- Some potential increase in net revenue and efficiency of vessel operations through consolidation and increased scale of operation and decreased financing costs.
- An impact on equity related to the opportunity for further consolidation.
- Some increase in social cohesion within the fleet.

- An increase in paper work for vessels owners related to the need to submit ownership interest information.
- A possible fee in association with increased program administrative costs for NMFS.

Harvesters in Other Fisheries.

- Some redistribution of Alaska IFQ away from vessels that participate in Alaska but not in the West Coast LEFG fishery.
- A possible increase in acquisition of LEFG permits by Alaska vessels that hire out to catch Alaska IFQ owned by West Coast LEFG participants and the attendant increase in profits and possible efficiency based on scale of operation.
- Vessels displaced as a result of consolidation may have some impact on other fisheries.

Crew.

- Consolidation may lead to fewer jobs but increased wages for remaining jobs.

Processors.

- Processing companies tied to a particular port may be affected if there is some geographic redistribution (see section on communities).

Communities.

- Potential for some harvest redistribution among ports (seems likely to be minor).
- An increase in social connections within the fleet.
- A possible small decrease in the lending business of financial institutions.

Agencies.

- An increase in administrative workload related to the need to collect, store, and track vessel ownership information.

Section 3.3 describes the potentially affected socioeconomic environment including:

- Fixed gear sablefish harvesting operations
- Harvesting operations in other fisheries
- Crew
- Processors
- Communities
- Management Agencies

As discussed in Section 4.1.2, the primary direct impact mechanisms are as follows.

1. A potential effect on arrangements that involve financial interests secured through vessel ownership in vessels:
    a. a redistribution of risks, financing transaction costs, and related profits from institutional lenders toward the private parties involved in a transaction, and
    b. more social connections between buyers and sellers than would be the case if borrowers were qualified by institutional lenders.
2. An uncertain but at most modest effect on the distribution of limited entry privileges among fishing operations:
    a. Some degree of increased opportunity for consolidation of Alaskan IFQ on vessels that also participate in the West Coast LEFG fishery,
    b. Some degree of increased opportunity for consolidation of LEFG permits on vessels that fish in both fisheries, and
    c. Some degree of increased opportunity for acquisition of LEFG permits by vessels that previously fished only in the Alaskan IFQ fishery.
3. An increase in the administrative effort required to track and enforce the control limits.

Fixed Gear Harvesting Operations

For the fixed gear sablefish harvesters, the proposed alternatives may affect profits and efficiency. There may also be some social effects.

The opportunity for larger operations (i.e. those constrained by the three-permit limit) to consolidate more harvest privileges (either by acquiring West Coast LEFG permits or by hiring out to WC&AK participants to harvest Alaska IFQ) may increase economic profits and fleet efficiency through economies of scale. The degree of the current constraint and consequently the opportunity provided by the action alternative (as described in Section 4.1.2) is modest for the fleet as a whole but may be important to some individuals.

The action alternatives may facilitate within-sector financing whereby the seller retains possession of a vessel as security for a loan (see discussion in Section 4.1.2). To the degree that additional seller financing of buyers is facilitated by an action alternative, the potential economic and social impacts for such sellers include:

- generating profits from financing the sale (either through charging an interest rate or a higher sale price);
- increasing the number of potential buyers by lowering transaction costs and financing barriers for potential buyers (which contributes to the profits in the first bullet and may speed the process of finding a buyer, reducing transaction costs for the seller); and
- a strengthened social network by facilitating entry of a community member or other known individual into the fishery.

The potential economic and social impacts for the vessel buyer in these situations include:

- access to financing and or lower financing costs than if financial institutions are the only option;
- competition from more potential buyers; and
- entry into a fleet with more social cohesion.

The current control rule and all-or-none accounting method is intended to err on the side of precaution in trying to ensure that the three-permit control rule is not undermined by private business arrangements which might convey control without conveying majority ownership interest. It also makes it more likely that there will be a greater number of harvesters that are totally independent of one another. The control rule is intended to disperse ownership of harvest rights among more individuals, balancing the efficiency outcome which would occur from unrestricted consolidation with objectives related to equity and dispersing income among communities.

One mechanism by which control might be asserted over a greater number of permits is through lending to finance the purchase of a vessel. At present, seller financing is reported to be a common practice in the industry. There exists opportunity to secure a loan associated with a vessel through a maritime lien, which does not result in the associated LEFG permits being counted against the lender. However, a common industry practice is to maintain security interest by retaining vessel ownership until the loan is paid. Such lending might be turned into leverage over a permit and the activities of a particular vessel. The current all-or-none rule reduces the opportunity to use that type of mechanism where its use is dependent on securing at least part ownership in a vessel. As discussed in Section 4.1.2, the action alternatives would provide opportunity to secure vessel financing through part ownership without tripping the control rule, potentially opening an avenue for circumventing the permit control rule. However, only those seller-financed transactions inhibited by the three-permit limit might be facilitated by one of the action alternatives. Additionally, even where the three-permit limit has presented an obstacle, members of industry may have found alternative ways to secure their loans, further reducing the potential effect through this impact mechanism. The action alternatives provide a limited exception for 20 percent (or 30 percent) ownership of two vessels without tripping the control criteria. This means that the maximum control over LEFG permits that an individual could have would be 100% ownership over three permits (as under No Action), plus up to 20 percent (or 30 percent) ownership in two vessels each of which were registered to three LEFG permits, (none of the permits on those vessels could be owned in any part by the individual). In other words, while the maximum number of permits an individual or entity could control, as control is determined under the LEFG permit program, is 9 LEFG permits, but the maximum number of permits over which an individual could have majority interest control would remain at 3. The options stop well short of providing the opportunity for an entity to have controlling interest in a vessel (50 percent interest). Impacts on financial institutions are discussed in the section on communities.

As a result of the additional vessel ownership information required to track and enforce compliance with this provision, under the action alternatives most owners of vessels registered with LEFG permits would likely be subject to the requirement to submit vessel ownership interest forms specifying each individual's share of ownership, increasing their paperwork burden.[17] There may also be an increase in fees charged to permit owners. LEFG permits and their associated tier limits are the main components of an LEFG IFQ. The MSA requires that costs of administering the program be recovered through fees, up to a maximum of 3% of ex-vessel revenue. Collecting the additional information would increase administrative workload and hence cost of administering and enforcing the program. These additional costs may be passed on to participants through fees, increasing vessel costs and resulting in a minor adverse impact on vessel profits.

Harvesters in Other Fisheries

As indicated in Section 4.1.2, an action alternative could result in shifts in fishing privileges among participants. On the one hand, there would be some decreased opportunity for Alaskan only vessels (AKO participants) to fish Alaska IFQ for WC&AK participants, as there would be a reduction in a constraint that currently limits WC&AK participants' ability to fish for one another. On the other hand, a few AKO participants that fish for WC&AK vessels might have a new opportunity to buy LEFG permits (become WC&AK vessels) without sacrificing income they earn by hiring out to fish Alaska IFQ for WC&AK vessels. However, there are already a large number of AKO vessels that have the opportunity to acquire LEFG permits and do not exercise such opportunity. The addition of a few more AKO vessels to the pool of potential participants is not expected to have a notable effect in new entry to the LEFG fishery by what are currently AKO participants.

The main impact mechanism by which other fisheries might be affected is consolidation. Section 4.1.2 indicates that under the action alternatives, there is some limited possibility that LEFG permits and Alaska IFQ may be consolidated onto fewer vessels, increasing competition and exacerbating management problems. Because of the limited number of entities affected, any impact would be expected to be relatively minor. This might then generate some surplus capital (vessels) that would be sold into other fisheries. Most US fisheries are under some form of rationalization program that would limit the effects of this surplus capital.

Crew

If there is some consolidation of LEFG permits and/or Alaska IFQ on to fewer vessels, then the income of crew members on vessels from which the permits/IFQ are moved may decrease while there may be a gain on the vessels to which the permits/IFQ are moved. If the loss of West Coast permits or Alaska IFQ result in a vessel going out of business then, rather than a decrease in income, there may be a net job loss. As described in Section 4.1.2., the degree of consolidation is expected to be minor.

Processors

[17] Currently, all vessel owners that are businesses (corporations) have to file an ownership interest form at renewal, but they do not provide percent ownership for individual shareholders. Vessel owners who are individual partners (husband/wife) would now have to file ownership interest forms and report relative ownership in the vessel. Also, vessels with multiple owners (corporations and individuals) would need to report relative ownership in the vessels. Businesses would continue to file ownership interest listing shareholders but would now need to provide percent of ownership for each shareholder.

Section 4.1.2 identifies some possibility of a geographic redistribution of harvest and landings, to the degree that LEFG permits are consolidated onto WC&AK vessels and that WC&AK vessels tend to have a different geographic distribution than West Coast only participants. Such a redistribution may affect processors (and processing-dependent jobs) that are dependent on the landings in a particular port. Processing companies that purchase through a number of ports would be less affected. Any redistribution of permits among owners is expected to be relatively minor (as described in Section 4.1.2 and the following section on communities), and it is uncertain whether or not there would be a geographic difference in the distribution of the harvesting activity of the owners receiving the permits.

Communities

Geographic distribution. Some increased consolidation of LEFG permits on vessels that participate on the West Coast and in Alaska is expected. The current fleet of WC&AK vessels tends to be distributed somewhat differently than those that participate only on the West Coast, with vessels from Washington and northern Oregon ports being more likely to participate in Alaskan fisheries than vessels from other ports (Tables 4-16). Whether geographic distribution is affected depends on the degree to which WC&AK acquire additional LEFG permits and the geographic area from which those additional LEFG permits come. With respect to consolidation, one of the primary motivations for the action is to allow the harvest of more Alaska IFQ to be consolidated on WC&AK operations, rather than allowing WC&AK operations to consolidate more LEFG permits. Nevertheless, some additional consolidation of LEFG permits may occur. If WC&AK operations acquire LEFG permits from West Coast-only vessels that operate in the same geographic region of the West Coast as the WC&AK operations, then there may be no net geographic impact would be expected. If they acquire permits from other regions on the West Coast, then some geographic redistribution may occur.

Tables 4-16. Counts of vessels by principal port and whether the vessels participated only on the West Coast LEFG fishery or also in Alaskan Fisheries (2012).

	West Coast Only	West Coast and Alaska Participation	Total
Puget Sound	-	3	3
North Washington Coast	8	2	10
South & Central WA Coast	8	4	12
Astoria	4	1	5
Newport	13	1	14
Brookings	9	-	9
Coos Bay	11	-	11
Crescent City	3	-	3
Eureka	4	-	4
Fort Bragg	6	1	7
Bodega Bay	2	-	2
San Francisco (excl. Bodega Bay)	4	-	4
Monterey	5	1	6
Morro Bay	6	-	6
Santa Barbara	1	-	1
Totals	84	13	97

With respect to the Alaska IFQ program, there could be some additional consolidation of harvest of Alaska IFQ on WC&AK vessels. Most of the Alaska IFQ consolidation would be expected to occur among existing WC&AK operations (i.e. those constrained by the West Coast LEFG control rule).

Social Connections. As discussed in Section 4.1.2, facilitation of seller financing may increase the degree to which buyers known to the seller are sold vessels, increasing social connections and cohesion within the fleet and community under the action alternatives.

Financial Institutions. Financial institutions are often part of local fishing communities. Under the action alternatives, financial institutions could lose some business if the control rule criteria have been inhibiting seller financing. Such inhibitions would likely be occurring only where the three-permit limit would be encountered and where means of securing lender interest, other than retaining ownership of the vessel, were not viable or cost effective (e.g. use of a maritime lien).

Agency Costs

Currently, to monitor the three permit limit, the agency need only keep track of a list of the individuals with some ownership interest in the permits and in the vessels. Under the action alternatives, the agency would have the additional cost of tracking whether an individual had more or less than a given percent and records would have to be updated each time an individual's share of ownership changes or a permit is transferred from one vessel to another. The action alternatives may require the tracking of ownership interests through multiple layers. For example, if the ABC Partnership owns 80% of a vessel and Mr. A owns 20% of a vessel but also owns a share of the ABC Partnership, Mr. A might then be considered to own in excess of 20% of the vessel. Such tracking will also add to program administrative costs.

Prior to the fixed gear sablefish program review, incremental costs associated with this IFQ were likely minimal, although at this time no quantitative assessment of incremental costs has been done. However, the actions being considered during this review process, if recommended and approved, would implement an electronic fish ticket and modify the control rules. These actions may introduce additional incremental costs. For example, implementation of modified control rules could require additional vessel ownership interest forms from some, as well as new database programming requirements that would take time and would require additional funding to implement. These are examples of additional incremental costs that could be tracked and partially recovered through implementation of a cost recovery program.

Chapter 5 References

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NOAA FISHERIES
West Coast Region

Implementation of Electronic Fish Tickets for Sablefish Landings

Agenda Item F.6.a

NOAA FISHERIES
West Coast Region

Problem Summary

- As of 2014, Federal permit numbers are not being recorded consistently on state landing receipts.
- The current catch accounting system is subject to inaccuracy and time delays, and is incapable of distinguishing between landings in the primary (tier) and daily trip limit (DTL) fisheries.
- OIG: “NOAA does not have adequate data and does not track or enforce landings overage violations in the Pacific Sablefish Permit Stacking IFQ.”

NOAA FISHERIES
West Coast Region

Purpose and Need

The purpose of the electronic fish ticket measure is to consider the implementation of a Federal requirement for an electronic fish ticket to capture essential fishery catch data for non-trawl groundfish fisheries. This measure is needed to improve catch accounting and to enforce sablefish tier limits in the primary fishery such that the integrity of the catch share program is maintained. In addition, there is a need to improve the timeliness of the data for management and enforcement of the fixed gear fisheries.

NOAA FISHERIES
West Coast Region

Electronic Fish Tickets

- **Electronic fish ticket** means a software program or data files meeting data export specifications approved by NMFS that are used to send landing data to the Pacific States Marine Fisheries Commission (PSMFC).

- **First Receiver** means a person who receives, purchases, or takes custody, control, or possession of catch onshore directly from a vessel.

Pacific States Marine Fisheries Commission

E-Tix Portal - Query Fish Tickets

Dave (Mere user) Colpo

- Home
- Fish Tickets
  - Print Ticket
  - Query Tickets
  - Enter Tickets
- Reports
  - Tax & Assessment
  - Code Lists
- Manage Lists
  - Licenses
  - Vessels
  - Operators
  - Buyers
  - Cost Types
  - Unloading Stations
- Administration
  - Manage Orgs
- Help
  - Washington
  - Oregon
  - California

Report a Problem

Return to Query Results

DRAFT

Cancel | Save | Submit | Delete | New | Print | Find

EZ900002 | Add Overage Ticket

State of Washington - Marine Fish

IFQ Landing? ☑ Fed. LE Permit GF1234 Trawl Endorsed? Yes IFQ Vessel Account #: VAAA1234 IFQ Mgmt Area 100 - N of 40'10

Date of Landing 05/19/14 Change

License (Vessel) 123324 (F/V Argo)

CG/WA Vessel #: 123324

Gear: 15

Operator Argo, Jason

Dealer# (Name) 98765 (WA Dealer)

Buyer 1 (Colpo, Dave)

Port of 1st Landing 295 - WESTPORT

Gear Used 15 - LAMPARA/RC

Days Fished 3

Inside/Outside Outside 3 Miles

Catch Area 61C - HECETA HE

Subunit

Primary Data Source COMM

COMMERCIAL

Transport Ticket #

Fish Code - Description	Pounds	Price	Amount	# of Fish	Condition	Grade	Gear	Data Source	Area	Subunit	Take Home/ Weighback
205 - Sole, Dover	1,000.00	$ 1.0000	$ 1,000.00		1	0	15	COMM	61C		NET
207 - Sole, Petrale	500.00	$ 2.0000	$ 1,000.00		1	0	15	COMM	61C		NET
Total:	1,500.00		$2,000.00	0							

Notes

Friend of Steve.

View/Edit Costs

Total Costs: $0.00

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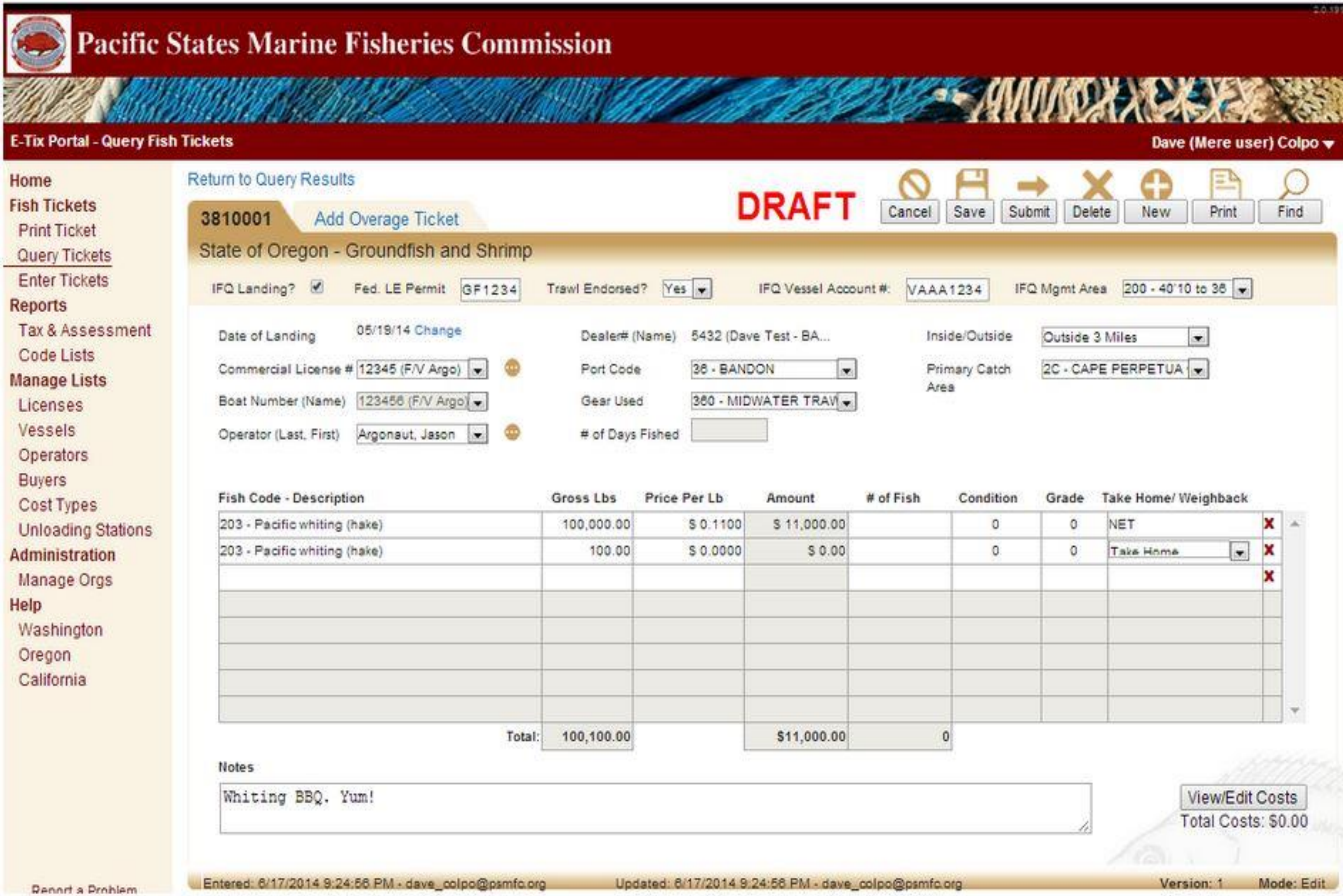

Pacific States Marine Fisheries Commission

E-Tix Portal - Query Fish Tickets

Dave (Mere user) Colpo

- Home
- Fish Tickets
  - Print Ticket
  - Query Tickets
  - Enter Tickets
- Reports
  - Tax & Assessment
  - Code Lists
- Manage Lists
  - Licenses
  - Vessels
  - Operators
  - Buyers
  - Cost Types
  - Unloading Stations
- Administration
  - Manage Orgs
- Help
  - Washington
  - Oregon
  - California

Report a Problem

Return to Query Results

DRAFT

Cancel | Save | Submit | Delete | New | Print | Find

3810001 | Add Overage Ticket

State of Oregon - Groundfish and Shrimp

IFQ Landing? ☑ Fed. LE Permit GF1234 Trawl Endorsed? Yes IFQ Vessel Account #: VAAA1234 IFQ Mgmt Area 200 - 40'10 to 36

Date of Landing 05/19/14 Change

Commercial License # 12345 (F/V Argo)

Boat Number (Name) 123456 (F/V Argo)

Operator (Last, First) Argonaut, Jason

Dealer# (Name) 5432 (Dave Test - BA...

Port Code 36 - BANDON

Gear Used 360 - MIDWATER TRAW

# of Days Fished

Inside/Outside Outside 3 Miles

Primary Catch Area 2C - CAPE PERPETUA

Fish Code - Description	Gross Lbs	Price Per Lb	Amount	# of Fish	Condition	Grade	Take Home/ Weighback
203 - Pacific whiting (hake)	100,000.00	$ 0.1100	$ 11,000.00		0	0	NET
203 - Pacific whiting (hake)	100.00	$ 0.0000	$ 0.00		0	0	Take Home
Total:	100,100.00		$11,000.00	0			

Notes

Whiting BBQ. Yum!

View/Edit Costs

Total Costs: $0.00

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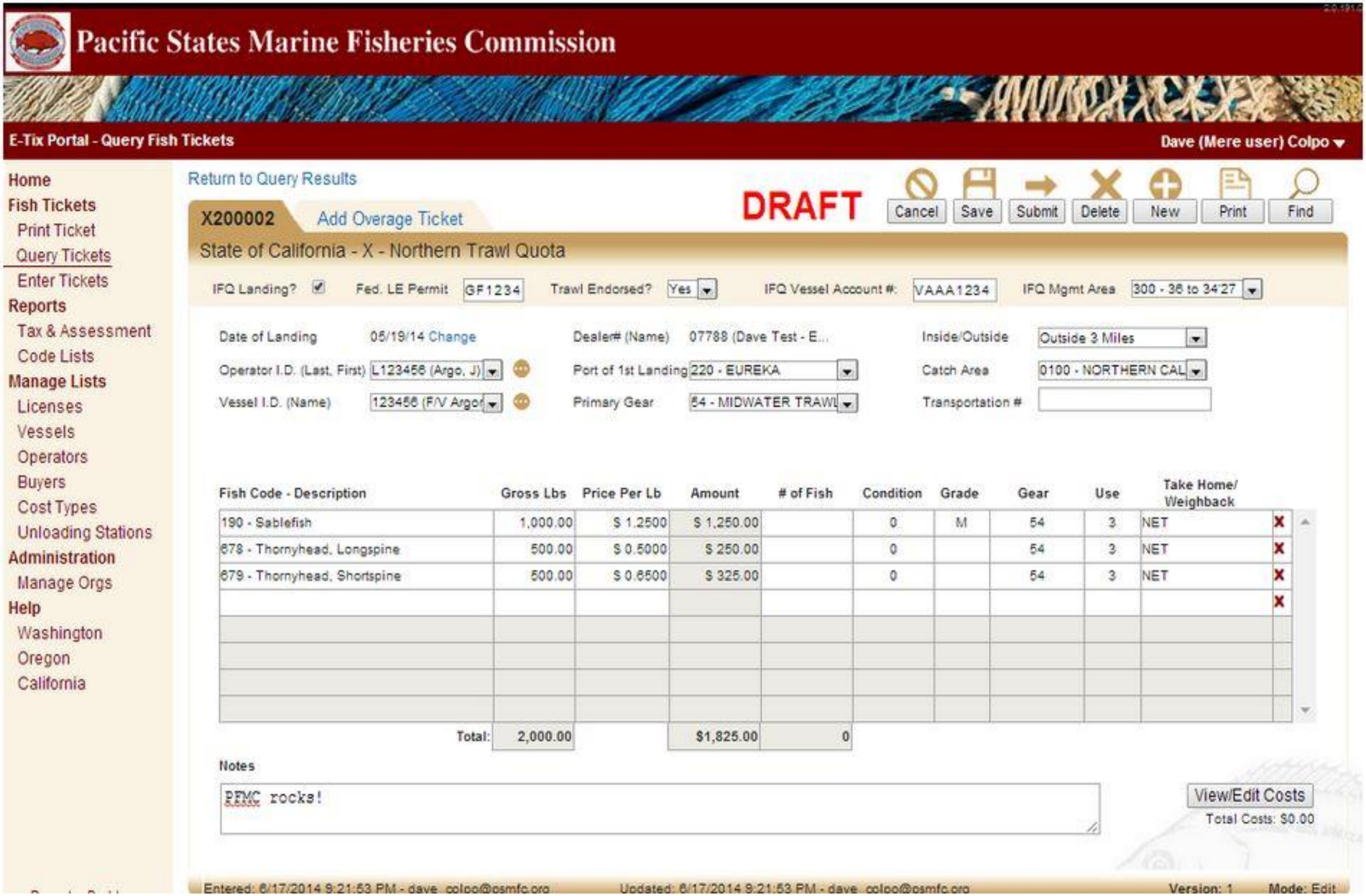

Pacific States Marine Fisheries Commission

E-Tix Portal - Query Fish Tickets

Dave (Mere user) Colpo

Home
Fish Tickets
Print Ticket
Query Tickets
Enter Tickets
Reports
Tax & Assessment
Code Lists
Manage Lists
Licenses
Vessels
Operators
Buyers
Cost Types
Unloading Stations
Administration
Manage Orgs
Help
Washington
Oregon
California

Return to Query Results

X200002 | Add Overage Ticket

DRAFT

Cancel | Save | Submit | Delete | New | Print | Find

State of California - X - Northern Trawl Quota

IFQ Landing? ☑ Fed. LE Permit GF1234 Trawl Endorsed? Yes IFQ Vessel Account #: VAAA1234 IFQ Mgmt Area 300 - 36 to 34'27

Date of Landing 05/19/14 Change
Dealer# (Name) 07788 (Dave Test - E...
Inside/Outside Outside 3 Miles
Operator I.D. (Last, First) L123456 (Argo, J)
Port of 1st Landing 220 - EUREKA
Catch Area 0100 - NORTHERN CAL
Vessel I.D. (Name) 123456 (F/V Argo
Primary Gear 54 - MIDWATER TRAWL
Transportation #

Fish Code - Description	Gross Lbs	Price Per Lb	Amount	# of Fish	Condition	Grade	Gear	Use	Take Home/ Weighback
190 - Sablefish	1,000.00	$ 1.2500	$ 1,250.00		0	M	54	3	NET
678 - Thornyhead, Longspine	500.00	$ 0.5000	$ 250.00		0		54	3	NET
679 - Thornyhead, Shortspine	500.00	$ 0.6500	$ 325.00		0		54	3	NET
Total:	2,000.00		$1,825.00	0					

Notes

PFMC rocks!

View/Edit Costs

Total Costs: $0.00

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NOAA FISHERIES

West Coast Region

Current Range of Alternatives
Alternative 1

(No Action) There are currently no Federal regulations requiring electronic fish ticket documentation for sablefish landings in the primary (tier) sablefish fishery, within the larger limited entry fixed gear (LEFG) fishery or within the OA fishery, which are managed under daily, weekly, and bimonthly trip limits.

NOAA FISHERIES
West Coast Region

Current Range of Alternatives
Alternative 2

A Federal requirement that **all tier** deliveries be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

Current Range of Alternatives
Alternative 3

NOAA FISHERIES
West Coast Region

A Federal requirement that **all limited entry permit sablefish deliveries (primary/tier and DTL)** be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

Current Range of Alternatives
Alternative 4

NOAA FISHERIES

West Coast Region

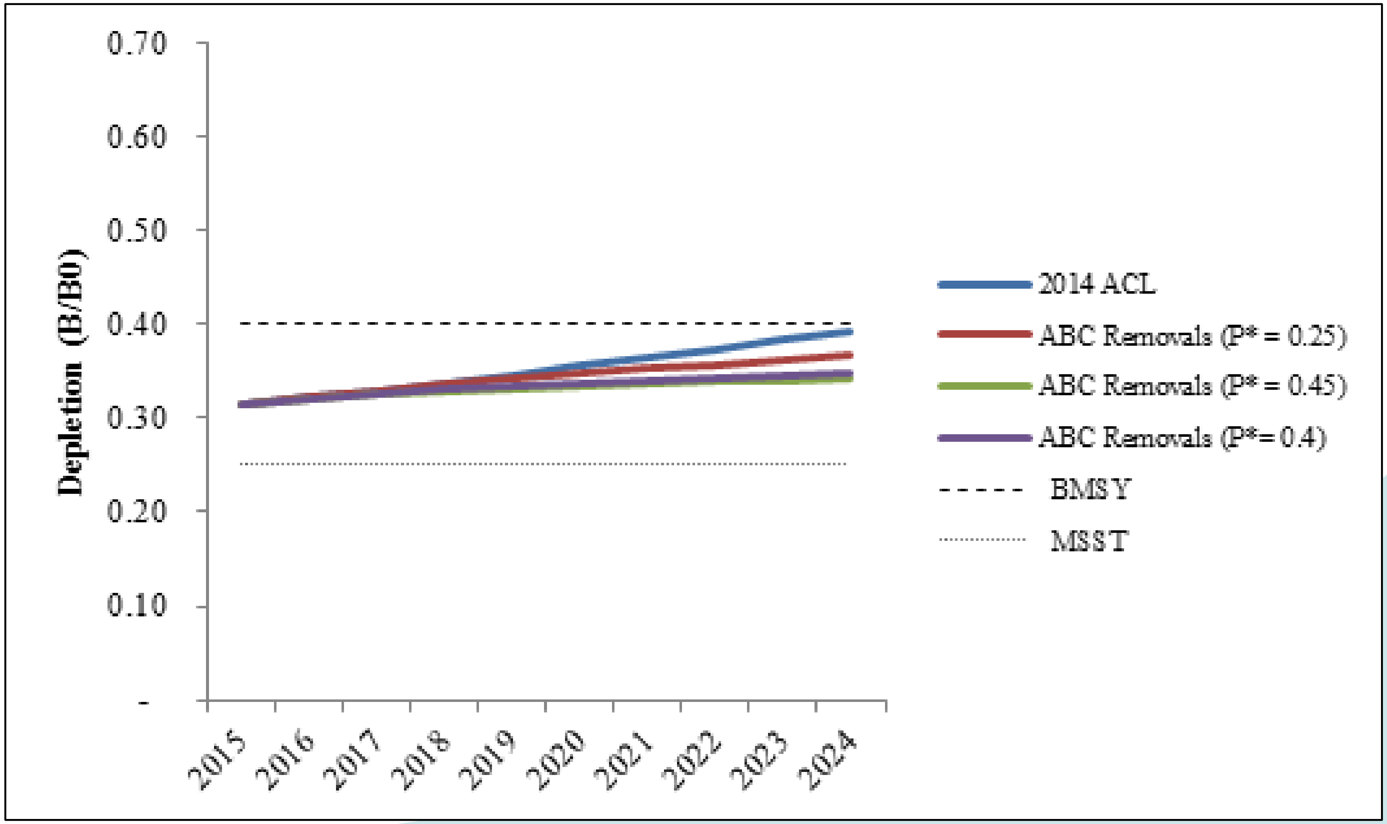
A Federal requirement that **all sablefish deliveries (primary/tier, DTL, and OA)** be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

Biological Considerations

NOAA FISHERIES
West Coast Region

Based on the most recent stock assessment, the sablefish stock is in the precautionary zone.

Agenda Item F.7.a, Attachment 4: Preliminary Draft of, "Groundfish Harvest Specifications and Management Measures and Amendment 24: Draft Environmental Impact Statement"



Socio-Economic Considerations Industry

NOAA FISHERIES
West Coast Region

- Under the action alternatives, the burden of implementation will primarily fall on sablefish first receivers.

- Each first receiver will need to have a computer with internet access.

- Fishermen may find a reduced number of first receivers capable of recording sablefish landings on electronic fish tickets

Socio-Economic Considerations
First Receivers

NOAA FISHERIES

West Coast Region

The number of additional first receivers required to use electronic tickets under each alternative, by state and coastwide.

(Table 4-6 in Agenda Item F.6.a, Attachment 2)

	Washington	Oregon	California	Coastwide
Alternative 1	0	0	0	0
Alternative 2	9	4	20	33
Alternative 3	9	4	40	53
Alternative 4	13	11	53	77

Socio-Economic Considerations First Receivers

NOAA FISHERIES

West Coast Region

Burden hour estimates for coastwide first receivers.

(Adapted from Table 4-14 in Agenda Item F.6.a, Attachment 2)

	Number of sablefish landings per year	Total number of first receivers submitting electronic tickets	Burden hour estimate (hours per year)	Burden hour estimate (minutes per month per first receiver)
Alternative 1	4,851	0	0	0
Alternative 2	639	56	72	7
Alternative 3	2,682	76	369	24
Alternative 4	4,851	100	666	33

Socio-Economic Considerations State and Federal Agencies

NOAA FISHERIES

West Coast Region

- Implementation of an electronic fish ticket would be separate from, and in addition to, existing state reporting requirements.

Electronic fish ticket data from first receiver → **PSMFC** → **State of landing, management and enforcement agencies** → **PacFIN**

PSMFC → **Federal management and enforcement agencies**


Questions?

Sablefish Catch Share Program Review – Phase I

Agenda ItemF.6

Agenda Item F.6.a
Supplemental STAFF
Agenda Item Overview
June 2014

Supplemental Reports

GAP

GMT

SSC

EC

Supplemental Public Comment

Program Review - Overview

- Phase I
  - Program Review – Public Review Draft (F.6.a, Att 1)
  - Draft Environmental Assessment (F.6.a, Att 2)
    - Rules for assessing permit control (for own/control limit)
    - Federal electronic landings reports
- Phase II
  - Consideration of Other Program Changes

Program Review Document (Agenda Item F.6.a, Att 1)

- Augmented based on April guidance
- Sections for Particular Attention
  - Preliminary Conclusions (Section 5.0)
  - Council Recommendations (Section 6.0)

Council Action

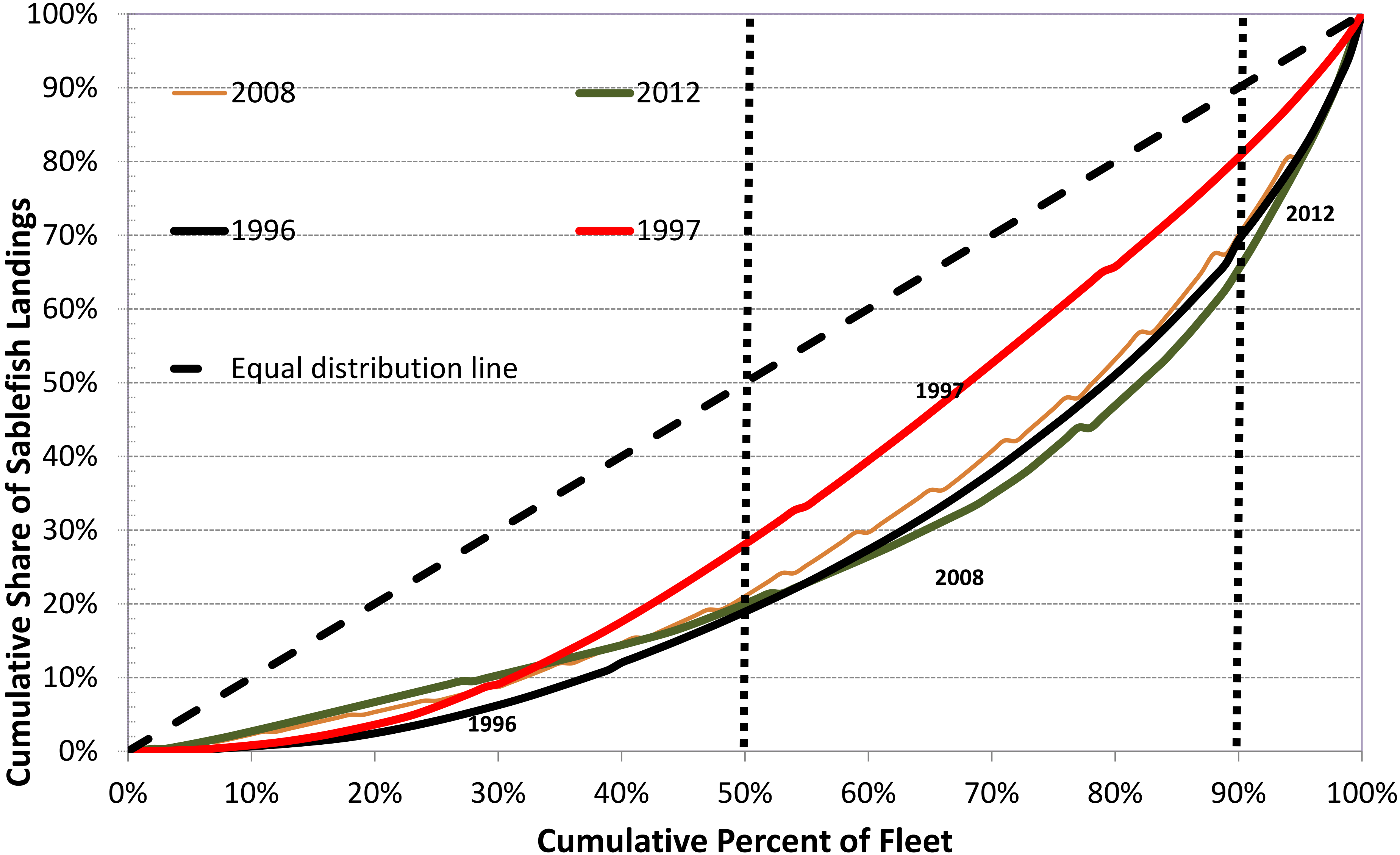
1. Provide guidance on finalization of the Phase I review document, as appropriate, including recommendations, if any.

2. Select final preferred alternatives for the rules for assessing permit control and electronic fish ticket requirements.

3. Identify Phase II issues for inclusion in the omnibus process, if any (Agenda Item F.9).

Program Review Document
Agenda Items F.6.a, Attachment 1

Distribution of Harvest

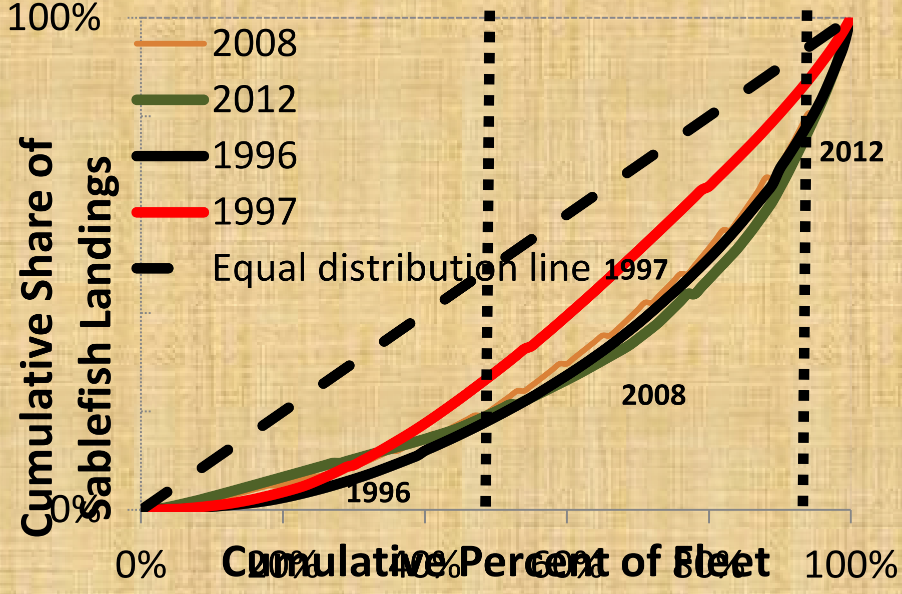


Phase I Review Document
Agenda Items F.6.a, Attachment 1, p. 25

Size Category	Vessels in the Fleet	Base Permits Used by The Fleet
≥60’	20	27
50’-60’	18	25
43’-50’	22	16
35’-43’	20	22
<35’	17	7

Program Review Document Agenda Items C.6.a, Attachment 1

Questions?



Council Decision Analysis Document
Agenda Items F.6.a, Attachment 2

- Rules for assessing permit control (for own/control limit) – Select ***FPA***
- Federal Electronic Landing Reports – Select ***FPA***

Own and Control Limit

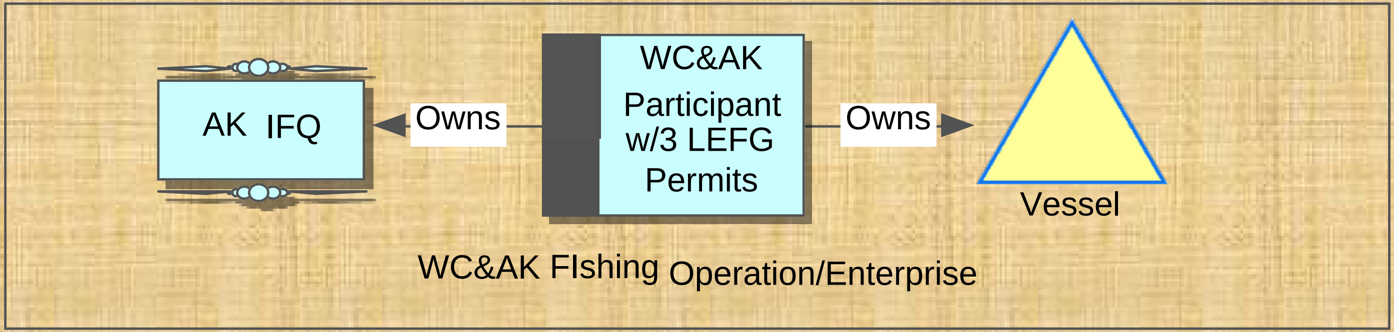
- 3 Permit Own/Control Limit
- Counting toward the limit
  - Partial ownership of any permit
  - Partial ownership of a vessel – permits registered to that vessel (leased or “held” permits)
  - E.g. A person gets to the three permit limit by being
    - an owner-operator of
      - a vessel and
      - the associated LEFG permit,

    and
    - part owner of another vessel which leases two LEFG permits

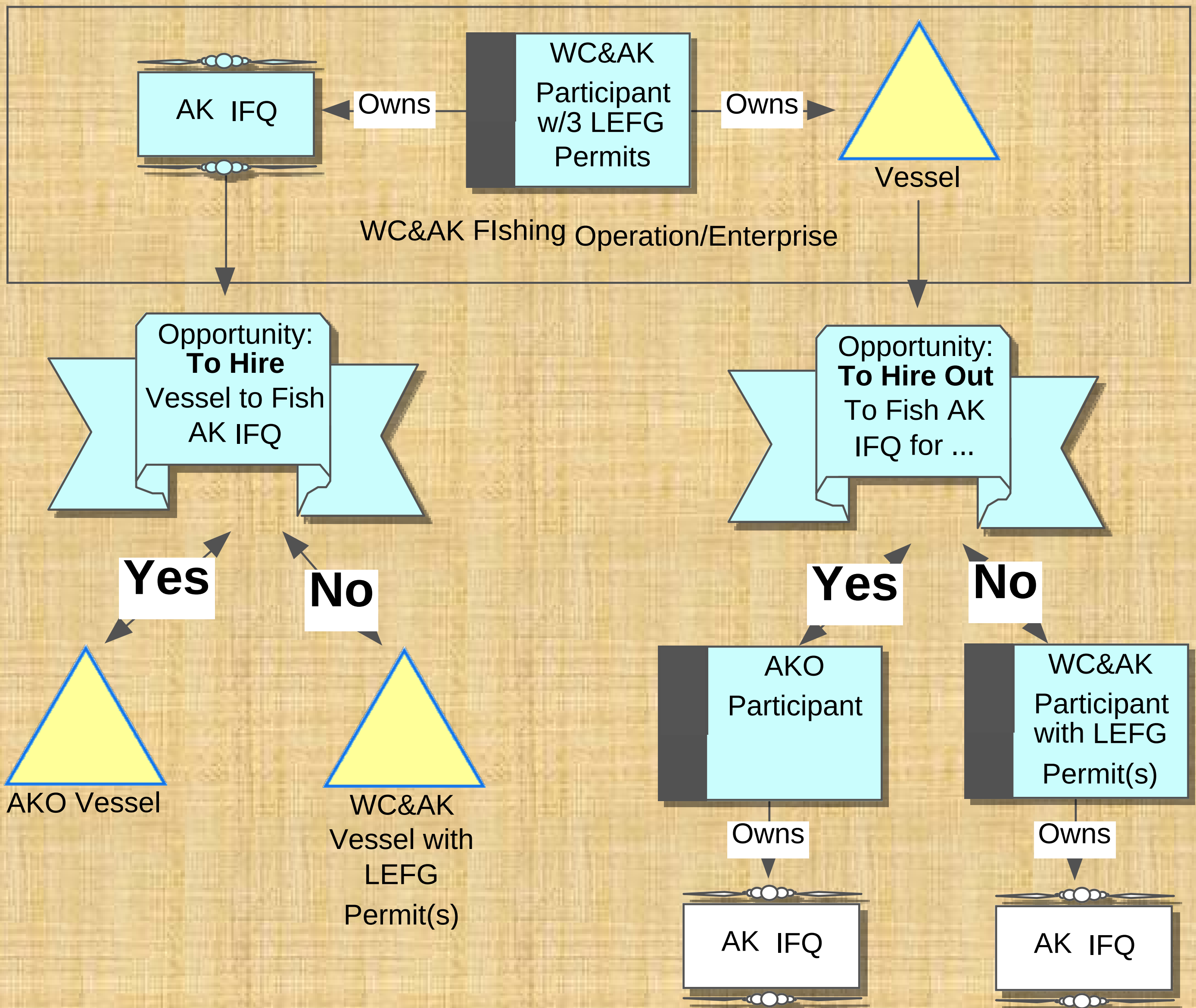
Assessing Permit Control and Alaska Fisheries

- Limitation on West Coast fishing operations' abilities to work with each other
- Cross participation in Alaska halibut and sablefish IFQ fisheries
  - In general, Alaska sablefish and halibut IFQ owners must either
    - be present during fishing, or
    - with a grandfather exception
      - hire a vessel to fish IFQ for them
      - 20% vessel ownership required
  - 20% vessel ownership counts for LEFG permit control

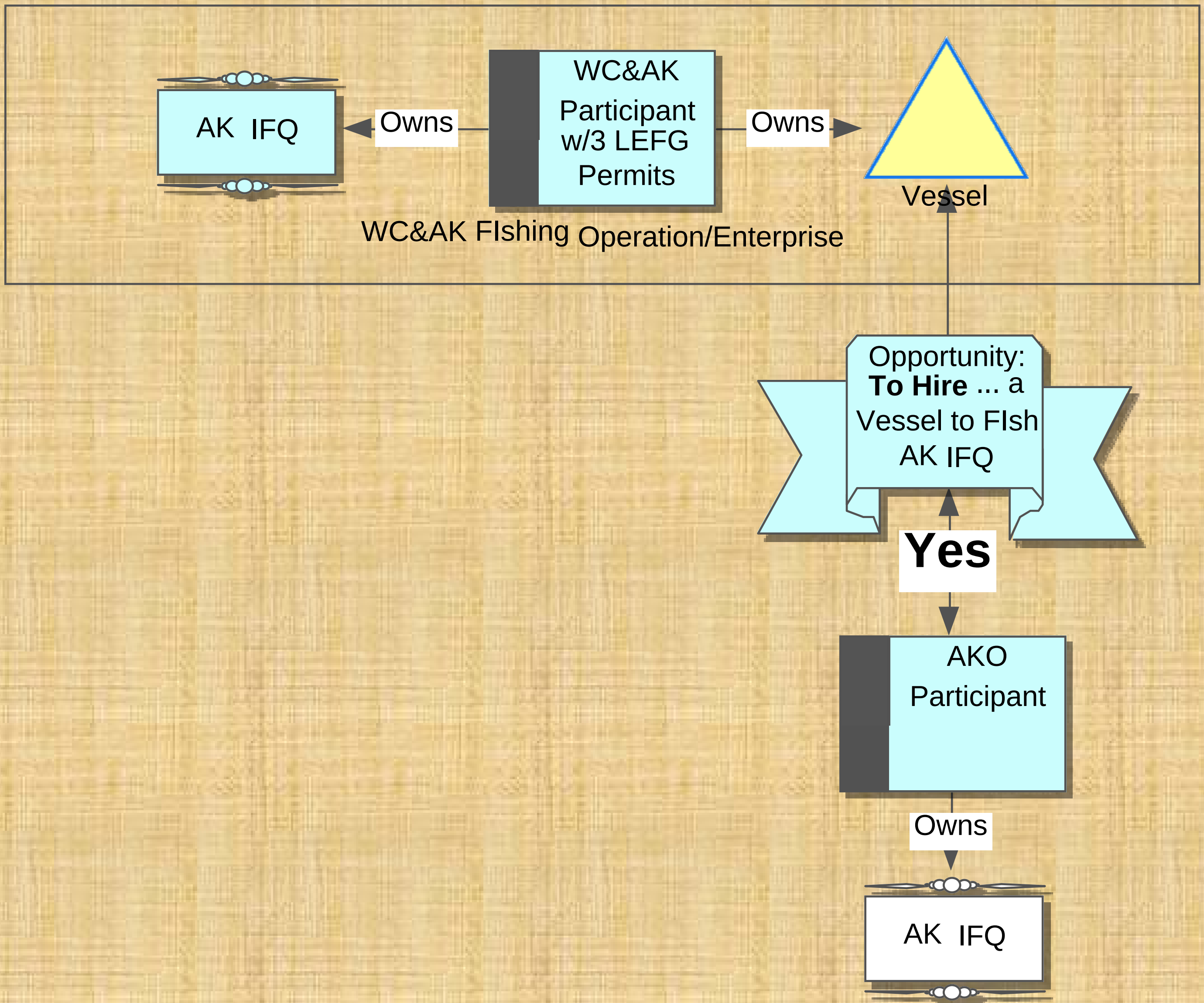
Assessing Permit Control and Alaska Fisheries



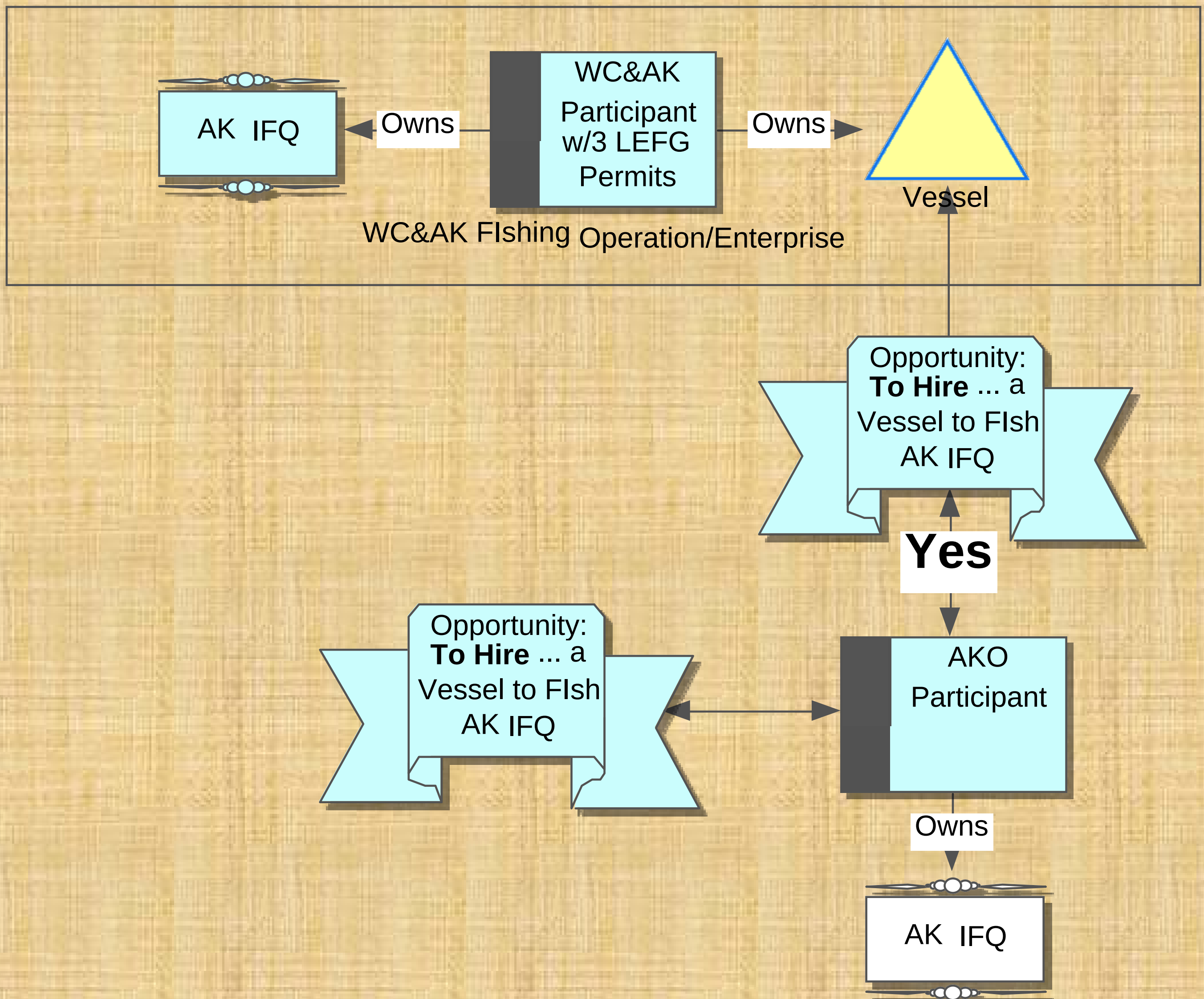
Assessing Permit Control and Alaska Fisheries



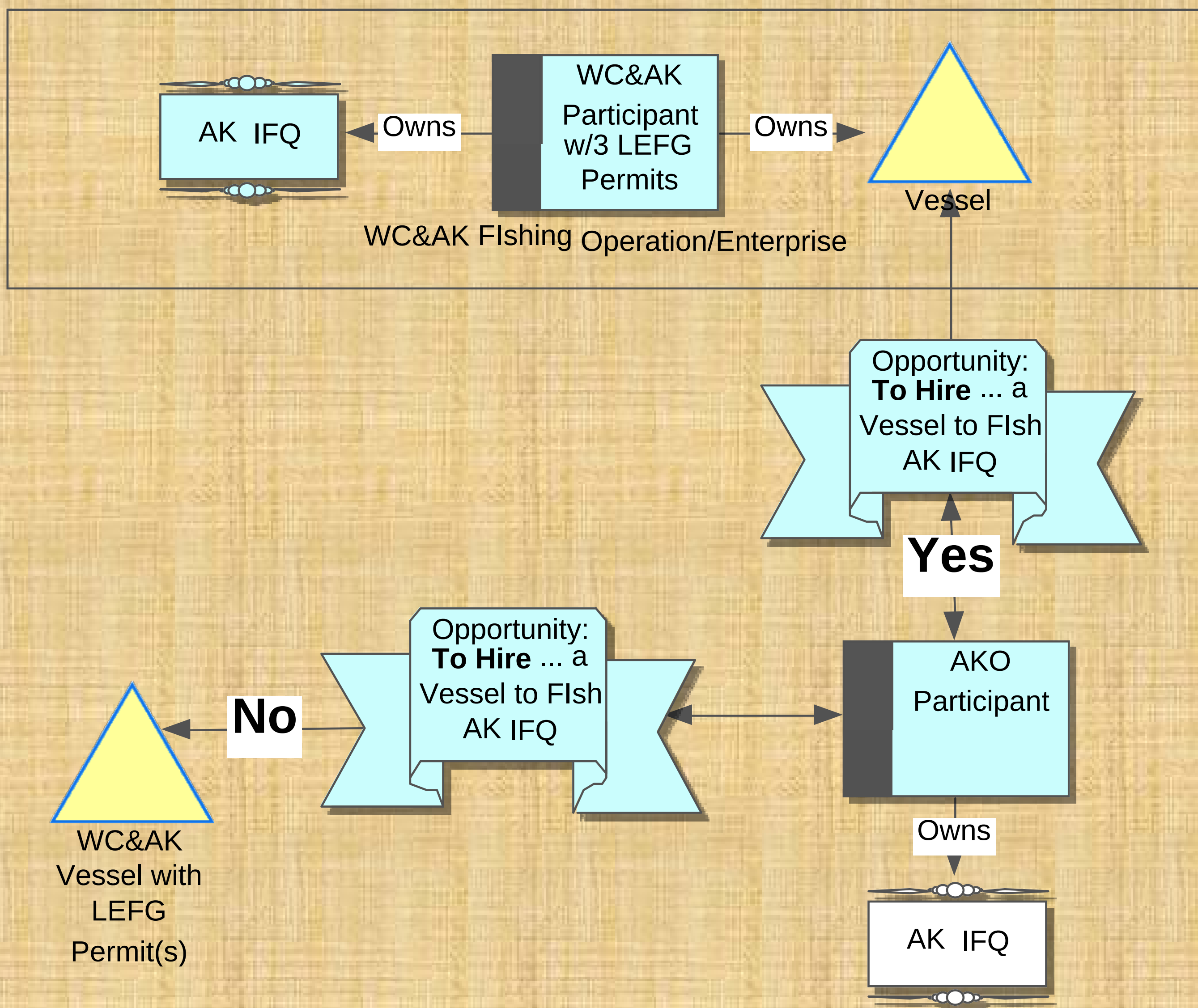
Assessing Permit Control and Alaska Fisheries



Assessing Permit Control and Alaska Fisheries



Assessing Permit Control and Alaska Fisheries



Assessing Permit Control Action Alternatives

- Action alternatives

  exempt the permits

  associated with up to two vessels,

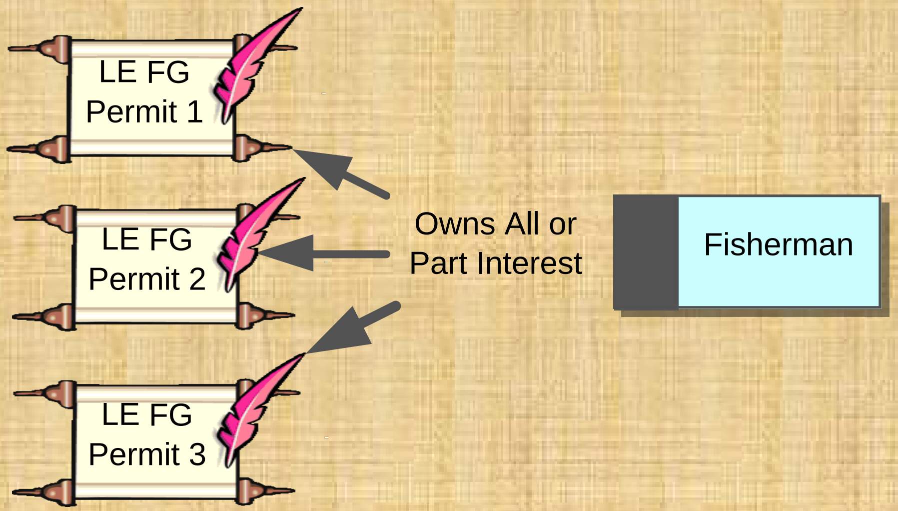
  so long as

  – no direct permit ownership, and

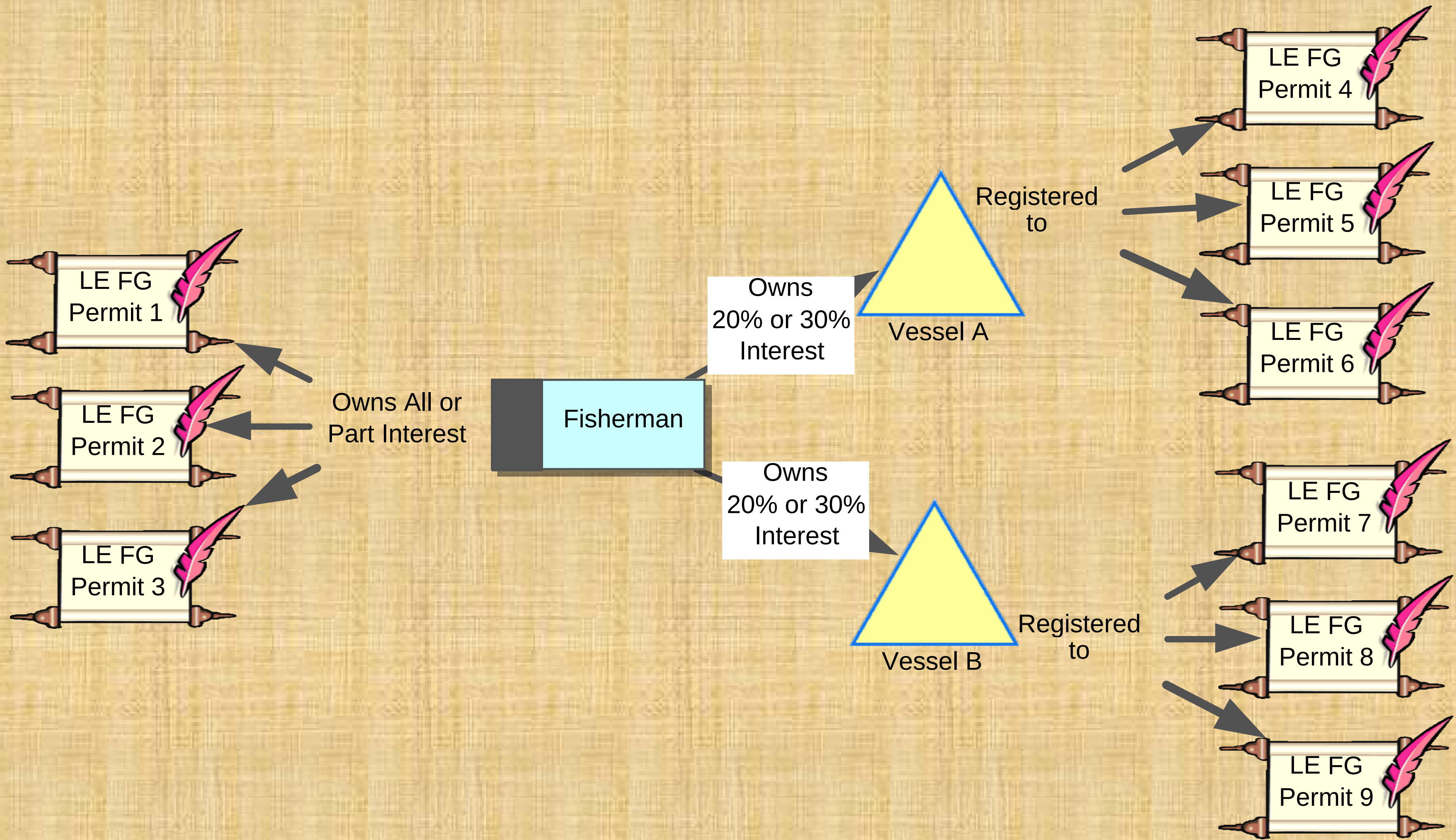
  – vessel ownership not more than

    - Action Alternative 2a – 20% **(PPA)**
    - Action Alternative 2b – 30%

Maximum Control Under Status Quo



Maximum Control
Under Action Alternatives

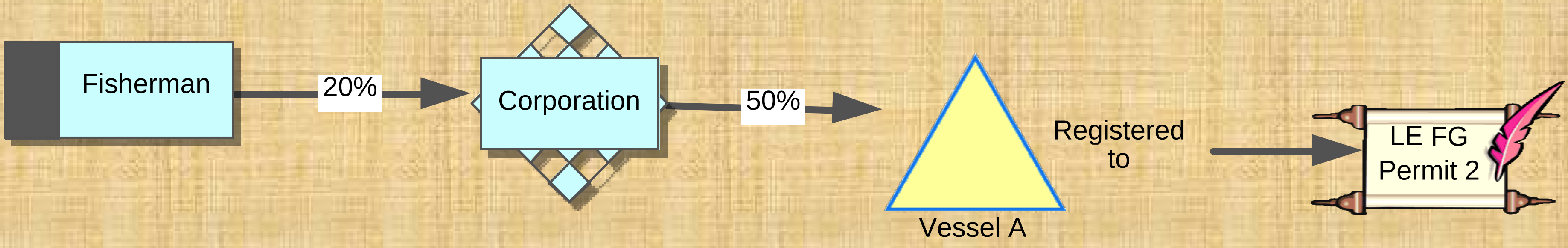


Details to Work Out

- Collective Ownership (e.g. corporation or partnership)
  - Before it was just a matter of “some” percent
  - Need to determine the percent owned

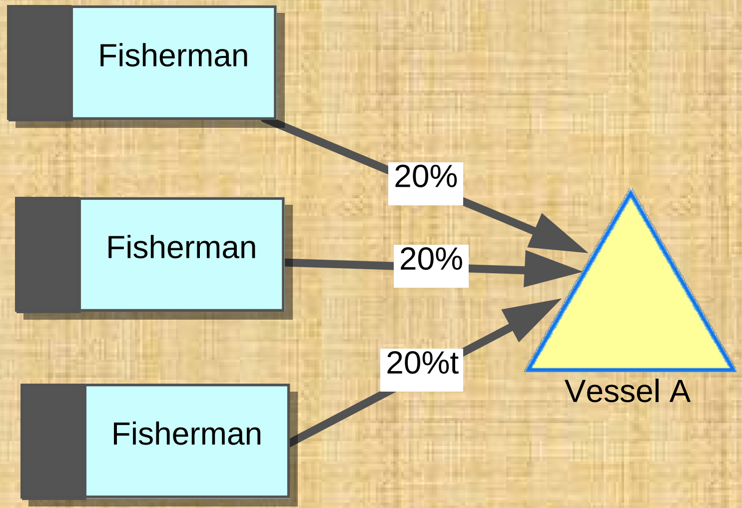
- Coordinated Ownership –
  - Potential for control to exceed the intended 20% or 30% threshold.

Collective Ownership : Determining the Percent a Person Owns



- Strawman Suboption 1 – Entire Interest Pass Thru
  - – fishermen owns 50% share of vessel A
- Strawman Suboption 2 – Pro-rata Pass Thru
  - – fishermen owns 10% share of vessel A (20% x 50%)

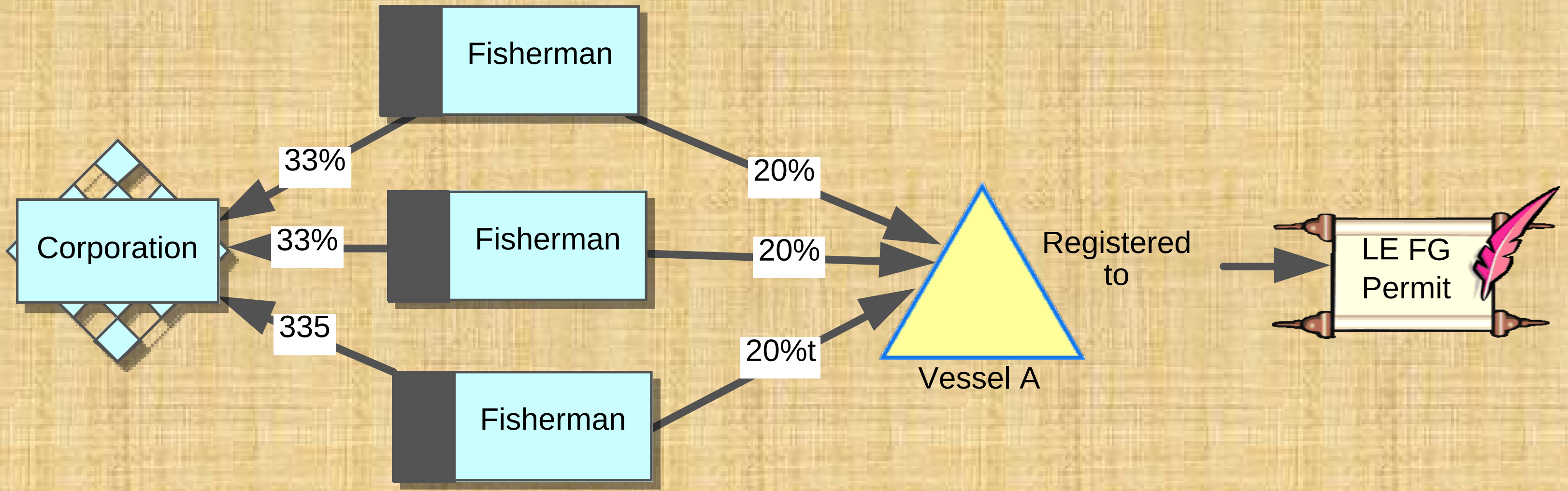
Coordinated Ownership



- Example
  - Each separately own 20 percent of a vessel which leases a permit.

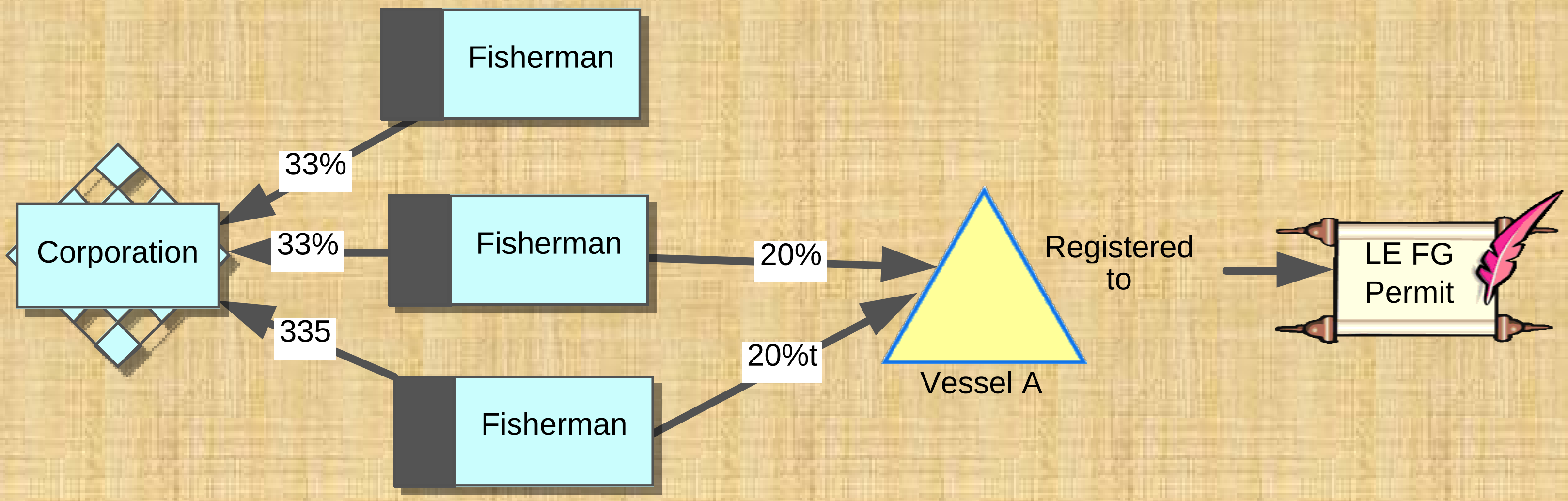
  - Action alternatives would exempt each vessel owner

Coordinated Ownership



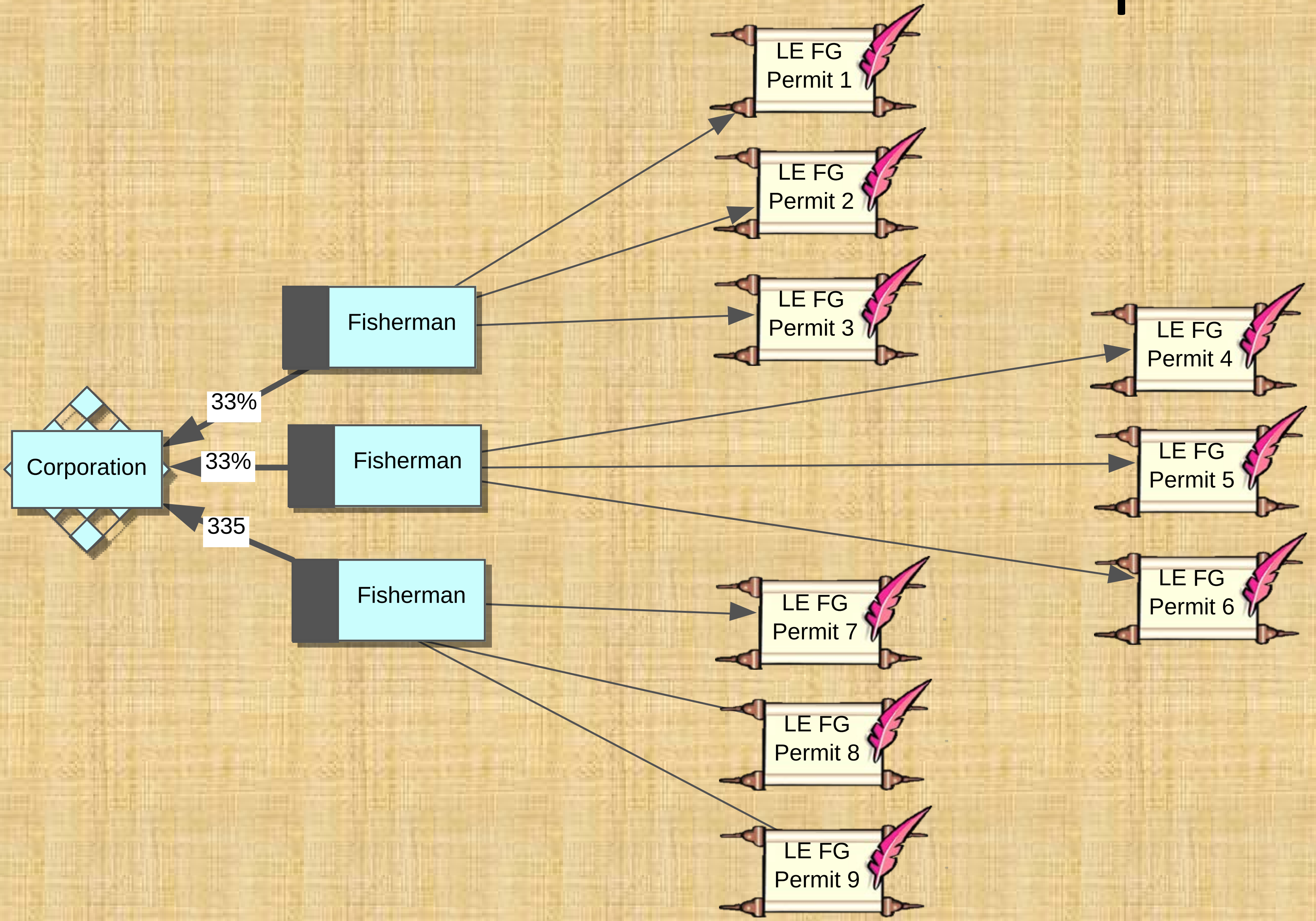
- Example
  - Each separately own 20 percent of a vessel which leases a permit.
  - Action alternatives would exempt each vessel owner
  - Control could be coordinated through a corporation

Coordinated Ownership



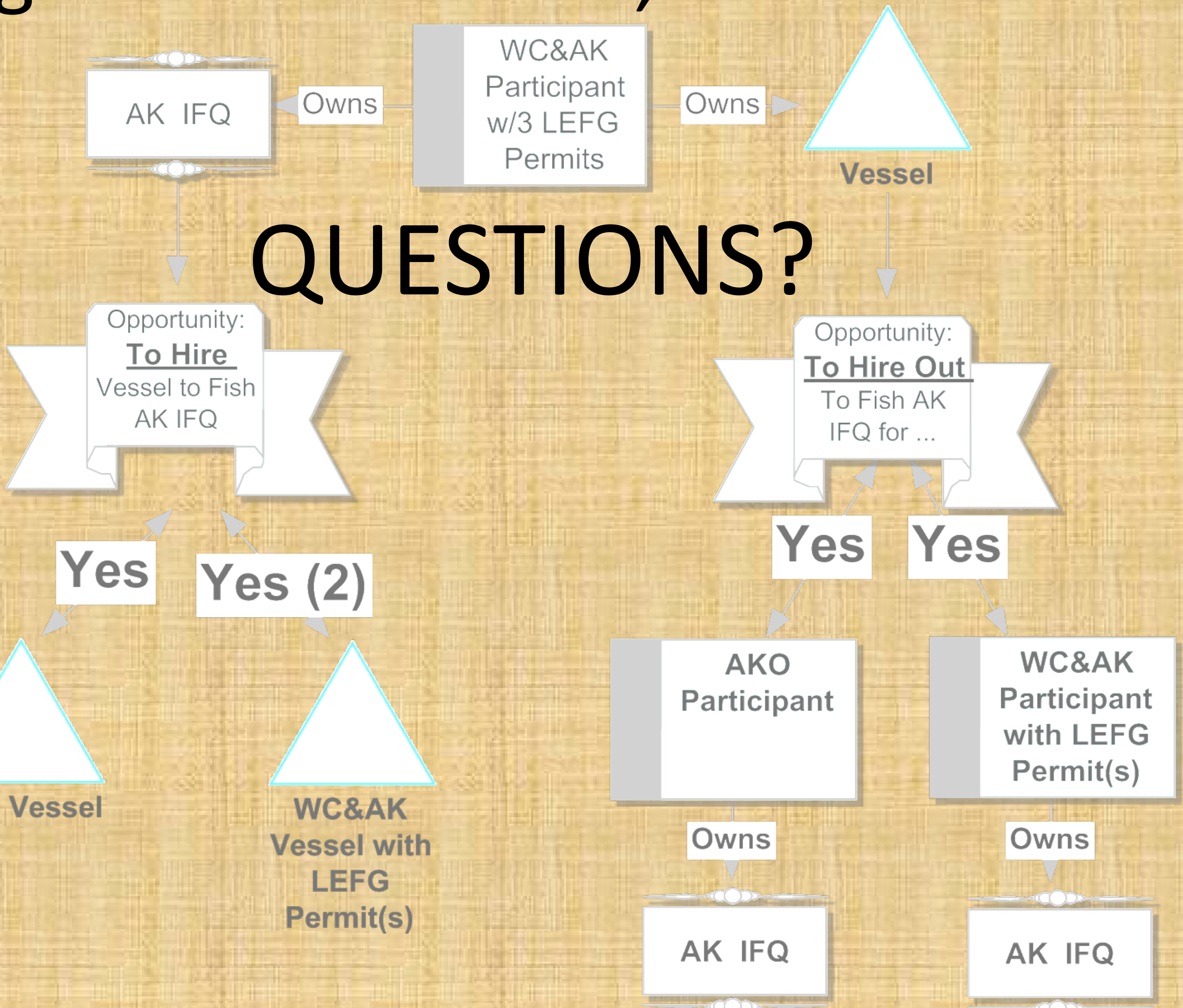
- The Coordinated Ownership Strawman Suboption would limit the exception.
- Members of a collective could own no more than 40% ownership interest in a vessel.

Coordinated Ownership



Council Decision Analysis Document
Agenda Items F.6.a, Attachment 2

QUESTIONS?



IMPLEMENTATION ISSUES ASSOCIATED WITH ELECTRONIC FISH TICKETS

Agenda Item F.6.a, Attachment 2, *Action to the Fixed Gear Sablefish Fishery Managed under the Pacific Coast Groundfish Fishery Management Plan*, analyzes the alternatives regarding implementation of an electronic fish ticket for sablefish landings in the Pacific Coast Groundfish Fishery. During development of this analysis, several implementation issues have been identified. These issues are listed below in the form of open-ended questions. NMFS plans to release a supplemental NMFS Report that addresses these questions.

Issue 1: Under Alternative 4, for open access, daily trip limit, sablefish landings, how will fishermen know whether they will have to land to a first receiver that has electronic fish ticket capabilities? In other words, what is the threshold for open access sablefish landings such that an electronic fish ticket is required?

Issue 2: What burden(s) are placed on the state management agencies?

Issue 3: Would first receivers be required to have some type of current, valid first receiver site license?

Issue 4: Would incidentally caught species on sablefish directed trips be required to be recorded on the electronic ticket?

Issue 5: Could transport tickets still be used? How would this work?

PFMC
05/30/14

ADDENDUM TO THE OWN/CONTROL LIMITS MEASURE: A NMFS-PROPOSED ALTERNATIVE AND CONCERNS REGARDING THE EXISTING PRELIMINARY PREFERRED ALTERNATIVE (PPA)

NMFS-proposed alternative: Under this alternative, eligible owner(s) of vessel(s) registered to a sablefish-endorsed limited entry permit could apply to the National Marine Fisheries Service (NMFS) for a limited exemption from the control rules. The exemption, if granted, would allow the person to own up to 20 percent of up to two vessels registered to other tier-endorsed limited entry permits without having the permits registered to the vessel(s) count against the individual's three-permit own/control limit. Additionally, members of a corporation would be restricted from owning, collectively, more than 40 percent of a vessel under the exemption (see "Strawman Suboption on Coordinated Ownership", Section 2.2.2 of *Action to the Fixed Gear Sablefish fishery Managed under the Pacific Coast Groundfish Fishery Management Plan*).

The current control rules would remain in place; any level of ownership in a sablefish tier-endorsed permit is a count of one towards the three-permit own/hold control rules and any level of ownership in a vessel registered to a sablefish tier-endorsed permit is also a count of one towards the three-permit own/hold limit.

To be considered eligible to receive this limited exemption from the control rules, the vessel owner must own tier-endorsed permits, Alaska sablefish individual fishing quota (IFQ), and vessel(s) that participate in both West Coast and Alaska sablefish fisheries. Currently, this is the only recently documented group of individuals that have had their ability to attain their tiers negatively impacted by the own/control limit. However, if there are other documented circumstances where this has been an issue, NMFS encourages the public to bring these issues to the attention of NMFS and the Pacific Fishery Management Council so that if other eligibility criteria are warranted they can be considered.

A tentative process for implementing this alternative is outlined as follows. If a vessel owner wants to apply for an exemption from the current control rules, NMFS would require the vessel owner to submit a letter to NMFS requesting the limited exemption, a copy of the vessel's current U.S. Coast Guard (USCG) vessel documentation form 1270, credible evidence of their eligibility to apply for the exemption, and an ownership interest form that shows both relative percent ownership amounts when there are multiple vessel owners and/or percent ownership of all shareholders of a business entity that owns the vessel(s). The request for exemption could be made at any time during the year and there would be no requirement to renew it annually. However, if any of the ownership interest amounts change or any vessel owners change (added or deleted) from that previously reported, the vessel owner must notify NMFS within 30 calendar days and resubmit a revised ownership interest form and USCG form1270.

Concerns regarding the existing preliminary preferred alternative (PPA): The PPA's proposed method for calculating vessel ownership for compliance with the control rules potentially adds three new layers of complexity to the existing regulations: (1) the 20 percent calculation for vessel owners, (2) capping that level of ownership at two vessels, and (3) potentially tracking the relative ownership of vessels across members of corporations to ensure it is within the 40 percent limit (if the strawman option on coordinated ownership is adopted, page 23 of Agenda Item

F.6.a, Attachment 2) . The administrative burden affects both NMFS and many vessel owners in the permit stacking program; NMFS would now have to calculate and track vessel ownership information at three levels and every vessel owner that is not the sole owner of their vessel would be required to fill out a vessel ownership interest form and understand and comply with increasingly complex regulations. Moreover, the scope of this PPA appears overly-broad when compared with the scope of the problem that is being addressed. The main problem being addressed here occurs when West Coast tier-endorsed permit owners also own Alaska sablefish IFQ and have been granted an owner on board exemption in Alaska that allows them to fish their Alaska IFQ on a vessel in which they have at least 20 percent ownership without being on board that vessel. If that vessel then also participates in the West Coast sablefish primary fishery , any tier-endorsed permits registered to that vessel count towards the vessel owner’s three-permit own/control limit, which can prevent the vessel owner from fishing tier-endorsed permits they own without exceeding the control limit. There are currently 97 vessels that participate in the West Coast LEFG fishery; of these vessels, only 13 participate in both the Alaska sablefish IFQ program and the West Coast permit stacking program. Under the PPA, the control rules would be modified for the entire permit stacking program in order to address an issue that only affects a minority of the fleet, but adds an increased administrative burden to all vessel owners and increased complexity to the regulations.

Although the outcome of this new alternative is likely to be very similar to the existing PPA, the approach is different. Instead of requiring many vessel owners to send vessel ownership information to NMFS (the majority of whom do not operate in Alaska) only the vessel owners who want the exemption would need to apply for it. The qualification standard for the exemption remains the same, but it is placing the burden on those who want the exemption to request it.

PFMC
05/30/14

ENFORCEMENT CONSULTANTS REPORT ON FIXED GEAR SABLEFISH CATCH SHARE PROGRAM REVIEW, INCLUDING FEDERAL ELECTRONIC FISH TICKETS FOR OPEN ACCESS SABLEFISH DELIVERIES

The Enforcement Consultants (EC) has reviewed the documents pertaining to Agenda Item F.6 and has the following comments.

Modify the Own/Control Limit:

At the April Council meeting, the Council selected the following as the Preliminary Preferred Alternative (PPA) for this issue:

> Alternative 2a (PPA): No action for permit ownership (any percentage ownership in a permit is a count of 1); however, holding a permit is counted only if the vessel owner has a greater than 20% share. Partial vessel ownership is capped at two vessels, i.e. the 20% or less ownership in a vessel exemption could only be used twice. After this two-permit exception is reached, then any permits registered to a vessel, wholly- or partially-owned by the entity, would count toward the three permit limit, as described under No Action.

The PPA's proposed method for calculating vessel ownership for compliance with the control rules adds new layers of complexity to the existing regulations. Under this alternative, National Marine Fisheries Service (NMFS) will have the additional administrative responsibility of calculating and tracking vessel ownership information at multiple levels. Every vessel owner that is not the sole owner of their vessel will be required to understand and fill out a vessel ownership interest form in order to comply with the new regulations.

Alternatively, the NMFS-recommended alternative (Agenda Item F.6.b, NMFS Report 2) would produce a similar outcome, but with a diminished regulatory and administrative burden; the calculation of ownership would remain the same, but only the vessel owners who want the exemption would need to apply for the requested exemption. The qualification standard for the exemption remains the same, but places the requirement to request that exemption on those who want the exemption.

If the Council decides to move ahead with an action alternative, the EC endorses the NMFS-recommended alternative as described in Agenda Item F.6.b, NMFS Report 2. The EC evaluated three issues in coming to a consensus on its recommendation: complexity of regulation, regulatory burden on the individual and fleet, and the administrative burden on NMFS. To achieve the desired outcome of the PPA (increased flexibility regarding permit ownership calculation), increased regulatory complexity is a given. It is our assessment the NMFS alternative will lessen the regulatory burden on the fleet at large, while lessening the administrative burden on the NMFS.

Requiring Federal Electronic Fish Tickets for West Coast Sablefish Deliveries:

The Department of Commerce (DOC) Office of Inspector General (OIG) recently completed an audit of the West Coast Sablefish Limited Entry Permit (LEP) Tier Fishery and reported the following:

1. NOAA does not have adequate data and does not track or enforce landings overages violations in the Pacific Sablefish Permit Stacking individual fishing quota (IFQ).

2. In addition to its incomplete controls over monitoring Pacific Sablefish landings, NOAA has also not effectively enforced restrictions on landings overages. As noted in table 2, we identified 189 instances where actual landings exceeded the allowed landings for individual permits from 2008 through 2013. Although the majority of the overages were not significant as compared to the fishery's daily trip limit, 12 of the overages totaled 32,607 pounds. NOAA did not take any action to correct the overages, such as requiring the purchase or leasing of an additional permit, reducing allowable landings in the subsequent fishing year, or referring the violation to Office of Law Enforcement (OLE).

The OIG report included the following recommendations:

> (1) Require all Limited Entry Fixed Gear Sablefish deliveries to be recorded on the Pacific States Marine Fisheries Commission (PSMFC) e fish ticket.
>
> (2) Use the IFQ Vessel Account System to load and track fixed gear sablefish tier deliveries.

A decision on Recommendation 2 may be premature in that other options for tracking tier deliveries may be identified, but for the EC, Recommendation 1 is a vital enforcement tool, not only for LEP sablefish, but for all West Coast sablefish deliveries.

Moving to an electronic format will provide multiple benefits to industry, science, management, and enforcement, such as:

> For industry, data electronically entered into the system can be verified and validated at the time of entry by the buyer/first receiver and provides a tool for those buyers to capture and track fish tickets, generate tax reports, and summarize data for their own internal purposes.
>
> For enforcement, as reported by the EC at the April 2014 Council meeting, enforcement of landing overage violations, both tier/daily trip limit (DTL) and open access (OA) deliveries could be greatly enhanced through access to accurate, near real time tracking of landings against tier limits, conversion to DTL landing limits when tiers are exhausted, and daily/weekly OA deliveries. Each of these delivery scenarios creates unique enforcement challenges for federal and state enforcement personnel. For example, the following questions may arise: What is the status of a vessel's tier(s)? Which tiers are/were credited to a particular landing? Is/was the owner on board? Is the DTL

delivery within limits? Is the OA delivery within limits, daily, weekly, or cumulatively? What is the potential for an illegal split delivery, i.e. underreporting? How many daily deliveries were made by a given vessel during a reporting week, month, or bi-monthly period? What was the cumulative total of those deliveries? And in which state(s) were the deliveries made?

OA deliveries are exceedingly challenging for state dockside enforcement. E-ticket reporting would improve cumulative trip limit monitoring immensely. The current OA regulations allow for 300 lb/day, or 1 landing per week of up to 800 lb, not to exceed 1,600 lb/2months. Therefore, for the daily limit, up to six deliveries may need to be tracked over a two month period, while a minimum of two deliveries may need to be tracked over that same two month period for the weekly limit.

Implementation Issues Associated with Electronic Fish Tickets: Agenda Item F.6.b

Issue 1: Threshold for E-Ticket deliveries

Some have suggested that for Alternative 4, (all deliveries be recorded on the e-ticket) a sub-option should be developed establishing a threshold for e-ticket reporting, i.e. 100 or 200 pounds. The rationale for this suggestion being that e-reporting of small deliveries places a significant burden on buyers. To the contrary, the EC believes establishing a reporting threshold would create needless regulatory complexity to this proposed reporting process. It could potentially create confusion for buyers to have to determine whether paper or electronic reporting is appropriate for relatively small deliveries. In discussions with some buyers, they indicate that one simple reporting rule for all West Coast Sablefish deliveries is their preferred option.

Through discussions with Pacific Council staff, the EC has determined that over the past three years there were 981 OA sablefish deliveries of 200 pounds or less made on the West Coast, averaging 327 deliveries per year. 25 percent (245 or approximately 82 trips a year) of those deliveries were comprised of 50% or less of sablefish. 67 percent (657 or approximately 220 trips a year) were 100 percent sablefish. It is our conclusion that the vast majority of all these trips were targeted DTL or OA sablefish trips. Consequently, the threshold concept is not viable in that it will not address the EC cumulative trip limit monitoring problems, because all deliveries, small or large, need to be tracked and monitored against either DTL or OA cumulative trip limits.

Issue 2: What burden(s) are placed on the state management agencies?

The EC has no comment other than to point out that e-ticket reporting is already accepted for all commercial landings in Oregon. Washington continues to make progress in moving in a similar direction and California is in discussion with PSMFC exploring the functionality of e-ticket reporting.

Issue 3: Would first receivers be required to have some type of current, valid Federal first receiver (FR) site license?

The EC does not believe a Federal FR site license needs to or should be a requirement for West Coast sablefish deliveries. The Federal FR license is used in trawl rationalization as a means for deploying catch monitors (CM) and implementing elements of the CM Program, i.e. evaluating site/facilities capabilities and requirements, none of which are elements of the sablefish LEP or OA fisheries. A state buyer's license would be a continuing requirement.

Issue 4: Would incidentally caught species on sablefish directed trips be required to be recorded on the e-ticket?

Yes, complete recording of the trip is, at a minimum, desired, if not necessary, particularly where the e-ticket is used in lieu of paper reporting.

Issue 5: Could transportation tickets still be used?

Yes, in the same way the states use this process under their current regulations.

In conclusion, the EC recommends:

(1) If modifications to the own/control limit are deemed appropriate by the Council, adopt the NMFS-recommended alternative listed in Agenda Item F.6.b, NMFS Report 2.
(2) Adopt Alternative 4: A federal requirement that all sablefish deliveries (primary/tier, DTL, and OA) be recorded on an e-ticket that documents the associated federal groundfish permit number (with the exception of OA, which may have either a federal vessel documentation number or a state number, per specific state requirements).
(3) All incidentally caught species associated with the sablefish delivery should be recorded on the e-ticket with no minimum threshold exception.

PFMC
06/22/14

GROUNDFISH ADVISORY SUBPANEL REPORT ON FIXED GEAR SABLEFISH CATCH SHARE PROGRAM REVIEW, INCLUDING FEDERAL ELECTRONIC FISH TICKETS OR OPEN ACCESS SABLEFISH DELIVERIES

The Groundfish Advisory Subpanel (GAP) received a review document of the sablefish limited entry fixed gear (LEFG) program and an Environmental Assessment Regulatory Impact Review (EARIR) for amendments to the program from Mr. Jim Seger and Ms. Ariel Jacobs. The GAP reviewed Table 5-1, which contained the preliminary conclusions of the work group on the success of the Council's LEFG sablefish permit stacking program. The 10 original objectives and the resulting findings of the program suggest it has significantly achieved what the Council had hoped to accomplish with a quota share alternative.

The authors of the review left four questions for constituent comment under section 5.2. The questions were reviewed by the members of the GAP. The four questions are as follows with GAP comments.

1. <u>The number of the Tier 3 permits stacked with two other permits increased consistently from the initiation of the program through 2008, but declined thereafter.</u> What may have caused the significant decrease that occurred from 2008 to 2012? During that time the occurrence of Tier 3 permits that were triple stacked dropped from 43 down to 22, almost as low as in the first full year of the program (Table 3-4)

   The GAP members could not account for this other than there may have been some operations that were retiring at this time that could account for some of the shift.

2. <u>What may have caused the apparently significant drop in fixed gear sablefish landings and dependence for Puget Sound ports since 2008. (Figure 3-14)</u>

   As the program has matured so have the markets. There are a number of fish buyers that make arrangements with other buyers or shoreside processing plants in other ports to offload product in order to accommodate vessels whose fish they historically have purchased from. The plant where product is delivered may not be the plant taking ultimate receipt of the product, but is likely receiving an off load fee and processing fee. Hence, other options have become available to the fleets.

3. <u>Is other fishery or processor information available concerning improvement in product quality or size of fish under the stacking program (e.g., targeting by location or depth, different product forms, etc.)</u>

   Since the program was implemented the directed sablefish fleet has moved off some of their shallower fishing grounds in order to avoid different rock fish species that have become over fished. The avoidance of yelloweye rockfish is one example. With regards to marketing, the resource is still very dependent on Asian markets. However, sablefish is more aggressively marketed in the United States as a high end product.

4. What might be the cause of the rapid increase in longline-to-trawl price differential for sablefish since 2010 that is not shared by the pot gear landings (Figure 3-22)

   The GAP could not account for this, but notes that in British Columbia, almost all its sablefish is harvested by pots and they receive similar prices as Alaska and Pacific Council sablefish when exported. Additionally, pot sablefish in S.E. Alaska and in the Bering Sea and Aleutians receive the same price for iced J-cut fish as the longline fleet from the shorebased processors.

   The GAP unanimously endorsed the following changes under Phase 1 of the LEFG program.

   The GAP supports the NMFS proposed alternative found in Agenda Item F.6.b, NMFS Report 2, which reads: "Under this alternative, eligible owner(s) of vessel(s) registered to a sablefish-endorsed limited entry permit could apply to the National Marine Fisheries Service (NMFS) for a limited exemption from the control rules."

   The exemption, if granted, would allow the same outcome as the Council's PPA.

   This option was described by staff as also requiring the vessel owner to apply to NMFS in order to receive the exemption. This option would eliminate requirements from the entire LEFG fleet submitting proof of ownership papers and limiting the paper work to only those who were in need of the exemption. The analysis identifies 13 operations in the Pacific Council area of authority that also have sablefish individual fishing quota (IFQ) rights in Alaska. It is believed several of these annually request an exemption.

   The analysis identified two strawman suboptions for determining how the ownership interest held by an entity such as a corporation or partnership accrues to the individual owners of that entity. The GAP recommends Strawman Suboption (2), which is as follows.

   Pro-Rata Ownership Interest Passes Through – If an entity owns a vessel, any individuals with a share in the ownership of that entity are counted as having a share in ownership of the vessel proportional to their actual share in ownership of the entity (e.g., if a corporation owns 50 percent of a vessel, and two individuals each own 50 percent of the corporation then for purpose of evaluating the three permit control limit those two individuals are each counted as having 25 percent ownership in that vessel)

   This approach is the same as that used in the Trawl Rationalization Program. It is for this reason and for a clear understanding of ownership assignments that the GAP favors this option.

   The GAP was originally willing to support a strawman suboption on coordinated ownership, however it was concluded by staff that this option may not achieve any additional benefits than existing status quo restrictions currently provide. For this reason the GAP chose to not endorse this option.

Electronic Fish Ticket Alternatives

The GAP supports Alternative 4, Federal requirement that all sablefish deliveries (primary/tier, daily-trip-limit [DTL], and open access [OA]) be recorded on an electronic fish ticket that documents the associated Federal groundfish permit number.

GAP recommendations for Phase 2 of the review are as follows.

1. Develop a program that combines the DTL and tier limit fisheries. This option would be much more cost effective for a vessel operator that is currently expending fuel for many single trips.

2. Allow the existing tier permits to be fished either with longline gear or pot gear and examine allowing pot gear to fish shallower than the existing fixed gear Rockfish Conservation Area (RCA) depths limitations.

   With the discussion this week on possibly moving yelloweye rockfish from the non-nearshore sector to the nearshore sector and the recent issue with shortraker and rougheye rockfish this option would allow for fixed gear to minimize its interaction with rockfish and the associated protective restrictions.

PFMC
06/22/14

GROUNDFISH MANAGEMENT TEAM REPORT ON THE FIXED GEAR SABLEFISH CATCH SHARE PROGRAM REVIEW, INCLUDING FEDERAL ELECTRONIC FISH TICKETS FOR OPEN ACCESS SABLEFISH DELIVERIES

The Groundfish Management Team (GMT) received a presentation from Ms. Ariel Jacobs (National Marine Fisheries Service, West Coast Region) and Mr. Jim Seger (Council staff) on Phase I of the Fixed Gear Sablefish Catch Share Program Review (Agenda Item F.6.a, Attachment 1), including the potential actions by the Council on electronic fish tickets for sablefish landings and modifications to the own/control limit. Due to the complexity of ownership options, permit control considerations, and competing workload priorities at this meeting, the GMT did not have an opportunity to study and discuss the components of the program in detail; the GMT has no comments to offer on these topics at this time. Regarding the use of Federal electronic fish tickets and the findings of The Office of Inspector General's (OIG) report on National Oceanic and Atmospheric Administration (NOAA) catch share programs (U.S. Dept. of Commerce 2014), the GMT offers the following comments and observations.

Federal electronic fish tickets for the sablefish fishery

The GMT sees advantages to electronic fish tickets in improving the timeliness of landings data available for coastwide management, especially for inseason tracking of the sablefish fishery sectors, and supports their use should the Council recommend them as a tool to assist in more efficient fishery management. However, the GMT points out that management has been successful using paper fish tickets, as shown by our ability to track and monitor fishery impacts in relation to achieving harvest guidelines (HGs) and staying within annual catch limits (ACLs). The fixed gear sablefish fishery has remained below (but has approached) the non-trawl allocation in 17 of the past 18 years (Figure 1; excerpted from Agenda Item F.6.a, Attachment 1, June 2014), the one exception being 1997.

The GMT also discussed whether electronic tickets would reduce errors. Using electronic fish tickets may reduce some types of errors relative to fish tickets (e.g., transcription errors). However, we note that errors will undoubtedly continue to be made, whether this occurs when completing traditional paper landing receipts, punching numbers into an electronic device by first receivers, or through transcription and data entry errors further up the line. Electronic tickets can prevent some more obvious errors, where the entry should be limited to one or only a few specific possibilities, but is not expected to reduce transcription errors, etc.

The Office of Inspector General (OIG) report NOAA catch share programs

Ms. Jacob's presentation included excerpts from a recent report by Department of Commerce's Office of the Inspector General on catch share programs. Some on the GMT were surprised and puzzled by the following conclusion and provide comment to clarify potential misunderstandings:

> "NOAA does not have adequate data and does not track or enforce landings overage violations in the Pacific Sablefish Permit Stacking Individual Fishing Quota (IFQ). NOAA currently does not monitor Pacific Sablefish landings on an individual permit basis during

> a fishing season. Instead, it only monitors landings for the entire fishery as a whole, using a paper-based system that is subject to compromise and the multiple possibilities of error associated with any manual process. In addition, we identified 189 instances where actual landings exceeded the allowed landings for individual permits from 2008 through 2013."

Members of the GMT understand that the data exists to track and enforce landings overage violations. A number of violations and overages were presented in the OIG report that were based on these data, which suggests that the data we have now should be adequate to detect violations. The violations are also relatively minor in terms of the poundage involved. Of the 189 violations, 110 were over by an average of 30 lbs. Only 12 were over 1,000 lbs. We cannot double-check to see if their numbers are correct because their methods were not provided.

The report does not mention state enforcement activities, and the GMT wants to point out that some of the overages they found could have been cited by state enforcement instead of Federal enforcement. States actively track landings against individual tiers and cite violations. Several of us are also involved with Pacific Fishery Information Network (PacFIN) and have pointed out in the past few years that there are issues tracking tier landings across states. This is more of a coordination problem, and a problem regarding data that was being recorded (or not recorded) on fish tickets, rather than a data problem or a paper fish ticket problem (i.e., this situation could have occurred whether using paper or electronic fish tickets). The PacFIN database is adequate to track landings against permits.

Lastly, enforcement of the tiers and the incentives of the catch share program have served their ultimate purpose of keeping catch to target levels. And in the trip limit fisheries, management performance and enforcement have performed to expectations (Figure 1).

We fully agree that the data system could be improved, and that electronic fish tickets may provide for more timely access to data from all three states. However, many on the GMT strongly disagree with the point that the data are inadequate. And while electronic fish tickets would make the system easier to enforce, it will not make the system impervious to “compromise” and “errors.” As we note above, quality control of fish tickets involves professional judgment/experience that cannot be replaced by fully electronic reporting.

We make these comments because the report’s findings did not seem completely accurate, which might color the Council’s view of urgency and management priorities. We do not agree with the view that the sablefish data issues are such that they question the very integrity of management. Given all the competing initiatives at play, the system can continue to function adequately without electronic fish tickets if the Council wishes to prioritize other matters over electronic fish tickets.

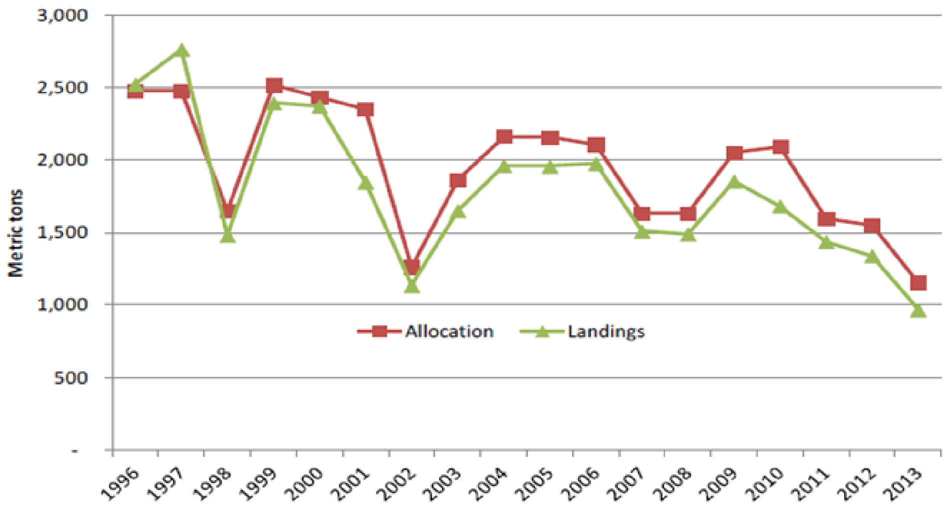


Figure 3-4. LEFG sablefish allocations and landings, 1996 through 2013. Years prior to 2002 include the mop-up and DTL fisheries, while years from 2002 to 2013 are for the primary season only.

Figure 1. Limited entry fixed gear sablefish allocations and landings, 1996 through 2013. Excerpt taken from [Agenda Item F.6.a, Attachment 1, June 2014](#).

PFMC
06/23/14

NOAA FISHERIES
West Coast Region

Agenda Item F.6.b, NMFS Report 1:

Implementation Issues Associated with Electronic Fish Tickets

Implementation Issues

NOAA FISHERIES
West Coast Region

Issue 1: Under Alternative 4, what is the threshold for open access sablefish landings such that an electronic fish ticket is required?

Issue 2: What burden(s) are placed on the state management agencies?

Issue 3: Would first receivers be required to have some type of current, valid first receiver site license?

Issue 4: Would incidentally caught species on sablefish directed trips be required to be recorded on the electronic ticket?

Issue 5: Could transport tickets still be used?

NOAA FISHERIES
West Coast Region

Agenda Item F.6.b, NMFS Report 2:

Addendum to the Own/Control Limits Measure: A NMFS-Proposed Alternative and Concerns Regarding the Existing Preliminary Preferred Alternative (PPA)

NMFS-Proposed Alternative

NOAA FISHERIES
West Coast Region

- Eligible owner(s) of vessel(s) registered to a sablefish-endorsed limited entry permit could apply to NMFS for a limited exemption from the control rules
- To be eligible to apply the vessel owner must own tier-endorsed permits, Alaska sablefish IFQ, and vessels that participate in both West Coast and Alaska sablefish fisheries
- The exemption would allow the person to own up to 20% of up to two vessels registered to other tier-endorsed limited entry permits without having the permits registered to the vessel(s) count against the individual's three-permit own/control limit

Agenda Item F.6.b
Supplemental SSC Report
June 2014

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON FIXED GEAR SABLEFISH CATCH SHARE PROGRAM REVIEW, INCLUDING FEDERAL ELECTRONIC FISH TICKETS FOR OPEN ACCESS SABLEFISH DELIVERIES

The Scientific and Statistical Committee (SSC) discussed the Pacific Coast Groundfish Limited Entry Fixed Gear Sablefish Permit Stacking Program Review (Agenda Item F.6.a, Attachment 1) with Mr. Jim Seger. The analysis incorporates suggestions made by the SSC at the April meeting. The SSC concurs with the preliminary conclusions in Section 5.0 (Preliminary Conclusions and Questions). Periodic retrospective evaluations such as this are useful for determining the efficacy of Council management programs. The SSC recommends the Council consider including collection of permit price and fishery participant data as described in Section 4.0 (Research Needs) in Section 6.0 (Council Recommendations).

PFMC
06/22/14

From: **janddmiles@frontier.com** <janddmiles@frontier.com>
Date: Mon, Jun 9, 2014 at 6:23 PM
Subject: DTL sablefish revamp
To: "John.Devore@noaa.gov" <John.Devore@noaa.gov>, "Donald.McIsaac@noaa.gov" <Donald.McIsaac@noaa.gov>, "michele.culver@dfw.wa.gov" <michele.culver@dfw.wa.gov>, "marci.yaremko@wildlife.ca.gov" <marci.yaremko@wildlife.ca.gov>, "gway.r.kirchner@state.or.us" <gway.r.kirchner@state.or.us>, "dmlowman01@comcast.net" <dmlowman01@comcast.net>, "hapollard@yahoo.com" <hapollard@yahoo.com>, "frank.lockhart@noaa.gov" <frank.lockhart@noaa.gov>, "dayna.matthews@noaa.gov" <dayna.matthews@noaa.gov>, "roberta@fvoa.org" <roberta@fvoa.org>, "ancona@mcn.org" <ancona@mcn.org>, "michele@michelelongoeder.com" <michele@michelelongoeder.com>, "morefish@mcn.org" <morefish@mcn.org>, "gdrfish@msn.com" <gdrfish@msn.com>, "Carolyn.Porter@noaa.gov" <Carolyn.Porter@noaa.gov>

Agenda item F6

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Dear Council Members:

I propose that the council consider changes to the sablefish DTL fishery. The goal would be to have a year round, stable sablefish fishery for fishermen, managers and law enforcement.

My idea on how to do this is:

1. Select a window period. I propose we use 2007-2012. During those years it was a boom time in the fishery. A lot of people spent a lot of money buying permits. To ensure their investment is realized, this window period would work well.
2. Figure out the percentage of DTL each permit caught during the window period and convert those pounds to the permit for a year round fishery.

In the past the council has always allocated the fish to the fishermen who have depended on the fishery. The council should allocate the DTL fish to fishermen that have been fishing in the DTL fishery. The unendorsed permits would be included in the allocation.

The benefit from this change:

Law enforcement: will not have to spend their time on monitoring landings and trying to determine if hundreds of boats are over thier limit by 10 pounds per trip.

Fishermen: can fish these pounds on their own time frame, there will be less need for high grading, it provides stability to plan out your entire fishing year without having to worry about if the DTL fishery will go up, or down, or cut off.

Managers: will be able to plan their year round fishery one time, no spending time on in-season changes, and no more staff time on monitoring and guessing effort. They can also implement the fishery close to the maximum pounds without fear of going over.

Observers: since this is not a full retention IQ program, all they have to do is observe on a selected boat the tier amount during some point of the year. For example, the fishermen must give the observer company a one month advance notice of when they will be fishing on their tier amount. This way there would be no change in how the observer program operates, they just plan for their trips.

Overall, I see this proposed change providing flexibility and stability for all parts of the industry. Thank you for considering my proposal.

Jeff Miles. GAP, F/V Top Gun (541)-260-0941

From: **Michele Longo Eder** <michele@michelelongoeder.com>
Date: Thu, Jun 12, 2014 at 5:51 PM
Subject: Public Comment Agenda Item F. 3 Omnibus and Agenda Item F6 Fixed Gear
To: "pfmc.comments@noaa.gov" <pfmc.comments@noaa.gov>

Agenda Item F.3 Omnibus and F.6 Fixed GearPublic Comment

Dear Chair Lowman and Council Members:

My husband , Bob Eder and I are owner/operators of the F/V Timmy Boy , based in Newport Oregon. We fish for sablefish under the LE Fixed Gear program, and also participate in the trawl IQ program, using fixed gear.

We are submitting this letter as public comment under two agenda items, as I have received varying guidance from NMFS and Council staff as to where this would best fit.

We would like to propose a rule change to 50 CFR 660, Subpart C, Section 660.12 (a) (11). This rule currently provides that it is a violation to fail to remove all fish from the vessel at landing (as defined in § 660.11) and prior to beginning a new fishing trip. "Land or Landing" is defined in the regulations as: "To begin transfer of fish, offloading fish, or to offload fish from any vessel. Once transfer of fish begins, all fish aboard the vessel are counted as part of the landing. "

Recently, we've received various interpretations as to how this rule is applied, depending on whether it is Fixed Gear Limited Entry Sablefish, or Trawl IQ Sablefish. It appears that if it is our trawl sablefish, it can be unloaded at 2 different locations, as long as they are both licensed first receivers. Conversely, it appears that if it is fixed gear sablefish, the rule is being interpreted to require we offload all our fish at one time, which, practically speaking, means at one location.

We'd like a rule change so that when we come in with a load of fixed gear sablefish, we can unload some to a buyer at a public hoist, for example, and then deliver the remainder to our main processor. Fish tickets , paper or in the future, electronic, would be written at both places for the amount sold, and the LE fixed gear permit numbers would be on the tickets so the fish is accounted for.

One of the reasons we'd like to do this is so we can potentially add value to our fish. We'd like to sell to an emerging live sablefish market, which does pay premium prices. We may also want to deliver fish across the dock and sell some of our fish to our own fish company for custom processing. In either event, the rule currently prohibits our ability to develop markets for our fixed gear fish, other than selling the entire load at one place for one set of prices.

A change in the rule as described above would provide for additional economic opportunity and development, to benefit the entire coast wide fixed gear fleet, and the public it serves.

Thank you for your consideration.

Sincerely,

Michele Longo Eder and Bob Eder
F/V Timmy Boy
Argos, Inc.P.O. Box 721 Newport, OR 97365
541-265-3337 office, 541-270-1161 cell, 541-265-6633 fax, michele@michelelongoeder.com

FISHERIES IN 2015-2016 AND BEYOND: HARVEST SPECIFICATIONS, MANAGEMENT MEASURES, AND AMENDMENT 24

The process to adopt the 2015-2016 harvest specifications and management measures began in June 2013 and culminates at this meeting with final action scheduled under Agenda Item F.7. Final action is also scheduled under this agenda item for Amendment 24, which would amend the Fishery Management Plan (FMP) to include default harvest control rules that would be used in future bienniums, unless modified by the Council, to establish harvest specifications; and to designate some FMP species as ecosystem component (EC) species. Amendment 24, coupled with the long-term impact analysis (referred to as the Tier analysis), is designed to streamline the analytical process, substantially reduce future workload, and increase the probability that future harvest specifications are implemented January 1. Detailed descriptions of anticipated Council actions are described in Agenda Item F.7.a, Attachment 1.

At its April 2014 meeting, the Council adopted final overfishing limits (OFLs) as recommended by the Scientific and Statistical Committee, acceptable biological catches (ABCs) that incorporate scientific uncertainty buffers, and annual catch limits (ACLs) for stocks and stock complexes (Agenda Item F.7.a, Attachment 2). Relative to the slope rockfish complexes, the Council's preliminary preferred decision was to maintain the status quo complex structures. Further, the Council recommended a coastwide sorting requirement for rougheye and blackspotted rockfish. The Council also took final action to designate the following species as EC species: finescale codling (aka Pacific flatnose), soupfin shark, spotted ratfish, all endemic skates except longnose skate, and all endemic grenadiers. Lastly, the Council selected preliminary preferred fishery structures and narrowed the list of new management measures under consideration for implementation in 2015 (see Attachment 1, page 4).

Council Action, below, lists seven decisions that must be made under Agenda Item F.7. The substance of each of these decisions is briefly described below.

- <u>Decisions 1 & 2</u>: Establish a new target year to rebuild cowcod and adopt revised 2016 OFL and ABC values for cowcod. Table 2 in Attachment 2 contains the estimated time to rebuild cowcod under a range of ACLs. The projected 2016 cowcod OFL and ABC under the Council's preferred alternative differs slightly from those specifications adopted in April (the 2016 OFL changed from 66 mt to 68 mt and the 2016 ABC under a P* of 0.45 changed from 59 mt to 62 mt).
- <u>Decision 3</u>: Confirm EC species designations and provide guidance on the associated FMP language (Attachment 8).
- <u>Decision 4</u>: Select the final preferred alternative for managing the slope rockfish complexes (Attachment 4).
- <u>Decisions 5 & 6</u>: Confirm final 2015-2016 harvest specifications for all groundfish stocks and stock complexes. Adopt final preferred fishery structures, including two-year allocations for overfished species and harvest guidelines for nearshore rockfish, and determine which new management measures should be implemented in regulation starting in 2015 (Attachments 1 and 3-6).

- Decision 7: Adopt a preferred alternative for Amendment 24 to the FMP, which modifies the procedures described in the FMP so that, in the absence of Council action, harvest specification values based on default harvest control rules for one or more stocks or stock complexes may be published in Federal regulations. During any biennial decision-making process the Council may depart from these default values by deciding to modify the harvest control rule for one or more management units. After deciding a final preferred alternative for Amendment 24, the Council should provide guidance on the necessary FMP language (Attachment 8).

Agenda Item F.7.a, Attachment 3 includes the Executive Summary from the preliminary draft Environmental Impact Statement (DEIS), which provides an overview of the proposed action alternatives and environmental impacts. Further, the attachment summarizes the Council's preliminary preferred fishery structures and management measures for the 2015-2016 fisheries. Agenda Item F.7.a, Attachments 4 and 7 contain the preliminary DEIS and Stock Assessment and Fishery Evaluation document, respectively, which are available electronically only.

The process and schedule for adopting the 2015-2016 and beyond harvest specifications and management measures relies on earlier decision-making and the publication of a DEIS prior to final Council action at this meeting. It is important to note there is less scope for the Council to make substantial changes when crafting the final preferred alternative because of this altered schedule made necessary by the National Environmental Policy Act requirements and a January 1, 2015 implementation target. The final preferred alternative can only vary slightly from any one of the alternatives evaluated in the DEIS so that forecasted impacts fall within the range of those disclosed in the DEIS. If the final preferred alternative does not meet those criteria, it is likely that the DEIS would have to be revised to disclose any substantially different impacts, republished for public review, and scheduled for final decision-making at a future Council meeting. This would probably preclude the objective of implementing new regulations on January 1, 2015 (the start of the next management period).

Council Action:

1. **Adopt a T_{TARGET} for the cowcod rebuilding plan;**
2. **Adopt revised values for the 2016 cowcod OFL and ABC;**
3. **Confirm EC species designations and provide guidance on the associated FMP language;**
4. **Adopt a final preferred alternative for slope rockfish stock complexes;**
5. **Confirm final 2015-2016 harvest specifications for all groundfish stocks and stock complexes;**
6. **Adopt final 2015-2016 season structures and management measures, including new management measures; and**
7. **Adopt a final preferred Amendment 24 alternative and provide guidance on the associated FMP language.**

Reference Materials:

1. Agenda Item F.7.a, Attachment 1: Action Item Checklist.
2. Agenda Item F.7.a, Attachment 2: Preferred 2015 and 2016 Harvest Specifications for Groundfish Stocks and Stock Complexes.
3. Agenda Item F.7.a, Attachment 3: Executive Summary and Description of the Preferred Season Structures and Management Measures, An Excerpt from the Preliminary DEIS.
4. Agenda Item F.7.a, Attachment 4: Preliminary Draft of, "Groundfish Harvest Specifications and Management Measures and Amendment 24: Draft Environmental Impact Statement" (**electronic only**).
5. Agenda Item F.7.a, Attachment 5: Appendix B to Proposed Harvest Specifications and Management Measures for the 2015-2016 Pacific Coast Groundfish Fishery and Amendment 24 to the Pacific Coast Groundfish Fishery Management Plan Preliminary Draft Environmental Impact Statement (**electronic only**).
6. Agenda Item F.7.a, Attachment 6: Excerpted Portions of Appendix B of the Preliminary Draft 2015-2016 Groundfish Harvest Specifications and Management Measures Environmental Impact Statement Relevant to the Preferred Alternative.
7. Agenda Item F.4.a, Attachment 7: Preliminary Draft of the 2014 Stock Assessment and Fishery Evaluation Document (**electronic only**).
8. Agenda Item F.7.a, Attachment 8: Proposed Groundfish FMP Amendment Language for Default Harvest Control Rules and for Designation of Ecosystem Component Species under Amendment 24.
9. Agenda Item F.7.c, Public Comment.

Agenda Order:

a. Agenda Item Overview — Kelly Ames and Kit Dahl
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Confirm Final 2015-2016 Harvest Specifications; Adopt Final Management Measures; Adopt Final Preferred Alternatives for Amendment 24 Default Harvest Control Rules

PFMC
05/30/14

ACTION ITEM CHECKLIST

#	Category	Sector	Measure
2015-2016 Harvest Specifications			
1	OFL		Confirm SSC-recommended OFLs including a revised 2016 cowcod OFL
2	ABC		Confirm P*[1] and ABCs. Adopt revised 2016 cowcod ABC
3	ACL		Confirm FPA ACLs[2]
4	ACT		Confirm 4 mt ACT for cowcod
5	Rebuilding		Confirm rebuilding plan parameters including a new T_{TARGET} for cowcod
2015-2016 Stock Complexes			
6			Confirm EC species' designations and associated FMP language to be implemented under Amendment 24
7			Confirm FPA to manage kelp greenling coastwide, WA cabezon, and leopard shark in the Other Fish complex
8			Decide FPA for Slope Rockfish complexes

[1] The FPA P* decision was 0.45 for all stocks and complexes except arrowtooth (0.40), lingcod south (0.40), longspine thornyheads (0.40), sablefish (0.40), shortspine thornyheads (0.40), spiny dogfish (0.40), starry flounder (0.40), and the Other Flatfish complex (0.40).

[2] The FPA ACL decision was to set the ACL equal to the ABC for all non-overfished species except that a constant catch approach was used for OR/CA black rockfish (1,000 mt), Dover sole (50,000 mt), longnose skate (2,000 mt), Pacific cod (1,600 mt), shortbelly rockfish (50 mt), and widow rockfish (2,000 mt). For overfished species, except cowcod and petrale sole, the FPA ACL was based on the SPR rate in the current rebuilding plan. For petrale sole, the ACL was based on the 25-5 harvest control rule. For cowcod, the SPR rate in the current rebuilding plan was translated into an exploitation rate since the XDB-SRA model cannot use SPR rates. A new rebuilding plan is required for cowcod.

2015-2016 Allocations and Harvest Guidelines (HG)			
9	Fishery HG		Confirm or modify amounts deducted from the ACL to account for groundfish mortality in Tribal, non-groundfish fisheries, EFPs[3], and research
10	HG		Confirm or modify HGs for species managed within a complex • Blue rockfish in California within the nearshore rockfish complexes north and south of 40°10' • Blackgill rockfish within the slope rockfish complex south of 40°10'
11	Allocations	Trawl/Non-Trawl	Confirm or modify 2-year trawl and non-trawl allocations for • Overfished species: bocaccio, canary, cowcod, petrale[4], and yelloweye • Longnose skate: trawl (90%) and non-trawl (10%) allocation • Shelf rockfish north trawl (60.2%) and non-trawl (39.8%) allocation • Shelf rockfish south trawl (12.2%) and non-trawl (87.8%) allocation
12	Set-Aside	Within Trawl, At-Sea	Confirm or modify the at-sea whiting set-asides adopted in April
13	HG	Non-Trawl	Confirm or modify 2-year within non-trawl HGs or within non-trawl shares for • Overfished species including bocaccio, canary, cowcod, and yelloweye[5] • Black rockfish: 58% OR, 42% CA • Blue rockfish: 40-10 adjustment for CA • Blackgill south of 40°10': 40-10 adjustment; 60% limited entry and 40% open access fixed gears • Sablefish south of 36º: 55% limited entry and 45% open access fixed gears • Nearshore rockfish HG north of 40°10'

[3] The Council will confirm or modify the PPA EFP set-asides under Agenda Item F.5. Those values will be finalized under Agenda Item F.7.
[4] The Amendment 21 allocation for petrale sole has been suspended since the stock is overfished and under a rebuilding plan. The action alternatives analyzed the status quo allocation (35 mt to non-trawl and remainder to trawl), which is the PPA. Further, the Council requested an analysis that would give 15 mt to the non-trawl sector and the remainder to the trawl sector.
[5] The action alternatives analyzed the trawl/non-trawl and within non-trawl allocations from the September 2013 scorecard. Further, the Council requested analysis that would move 0.6 mt from the non-nearshore fishery to the nearshore fishery.

2015-2016 Season Structures			
14		Treaty Fisheries	Management measures
15		Shorebased IFQ	Trawl RCA, non-IFQ trip limits
16		Non-Nearshore	Non-Trawl RCA seaward configuration, trip limits (including sablefish)
17		Nearshore	Non-Trawl RCA shoreward configuration, trip limits
18		WA Recreational	Season dates, bag limits, length limits, area closures
19		OR Recreational	Season dates, bag limits, length limits, area closures
20		CA Recreational	Season dates, bag limits, length limits, area closures
2015-2016 Adjustments to Existing or Routine Measures			
21		Trawl	RCA boundary adjustments to better approximate depth, including the 200 fm modified line in Oregon and a 60 fm line in California
22		Trawl	Using underutilized set-asides in the projections for the shorebased IFQ carryover
23		Non-Trawl	Trip limit adjustments for lingcod N. of 40°10' N lat. (increase), slope rockfish N. of 40°10' N lat. (decrease), bocaccio S. of 34°27' N. lat. (increase), and shelf rockfish S. of 34°27' N. lat. (increase)
24		Non-Trawl - Rec	Modifications to groundfish retention regulations in the Pacific halibut fisheries[6]

[6] Action to modify the groundfish retention allowances in the Pacific halibut fishery would occur during the development of the annual Catch Sharing Plan.

New Management Measures for in implementation in 2015-2016			
25		Trawl	Establish new trawl RCA coordinates for 300 and 350 fm boundaries
26		Non-Trawl	Provide for lingcod retention in Periods 1, 2, and 6.
27		Non-Trawl – Rec	Implement a one fish canary rockfish sub-bag limit for the Oregon recreational fisheries
Amendment 24 – Default Harvest Control Rules			
28			Select a final preferred alternative for default harvest control rules that would be used in future bienniums, unless modified by the Council, to establish future harvest specifications
29			Provide guidance on FMP language to implement Amendment 24

Agenda Item F.7.a
Attachment 2
June 2014

PREFERRED 2015 AND 2016 HARVEST SPECIFICATIONS FOR GROUNDFISH STOCKS AND STOCK COMPLEXES

Summary of Tables included in this attachment:

- Table 1. Preferred harvest specifications for stocks and stock complexes for 2015-2016. The harvest control rule used to calculate the ABCs and ACLs are shown in the right column.
- Table 2. Estimated time to rebuild and exploitation rate relative to alternative 2015-2016 ACLs for cowcod south of 40º10' N lat.
- Table 3. Option 1 state harvest guidelines for the Nearshore Rockfish complex north of 40º10' N lat. in 2015 and 2016 under preferred harvest specifications.
- Table 4. Option 2 state harvest guidelines for the Nearshore Rockfish complex north of 40º10' N lat. in 2015 and 2016 under preferred harvest specifications.
- Table 5. Option 3 state harvest guidelines for the Nearshore Rockfish complex north of 40º10' N lat. in 2015 and 2016 under preferred harvest specifications.
- Table 6. Preferred blue rockfish harvest guidelines for California fisheries in 2015 and 2016.
- Table 7. Preferred 2015 and 2016 OFL and ABC contributions (in mt), and proposed harvest guidelines (in mt) for blackgill rockfish south of 40º10' N lat.

Table 1. Preferred harvest specifications for stocks and stock complexes for 2015-2016. The harvest control rule used to calculate the ABCs and ACLs are shown in the right column.

Stock*	Area	2015			2016			Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
BOCACCIO	S of 40º10' N. lat.	1,444	1,380	349	1,351	1,291	362	SPR = 77.7%
CANARY	Coastwide	733	701	122	729	697	125	SPR = 88.7%
COWCOD	S of 40º10' N. lat.	67	60	10	68	62	10	SPR = 82.7% (E = 0.007); ACT =- 4 mt
DARKBLOTCHED	Coastwide	574	549	338	580	554	346	SPR = 64.9%
POP	N of 40º10' N. lat.	842	805	158	850	813	164	SPR = 86.4%
PETRALE SOLE	Coastwide	2,946	2,816	2,816	3,044	2,910	2,910	25-5 rule (P* = 0.45)
YELLOWEYE	Coastwide	52	47	18	52	47	19	SPR = 76.0%
Arrowtooth flounder	Coastwide	6,599	5,497	5,497	6,396	5,328	5,328	ACL = ABC (P* = 0.4)
Black	WA	421	402	402	423	404	404	ACL = ABC (P* = 0.45)
Black	OR & CA	1,176	1,124	1,000	1,183	1,131	1,000	1,000 mt constant catch
Cabezon	OR	49	47	47	49	47	47	ACL = ABC (P* = 0.45)
Cabezon	CA	161	154	154	158	151	151	ACL = ABC (P* = 0.45)
California scorpionfish	S of 34°27' N. lat.	119	114	114	117	111	111	ACL = ABC (P* = 0.45)
Chilipepper	S of 40º10' N. lat.	1,703	1,628	1,628	1,694	1,619	1,619	ACL = ABC (P* = 0.45)
Dover sole	Coastwide	66,871	63,929	50,000	59,221	56,615	50,000	50,000 mt constant catch
English sole	Coastwide	12,092	11,040	11,040	8,493	7,754	7,754	ACL = ABC (P* = 0.45)
Lingcod	N of 40'10º N. lat.	3,010	2,830	2,830	2,891	2,719	2,719	ACL = ABC (P* = 0.45)
Lingcod	S of 40'10º N. lat.	1,205	1,004	1,004	1,136	946	946	ACL = ABC (P* = 0.4)
Longnose skate	Coastwide	2,449	2,341	2,000	2,405	2,299	2,000	2,000 mt constant catch
Longspine thornyhead	Coastwide	5,007	4,171	NA	4,763	3,968	NA	NA
	N of 34º27' N. lat.	NA	NA	3,170	NA	NA	3,015	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 34º27' N. lat.	NA	NA	1,001	NA	NA	952	ACL = prop. of coastwide ABC (P* = 0.4)
Pacific cod	Coastwide	3,200	2,221	1,600	3,200	2,221	1,600	1,600 constant catch
Pacific whiting	Coastwide	NA	NA	NA	NA	NA	NA	NA

Stock*	Area	2015			2016			Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
Sablefish	Coastwide	7,857	7,173	NA	8,526	7,784	NA	NA
	N of 36º N. lat.	NA	NA	4,793	NA	NA	5,241	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 36º N. lat.	NA	NA	1,719	NA	NA	1,880	ACL = prop. of coastwide ABC (P* = 0.4)
Shortbelly	Coastwide	6,950	5,789	50	6,950	5,789	50	50 mt constant catch
Shortspine thornyhead	Coastwide	3,203	2,668	NA	3,169	2,640	NA	NA
	N of 34º27' N. lat.	NA	NA	1,745	NA	NA	1,726	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 34º27' N. lat.	NA	NA	923	NA	NA	913	ACL = prop. of coastwide ABC (P* = 0.4)
Spiny Dogfish	Coastwide	2,523	2,101	2,101	2,503	2,085	2,085	ACL = ABC (P* = 0.4)
Splitnose	S of 40º10' N. lat.	1,794	1,715	1,715	1,826	1,746	1,746	ACL = ABC (P* = 0.45)
Starry flounder	Coastwide	1,841	1,534	1,534	1,847	1,539	1,539	ACL = ABC (P* = 0.4)
Widow	Coastwide	4,137	3,929	2,000	3,990	3,790	2,000	2,000 mt constant catch
Yellowtail	N of 40º10' N. lat.	12,281	11,213	11,213	11,647	10,634	10,634	ACL = ABC (P* = 0.45)
Nearshore Rockfish N	N of 40º10' N. lat.	88	77	69	88	77	69	ACL = ABC (P* = 0.45); 40-10 adj. for blue in CA + China
Nearshore Rockfish S	S of 40º10' N. lat.	1,313	1,169	1,114	1,288	1,148	1,006	ACL = ABC (P* = 0.45); 40-10 adj. for blue N of Pt. Con.
Shelf Rockfish N	N of 40º10' N. lat.	2,209	1,944	1,944	2,218	1,953	1,952	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted in CA
Shelf Rockfish S	S of 40º10' N. lat.	1,918	1,625	1,624	1,919	1,626	1,625	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted N of Pt. Con.
Slope Rockfish N	N of 40º10' N. lat.	1,804	1,669	1,669	1,818	1,683	1,683	ACL = ABC (P* = 0.45)
Slope Rockfish S	S of 40º10' N. lat.	806	698	687	807	699	689	ACL = ABC (P* = 0.45); 40-10 adj. for blackgill
Other Flatfish	Coastwide	11,298	8,620	8,620	9,948	7,496	7,496	ACL = ABC (P* = 0.4)
Other Fish	Coastwide	291	242	242	291	243	243	ACL = ABC (P* = 0.45)

Table 2. Estimated time to rebuild and exploitation rate relative to alternative 2015-2016 ACLs for cowcod south of 40º10' N lat.

Stock	Current T_{TARGET}	Current SPR or Harvest Control Rule	Pref. T_{TARGET}	ACL Alt.	ACLs (mt) 2015	ACLs (mt) 2016	SPR or Harvest Control Rule	Median Time to Rebuild	Rebuilding Duration Beyond T@F=0 (yrs.)	Prob. of Rebuilding by Current T_{TARGET}	Prob. of Rebuilding by T_{MAX}
Cowcod	2068	82.7%	X		0	0	E = 0	2019	0	95.9%	93.8%
					1.8	1.9	E = 0.0013	2019	0	95.2%	93.0%
					2.4	2.5	E = 0.0018	2019	0	95.0%	92.7%
					3.0	3.1	E = 0.0022	2019	0	94.7%	92.4%
					3.6	3.7	E = 0.0027	2019	0	94.4%	91.9%
				Pref. ACT	4.2	4.4	E = 0.0031	2019	0	94.0%	91.5%
					4.8	5.0	E = 0.0036	2019	0	93.4%	91.3%
					5.5	5.6	E = 0.0040	2019	0	93.4%	91.0%
					6.1	6.2	E = 0.0045	2019	0	93.1%	90.6%
					6.7	6.9	E = 0.0049	2019	0	92.7%	90.2%
					7.3	7.5	E = 0.0054	2019	0	92.4%	89.8%
					7.9	8.1	E = 0.0058	2019	0	92.0%	89.6%
					8.5	8.7	E = 0.0063	2019	0	91.5%	89.2%
					9.1	9.3	E = 0.0067	2019	0	91.2%	88.8%
				Pref. ACL	9.5	9.7	E = 0.007	2020	1	90.9%	88.4%
					9.7	10.0	E = 0.0072	2020	1	90.9%	88.5%
					27.7	28.1	E = 0.0203	2022	3	76.7%	74.3%
					38.1	38.4	E = 0.0281	2025	6	67.5%	65.7%
					48.3	48.5	E = 0.0356	2030	11	60.6%	59.2%
					53.0	53.0	E = 0.0391	2035	16	57.5%	56.4%
					55.5	55.4	E = 0.0409	2039	20	55.0%	53.4%
					62.1	61.9	E = 0.0458	2057	38	51.4%	50.0%

Table 3. Option 1 state harvest guidelines for the Nearshore Rockfish complex north of 40º10’ N lat. in 2015 and 2016 under preferred harvest specifications.

Option 1 Miles of Coastline

Species	WA%	OR%	CA%	2015				2016			
				Contribution	WA mt	OR mt	CA mt	Contribution	WA mt	OR mt	CA mt
Black and yellow	26%	49%	25%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue (CA)	0%	0%	100%	17.0	0.0	0.0	17.0	17.5	0.0	0.0	17.5
Blue (OR & WA)	34%	66%	0%	26.9	9.2	17.8	0.0	26.9	9.2	17.8	0.0
Brown	26%	49%	25%	1.7	0.5	0.9	0.4	1.7	0.4	0.8	0.4
Calico	26%	49%	25%	-	-	-	-	-	-	-	-
China	26%	49%	25%	6.2	1.6	3.0	1.6	6.5	1.7	3.2	1.6
Copper	26%	49%	25%	9.7	2.5	4.8	2.4	9.4	2.5	4.6	2.4
Gopher	26%	49%	25%	-	-	-	-	-	-	-	-
Grass	26%	49%	25%	0.5	0.1	0.3	0.1	0.5	0.1	0.3	0.1
Kelp	26%	49%	25%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olive	26%	49%	25%	0.3	0.1	0.1	0.1	0.3	0.1	0.1	0.1
Quillback	26%	49%	25%	6.2	1.6	3.0	1.5	6.2	1.6	3.0	1.5
Treefish	26%	49%	25%	0.2	0.0	0.1	0.0	0.2	0.0	0.1	0.0
Total				68.7	15.6	30.0	23.2	69.2	15.6	29.9	23.7

Table 4. Option 2 state harvest guidelines for the Nearshore Rockfish complex north of 40º10' N lat. in 2015 and 2016 under preferred harvest specifications.

Option 2 Historical Catch

Species	WA%	OR%	CA%	2015				2016			
				Contribution	WA mt	OR mt	CA mt	Contribution	WA mt	OR mt	CA mt
Black and yellow	0%	21%	79%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue (CA)	NA	NA	100%	17.0	NA	NA	17.0	17.5	NA	NA	17.5
Blue (OR & WA)	6%	94%	NA	26.9	1.6	25.3	NA	26.9	1.6	25.3	NA
Brown	0%	8%	92%	1.7	0.0	0.1	1.6	1.7	0.0	0.1	1.6
Calico	NA	NA	NA	-	-	-	-	-	-	-	-
China	18%	68%	14%	6.2	1.1	4.2	0.9	6.5	1.2	4.4	0.9
Copper	13%	53%	34%	9.7	1.3	5.1	3.3	9.4	1.2	5.0	3.2
Gopher	0%	29%	71%	-	-	-	-	-	-	-	-
Grass	0%	49%	51%	0.5	0.0	0.3	0.3	0.5	0.0	0.3	0.3
Kelp	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA
Olive	0%	3%	97%	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.3
Quillback	16%	47%	36%	6.2	1.0	2.9	2.2	6.2	1.0	2.9	2.2
Treefish	0%	0%	100%	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.2
Total				68.7	5.0	38.0	25.7	69.2	5.0	38.0	26.1

Table 5. Option 3 state harvest guidelines for the Nearshore Rockfish complex north of 40º10’ N lat. in 2015 and 2016 under preferred harvest specifications.

Option 3 Hybrid

Species	WA%	OR%	CA%	2015				2016			
				Contribution	WA mt	OR mt	CA mt	Contribution	WA mt	OR mt	CA mt
Black and yellow	0%	21%	79%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue (CA)	NA	NA	100%	17.0	NA	NA	17.0	17.5	NA	NA	17.5
Blue (OR & WA)	6%	94%	NA	26.9	1.6	25.3	NA	26.9	1.6	25.3	NA
Brown	0%	8%	92%	1.7	0.0	0.1	1.6	1.7	0.0	0.1	1.6
Calico	NA	NA	NA	-	-	-	-	-	-	-	-
China	26%	49%	25%	6.2	1.6	3.0	1.6	6.5	1.7	3.2	1.6
Copper	26%	49%	25%	9.7	2.5	4.8	2.4	9.4	2.5	4.6	2.4
Gopher	0%	29%	71%	-	-	-	-	-	-	-	-
Grass	0%	49%	51%	0.5	0.0	0.3	0.3	0.5	0.0	0.3	0.3
Kelp	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA
Olive	0%	3%	97%	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.3
Quillback	26%	49%	25%	6.2	1.6	3.0	1.5	6.2	1.6	3.0	1.5
Treefish	0%	0%	100%	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.2
Total				68.7	7.4	36.6	24.8	69.2	7.4	36.5	25.3

Table 6. Preferred blue rockfish harvest guidelines for California fisheries in 2015 and 2016.

Area	OFL contribution by area		ABC contribution by area		40-10 adjusted HG contribution by area	
			P* = 0.45 a/		P* = 0.45 a/	
	2015	2016	2015	2016	2015	2016
40º10’ - 42º N lat.	27.4	27.7	25.0	25.3	17.0	17.5
34º27’ - 40º10’ N lat.	188.6	190.3	172.2	173.8	116.6	120.0
South of 34º27’ N lat. (unassessed area)	72.9	72.9	60.8	60.8	60.8	60.8
Total for CA	288.9	290.9	258.0	259.8	194.4	198.3

a/ Harvest specifications based on the ABCs determined using a P* = 0.45 are preferred.

Table 7. Preferred 2015 and 2016 OFL and ABC contributions (in mt), and proposed harvest guidelines (in mt) for blackgill rockfish south of 40º10’ N lat.

Stock	2015 OFL contribution	2015 ABC contribution	2015 HG a/	2016 OFL contribution	2016 ABC contribution	2016 HG a/
Blackgill Rockfish S of 40º10’	137	125	114	140	128	117

a/ Harvest guideline is based on the 40-10 adjustment from the preferred ABC.

Agenda Item F.7.a
Attachment 3
June 2014

EXECUTIVE SUMMARY AND DESCRIPTION OF THE PREFERRED SEASON STRUCTURES AND MANAGEMENT MEASURES, AN EXCERPT FROM THE PRELIMINARY DEIS

Executive Summary

INTRODUCTION

This document provides information about, and analyses of, setting groundfish harvest specifications and establishing related management measures for 2015 and subsequent years for fisheries covered by the Pacific Coast Groundfish Fishery Management Plan (hereafter, Groundfish FMP or FMP), which are developed by the Pacific Fishery Management Council (Council) in collaboration with the National Marine Fisheries Service (NMFS). Groundfish harvest specifications are set every 2 years for a 2-year period. In addition to harvest specifications and management measures for the 2015-16 biennial period, this document evaluates the impacts of setting harvest specifications and management measures over the long term. These actions must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore. The states manage their fisheries, including nearshore rockfish fisheries in the territorial sea, in a manner consistent with, or more restrictive than, the Groundfish FMP and Federal implementing regulations.

THE PROPOSED ACTIONS

The proposed action has three components: 1) Establishing harvest specifications and management measures for the 2015-2016 biennial management period, 2) changing groundfish stock complexes and designating ecosystem component species, and 3) amending the Groundfish FMP to describe how the Council would use default harvest control rules (HCRs) in their decision-making process in future biennial cycles and to clarify what are considered new and routine management measures during the biennial process. In all cases the alternative of No Action is also considered. This EIS includes an analysis of the long-term impacts of biennial harvest specifications and foreseeable adjustments to routine management measures to support decision-making in future biennial periods.

ALTERNATIVES

Table ES-1 summarizes the alternatives and options evaluated in this EIS.

Establishing Harvest Specifications and Management Measures for the 2015-2016 Biennial Management Period

Harvest specifications are established for each managed stock or stock complex in the Grondfish FMP. Specifications include the overfishing limit (OFL), the allowable biological catch (ABC), and the annual catch limit (ACL). Catch above the OFL constitutes overfishing. The ABC is a precautionary reduction from the OFL to account for scientific uncertainty in the OFL specification and management error. Section 4.4 in the Groundfish FMP describes the method usually used to determine this precautionary reduction. It involves two quantities, sigma (σ) and P*. Sigma represents variability in stock assessment results and P* represents the probability of catch at the ABC resulting in overfishing. A formula incorporating these two values produces a percentage value representing the precautionary reduction. Sigma is determined by the SSC while the Council chooses P*, which according to the Groundfish FMP, cannot exceed 0.45.

Overall catch is managed to the ACL. For most stocks the ACL is set equal to the ABC but the ACL may be set below the ABC for a variety of reasons. The Council may also set an annual catch target (ACT) to establish a higher level of precaution, particularly if there is greater uncertainty about the true level of catch due to estimation error.

Management measures include adjustments to and allocations of ACLs, adjustments to existing management measures including those designated as routine, and adoption of new management measures. During the biennial cycle existing, routine measures may be adjusted and new measures established. These management measures are mainly intended to control groundfish catch and improve monitoring of the fishery. Allocations establish overall limits for different groundfish fishery sectors (segments of the overall fishery distinguished by gear type, permit programs, target species, and other factors) as a basis for controlling catch. Many allocations have been included in the FMP and the same proportions are applied from period to period; others may be modified biennially based on conditions in the fishery. Harvest guidelines may also be used to aid the implementation of management measures that takes into account fishing opportunity in different fishery sectors. Catch control tools for the commercial groundfish fishery include individual fishing quota (IFQ), vessel allocations of sablefish catch opportunity to certain fixed gear, cumulative landing (or trip) limits, and closed areas to reduce bycatch of species of concern, predominantly overfished species. Recreational catch control tools include time and area closures and bag limits. Catch monitoring is accomplished by at-sea observers and dockside accounting for commercial catch and landings, and sampling and observation of recreational fisheries. Management measure alternatives are structured to provide sufficient fishing opportunity to achieve but not exceed ACLs. The alternatives are:

The Council considered four alternatives for 2015-2016 harvest specifications and management measures.

No Action

Harvest specifications values in place on January 1, 2014, would remain in effect for the 2015-2016 period (see Table 2-3 for the numerical values and basis for these harvest specifications). Management measures in place on December 31, 2014 would remain in place during the 2015-2016 biennial period. However, the Council may take inseason action to adjust routine management measures during the biennium.

The Preferred Alternative

Annual catch limits (ACLs) for most species are determined based on the ACLs being set equal to the ABCs with a P* value of 0.45. The ACLs for arrowtooth, lingcod south of 40°10 N. lat., longspine thornyhead north and south of 34°27 N. lat., sablefish north and south of 36° N. lat., shortspine thornyhead north and south of 34°27 N. lat., spiny dogfish, and starry flounder would be determined based on the ACLs being set equal to the ABCs with a P* value of 0.40. For some stocks ACLs are set below the ABC, in which case the P* value does necessarily determine the ACL. Overfished species ACLs are set based on rebuilding plans except for cowcod south of 40º10' N. lat., for which a new stock assessment is available. The ACL is increased from 3 mt to 10 mt and an annual catch target (ACT) of 4 mt is established. For this stock Constant catch ACLs for Dover sole and widow rockfish are increased from their 2014 values. Table 2-4 contains the preferred 2015 and 2016 harvest specifications.

Under the Preferred Alternative enhanced accountability measures to control mortality of rougheye rockfish and a sorting requirement for rougheye and blackspotted rockfish are implemented. These measures allow catch to be more accurately and responsively tracked while the rougheye rockfish/blackspotted rockish stock remains within the current slope rockfish complexes. Stocks are removed from the Other Fish complex; most are designated ecosystem component species while spiny dogfish is managed separately with its own harvest specifications. The Washington, Oregon, and California kelp greenling stocks, the Washington cabezon stock, and leopard shark remain in the Other

Fish complex. Some species currently not in the Groundfish FMP are designated EC species.[1] The EC classification is described in National Standard 1 Guidelines. EC species are monitored but not actively managed. They are species that are caught incidentally in relatively small amounts. If monitoring indicates an increasing trend in catch for an EC species, reclassification and/or appropriate management measures may be considered. In addition to moving many of the species in the Other Fish complex to the EC species designation, the Council designated several species not currently in the Groundfish FMP as EC species.

Catch control measures are established and adjusted in order to attain but not exceed the Preferred Alternative ACLs.

Alternative 1

Where applicable, ABCs are determined based on a P* value of 0.45, and the ACL is set equal to the ABC. For several stocks the ACL is set below the ABC and so the P* value does not necessarily determine the ACL. Instances where the ACL is below the ACL include specification of a fixed or constant catch level, precautionary adjustments using the 40-10 and 25-5 rules, and the use of the harvest rate specified in a rebuilding plan. Table 2-5 shows the harvest specifications for each stock under Alternative 1.

Catch control measures are established and adjusted in order to attain but not exceed the Alternative 1 ACLs.

Alternative 2

Where applicable, ACLs are determined based on the ACLs being set equal to the ABCs with a P* value of 0.25. As described above for Alternative 1, ACLs may be set below the ABC, in which case the P* value does necessarily determine the ACL. Table 2-6 contains the harvest specifications under Alternative 2.

Catch control measures are established and adjusted in order to attain but not exceed the Alternative 2 ACLs.

Amendment 24

This amendment would incorporate a description of the default harvest control rule (HCR) concept into the Groundfish FMP, which is intended to make clear that if the Council does not take action to modify an HCR, the default HCR is used, applying the best available scientific information, to calculate harvest specification numerical values. This approach helps make clear that most of the time the Council is either reapplying existing harvest policies or making modest changes within the framework set out in the Groundfish FMP and consistent with the Magnuson-Stevens Act. This action also provides an opportunity to evaluate the long-term impacts of biennial harvest specifications and management measures process in this EIS. This is intended to allow more focused analyses of future biennial actions. The description of the types of management measures that are established and adjusted during the biennial process would also be clarified as part of Amendment 24. As part of the biennial process new management measures may be implemented and existing, “routine” management measures adjusted; for example, existing catch control tools are usually changed in response to changes in ACLs. Routine measures are already part of the regulations and the effects of using these measures were previously

[1] Designating EC species requires amending in Groundfish FMP to change the classification of currently managed species and incorporate species not currently included in the FMP. These changes would be part of Amendment 24, described below.

analyzed. This allows National Marine Fisheries Service to use a simpler process to implement these regulatory changes under applicable law. Four alternatives are evaluated.

No Action

The Groundfish FMP is not amended.

Alternative 1

The default HCRs would use a P* value of **0.45** to determine the ABC, where applicable, using the best available scientific information. During the biennial harvest specifications process the Council can take action to modify the HCR and harvest specifications for the next biennial period would be based on the new HCR. FMP language describing the types of management measures developed and implemented as part of the biennial process is revised for clarification.

Alternative 2

The default HCRs would use a P* value of **0.25** to determine the ABC, where applicable, using the best available scientific information. During the biennial harvest specifications process the Council can take action to modify the HCR and harvest specifications for the next biennial period would be based on the new HCR. FMP language describing the types of management measures developed and implemented as part of the biennial process is revised for clarification.

Alternative 3

The default HCRs are the HCRs used during the previous biennial cycle. Harvest specifications are computed using the best available scientific information (such as the most recent stock assessment). During the biennial harvest specifications process the Council can take action to modify the HCR and harvest specifications for the next biennial period would be based on the new HCR. FMP language describing the types of management measures developed and implemented as part of the biennial process is revised for clarification.

Table ES-1. Schematic of the elements of the alternatives.

<table>
<tr><th>Element</th><th>No Action</th><th>Preferred Alternative</th><th>Alternative 1</th><th>Alternative 2</th></tr>
<tr><td>2015-16 harvest specifications and management measures</td><td>Rollover 2014 harvest specifications and management measures</td><td>Council preferred harvest specifications; adjust management measures as necessary</td><td>Harvest specifications based on p*=0.45; adjust management measures as necessary</td><td>Harvest specifications based on p*=0.25; adjust management measures as necessary</td></tr>
<tr><td></td><td>No Action</td><td colspan="2">The Preferred Option</td><td>Option 1</td></tr>
<tr><td>Stock complex reorganization and designation of Ecosystem Component Species</td><td>Slope Rockfish and Other Fish complexes not reorganized; EC species not designated</td><td colspan="2">Slope Rockfish complex not reorganized; measures to monitor and manage rougheye and blackspotted rockfish catch implemented; spiny dogfish removed from Other Fish complex and managed; other species removed and designated EC species; some species not already in the FMP added as EC species</td><td>Rougheye rockfish (including blackspotted rockfish) and shortraker rockfish removed from the slope rockfish complexes and managed as a new coastwide rougheye-blackspotted-shortraker (RBS) complex</td></tr>
<tr><td></td><td>No Action</td><td>Alternative 1</td><td>Alternative 2</td><td>Alternative 3</td></tr>
<tr><td>Amendment 24 (default HCRs and management measure process)</td><td>No Amendment</td><td>Default HCR with ABC based on P*=0.45; amend Section 6.2 to clarify “new” vs. “routine” measures</td><td>Default HCR with ABC based on P*=0.25; amend Section 6.2 to clarify “new” vs. “routine” measures</td><td>Default HCR with ABC based on current P*; amend Section 6.2 to clarify “new” vs. “routine” measures</td></tr>
</table>

IMPACTS OF THE PROPOSED ACTIONS

Groundfish

Table 2-2 through Table 2-5 show 2015-2016 harvest specifications under each of the alternatives including No Action. Under the Preferred Alternative harvest control rules change for seven of the 40 stocks or stock complexes (not including Pacific whiting) for which ACLs are established. These changes are:

- The Dover sole constant catch ACL is increased from 25,000 mt to 50,000 mt
- The ACLs for shortspine thornyhead stocks north and south of 34°27' N. lat. are proportions of the coastwide ABC; the ABC is determined using a P* value of 0.4 rather than 0.45
- Spiny dogfish is removed from the Other Fish complex and managed with its own ACL, which is set equal to the ABC using a P* value of 0.4
- The constant catch ACL for widow rockfish is increased from 1,500 mt to 2,000 mt

- For the Nearshore Rockfish North complex the 40-10 precautionary adjustment is applied to determine the China rockfish contribution to the stock complex ACL (which is determined as the sum of constituent species' ACL contributions)
- The Other Fish complex ACL is equal to the complex ABC set equal 0.45 consistent with the removal of many species from the complex, including spiny dogfish

Based on a new stock assessment, harvest specifications for cowcod, an overfished species, are changed. The Council will chooses a new target rebuilding year for the stock at its June 2014 meeting. The Council chose a 10 mt ACL for this stock, which is consistent with the current rebuilding plan SPR-based harvest rate of 82.7%. The Council also established an annual catch target (ACT) of 4 mt as an additional precautionary measure. Catch will be managed to stay below the ACT.

ACLs for 14 of the stocks or stock complexes would increase in 2015 compared to 2014 ACLs (No Action).

Section 4.1 evaluates the biological impacts of preferred 2015-2016 harvest specifications on a select list of groundfish stocks focusing on 1) overfished stocks currently managed under rebuilding plans, 2) stocks where the Council chose a range of alternative ACLs for analysis, 3) stocks and stock complexes where total catches in recent years have been at least 80 percent of specified ACLs, and 4) stocks preferred to be removed from a status quo stock complex and managed with stock-specific harvest specifications.

Section 4.2 evaluates deductions from and allocations of the ACLs and modifications to routine management measures to control catch so that the ACLs established under the alternatives are not exceeded. Commercial fishery management measures subject to modification include catch control tools including individual fishing quota (IFQ) annual quota pound issuance, establishing tier limits for the limited entry sablefish primary season, modifying cumulative landing limits for other fisheries and species, and changes to the boundaries of time area closures to control bycatch of overfished species and other species where there is a conservation concern. Recreational management measures subject to modification include bag limits and time/area closures (seasons). At its June meeting the Council will also consider adopting several new management measures related to harvest specifications.

Section 4.8 evaluates the long-term biological impacts of setting harvest specifications and Section 4.9 describes the impacts of the range of potential modifications to routine management measures that may be made in the foreseeable future.

Socioeconomic Environment (Fishing Communities)

Under the Preferred Alternative coastwide non-whiting ex-vessel revenue is projected to increase by $16 million in 2015 compared to No Action 2014 ACLs and management measures. This represents a $19.3 million increase from annual average inflation-adjusted ex-vessel revenue, 2003-2012. Recreational angler trips are expected in increase between 167,000 and 3.9 million marine angler trips depending on the management option chosen under the Preferred Alternative. Resulting commercial and recreational income accruing to fishing communities under the Preferred Alternative would increase by between $27.3 million and $49.3 million depending on the option chosen.

For the foreseeable future changes in ex-vessel revenue, net revenue (a proxy for commercial fishery profits), recreational angler trips, and personal income will be partly a function of fishing opportunity determined by stock yield and management measures. Based on assumptions about yield and potential policies for setting harvest specifications (as described in the Amendment 24 alternatives) catches are expected to increase under most model scenarios, assuming management succeeds in achieving management objectives for stock biomass size and related fishing mortality levels. Fishing opportunity could decline if stock yields are below the most likely conditions and more conservation management policies, such as using a P* value of 0.25 to determine the ABC, were used for all stocks. Recent average catch is in most cases lower than projected ACLs under scenarios combining different assumptions about potential yield and policies for determining ABCs. These scenarios suggest that revenue and personal income is likely to increase over the long term. However, historically there has been a lot of inter-annual volatility in ex-vessel revenue in both a positive and negative direction. Declines in revenue can occur because of unaccounted for changes in yield and changing market conditions affecting prices.

Essential Fish Habitat

Over both the short and long term the adverse impacts of fishing on groundfish essential fish habitat (EFH) is expected to be similar to adverse impacts experienced in the past. These adverse impacts result from fishing gear coming in contact with the seafloor, disrupting both physical characteristics and biogenic habitat such as corals and sponges. The Council has implemented a variety of mitigation measures to address adverse impacts, and other management measures, such as Groundfish Closed Areas to control bycatch, have mitigated adverse impacts as an ancillary effect. The Council is currently reviewing the groundfish EFH designation and mitigation measures established by Amendment 19 and could establish additional mitigation measures as part of the review process. The review process will not be completed before the 2015-2016 biennial period begins.

California Current Ecosystem

The Atlantis California Current Ecosystem Model was used to simulate the effects of the range of harvest policies that may be implemented in the foreseeable future. Since ecosystem effects take a long time to be manifested, it is not possible to distinguish between short- and long-term policy choices. The alternatives considered for the 2015-2016 biennial harvest specifications parallel those considered under Amendment 24 so in general the alternatives with a more conservative policy (2015-2016 Alternative 2 and Amendment 24 Alternative 2, P*=0.25) can be equated as can the alternatives with the most risk prone policy (2015-2016 Alternative 1, Amendment 24 Alternative 1, P*=0.45). Scenarios bracketing the range of harvest policies and ecosystem productivity regimes were modeled. Scenarios with very high harvest levels and low ecosystem productivity had the most pronounced effects, resulting in significant direct effects (effects of fishing on harvested stocks) and detectable indirect effects (effects on other ecosystem components in response to changes in the abundance of harvested stocks). It is important to note that these scenarios are deterministic, in other words there is no provision for a management response to new information about stock status. In the real world, the Council and NMFS would respond to new information showing that substantial adverse effects are occurring by reducing catch limits.

Total system biomass, a general measure of indirect effects, ranged from a decline of 8% from the benchmark scenario (recent average catch, most likely ecosystem productivity state) for the low productivity-high catch scenario to an increase of 5% under high productivity-low catch scenario. For most stocks low catch was represented by recent average catch streams. Thus if catch does not change substantially from recent levels few if any indirect effects would be predicted.

One important caveat to these simulations is that catch levels for Pacific whiting were not varied, since the alternatives evaluated within this EIS do not include varying whiting harvest. However, this species has an important structuring role in the California Current Ecosystem both as forage during early life stages and a piscivore (fish eater) when adult. Pacific whiting stock size is highly variable in response to conditions affecting recruitment of juveniles into the fishable, adult population. Though the model does not include these episodic recruitment events, the high and low ecosystem productivity states considered here may bracket the productivity of Pacific whiting, as well as the other groundfish stocks evaluated within this EIS. For Pacific whiting, by years 25-30, the high productivity scenarios (under recent average catches) yields abundance that is 1.16 times higher than base productivity, and low productivity yields abundance that is 0.78 times that of base productivity. Therefore, the model results address alternative levels of whiting productivity, though not alternative whiting harvest levels.

Protected Species

Protected species include those listed under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). NMFS has also agreed to consider the effects of actions on seabirds not listed under the ESA. ESA-listed species of concern include several kinds of fish (eulachon, green sturgeon, salmon), the humpback whale, leatherback sea turtle, and the short-tailed albatross.

Similar to other environmental components, the impacts of the proposed action on protected species during the 2015-2016 biennial period, measured in terms of take and resulting mortality, is only relevant within a long-term context considering the effect of such take on population size and viability. For ESA-listed species NMFS Protected Resources Division and the US Fish and Wildlife Service have consulted on the effects of the groundfish fishery. Information on effects is provided in Biological Opinions, which contain Incidental Take Statements (ITSs). The ITSs include estimates of the number of listed species likely to be taken, a determination of whether take levels jeopardize the continued existence of the species and measures that NMFS must implement to mitigate estimated levels of take. If these take levels are exceeded consultations may be reinitiated and new mandatory measures identified.

All marine mammals are protected under the MMPA. The objective of the Act is to allow marine mammals to reach their optimum sustainable population level and to reduce human caused serious injury and mortality to the maximum extent practicable. Through periodic stock assessments the potential biological removal level of a stock is estimated. A marine mammal population can meet or sustain the optimum population when human caused mortality is below this level. Takes for all segments of the groundfish fishery, except for the sablefish pot fishery, have been determined to have a remote likelihood of or no known serious injuries or mortalities. The sablefish pot fishery has been determined to cause occasional serious injury or mortality.

At-sea observer coverage allows total marine mammal interactions to be estimated. Non-ESA listed species taken in the groundfish fishery include

- California sea lion: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake (Pacific whiting)[2]
- Harbor seal: California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake (Pacific whiting)
- Northern elephant seal: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, at-sea hake (Pacific whiting)
- Harbor porpoise: California halibut trawl
- Dall's porpoise: At-sea hake (Pacific whiting)
- Pacific white-sided dolphin: Shoreside groundfish trawl
- Risso's dolphin: Shoreside groundfish trawl
- Common bottlenose dolphin: Non-nearshore fixed gear

If estimated takes substantially increase such that overall human caused serious injury or mortality exceeded potential biological removal remedial actions would be taken.

[2] California halibut trawl is a state managed fishery and only subject to the proposed action with respect to catch accounting to ensure that ACLs are not exceeded.

Non-ESA listed seabirds are also taken in the groundfish fishery. The only species with more than negligible observed takes is the black-footed albatross. Mitigation measures in the process of being implemented to reduce the risk of takes of ESA-listed short-tailed albatross will likely have a mitigating effect for this species as well.

There is no information to conclude that under any of the alternatives the level of take of protected species will change substantially from historical baseline levels in either the short or long term.

Non-Groundfish Species

Groundfish fisheries catch a range of non-groundfish species in small amounts proportional to catch of groundfish. Some of these species—such as Pacific halibut, Dungeness crab, and salmon—are commercially valuable and have directed fisheries. Commercially valuable species are managed under other Council FMPs, other Federal authority, or by the states. Fishing mortality in the groundfish fishery is taken into account when managing such directed fisheries. Catch of non-groundfish species as a percent of total catch during 2003-2011 varied between 1.4% (3,801 mt) iand 5.9% (8,551 mt). Non-groundfish catch amounts did not correlate with total catch so it is not possible to predict how changes in target species fishing opportunity would affect non-groundfish catch. There is no information is conclude that non-groundfish catch is likely to exceed the historical range of catch over either the short or long term. Fishery observer data allows catch levels to be estimated so that if a substantial change in catch is detected, such that a conservation concern arises, mitigation measures could be implemented.

Chapter 4

4.2 Impacts of 2015-2016 Management Measures to Groundfish Stocks

This section describes how management measures function so that groundfish catch may achieve, but not exceed, ACLs. This constitutes the impact mechanism linking harvest specifications to the direct and indirect biological impacts on groundfish stocks. The principal impact is the level of fishing mortality and secondarily changes in stock structure due to age-specific mortality patterns. Harvest specifications are determined based on the Groundfish FMP framework to achieve optimum yield.

The section is organized by alternative and within each alternative by fishery sector. The first management measure step is to determine set asides deducted from ACLs to account for various fishing activities and allocate the resulting fishery HGs. Management measures are then developed based on catch projections so that fishing mortality does not exceed allocations and the overall ACLs. Subsequent sections evaluate how management measures applied to groundfish fishery sectors are projected to prevent allocations and the overall ACLs from being exceeded.

4.2.1 No Action (see Agenda Item F.7.a, Attachment 4, Electronic Version of the DEIS)

4.2.2 Preferred Alternative

Table 4-1 through Table 4-6 contains the harvest specifications and allocations analyzed under the Preferred Alternative. A description of the harvest control rules used to calculate the ACLs can be found in Chapter 2, Section XXX.

4.2.2.1 Deductions from the ACL and Allocations

Under all action alternatives, off-the-top deductions from the ACL were updated based on the most recent information on fishery performance and need. The deductions from the ACL are held constant across all action alternatives. Amounts deducted that are from the ACL to accommodate groundfish mortality from scientific research, incidental open access fisheries, and EFPs can be modified based on inseason projections (see Section XXX). A description of the calculations are provided below.

Tribal Fishery: Tribal fisheries consist of trawl (bottom, mid-water, and whiting), fixed gear, and troll. The tribal amounts in the April 17, 2014 regulations were updated with the most recent tribal requests (see Agenda Item H.10.b, Supplemental Tribal Report, November 2013 and Agenda Item H.10.b, Supplemental Tribal Report 2, November 2013).

Research: Research activities include the NMFS trawl survey, International Pacific Halibut Commission longline survey, and other Federal and state research. The Council approach is that off-the-top deductions from the ACL should be equal to the maximum historical scientific research catch from 2005-2012, except for canary rockfish and yelloweye rockfish. The Council policy for canary and yelloweye rockfish was not based on the maximum historical value. The Council considered the high canary rockfish catch of 7.2 mt in 2006 from the NMFS trawl survey a rare event since surveys in later years encountered substantially less canary. The Council adopted a 4.5 mt canary rockfish set-aside, which is higher than the average research catch from 2005-2012. For yelloweye rockfish, the Council adopted a 3.3 mt research set-aside based on anticipated research needs of the International Pacific Halibut Commission (1.1 mt), Washington Department of Fish and Wildlife (1 mt), Oregon Department of Fish & Wildlife (1 mt), and other projects (0.2 mt).

Incidental Open Access: Deductions from ACLs are made to account for groundfish mortality in the incidental open access fisheries. The off-the-top deductions from the ACL for all species, except longnose skate, were derived from the maximum historical values in the 2007-2012 WCGOP Groundfish Mortality reports (see http://tinyurl.com/nv3pddm). The recommended set-aside for longnose skate was based on data from the 2009-2012 Total Mortality reports, the years in which longnose skate were reported separately from the Other Fish category.

Exempted Fishing Permits: The Council adopted one EFP and associated off-the-top deductions from the ACL for 2015-2016 for public review. The EFP seeks to test the effectiveness of vertical hook-and-line gear to selectively harvest midwater species such as yellowtail rockfish (Agenda Item H.2.a, Attachment 4, November 2013).[1]

Recreational (Sablefish north of 36° N. latitude only): The allocation framework for sablefish north of 36° N. latitude specifies that the anticipated recreational catches of sablefish be deducted from the ACL prior to the commercial limited entry and open access allocations. The set-aside is the maximum historical value from recreational fisheries from 2004-2012 (Table 4-5).

[1] The Council is considering EFPs for participants in the catch share program. See Section XXX (Cumm affects) for more details.

Table 4-1. Preferred Alternative. 2015 ACLs and estimates of tribal, EFP, research, and incidental open access (OA) mortality (in mt), used to calculate the fishery harvest guideline (HG).

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	349		3	4.6	0.7	340.7
CANARY	Coastwide	122	7.7	1	4.5	2	106.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	338	0.2	0.1	2.1	18.4	317.2
POP	N of 40º10' N. lat.	158	9.2		5.2	0.6	143.0
PETRALE SOLE	Coastwide	2,816	220		14.2	2.4	2,579.4
YELLOWEYE	Coastwide	18	2.3	0.03	3.3	0.2	12.2
Arrowtooth flounder	Coastwide	5,497	2,041		16.39	30	3,409.6
Black	WA	402	14				388.0
Black	OR and CA	1,000		1			999.0
Cabezon	OR	47					47.0
Cabezon	CA	154					154.0
California scorpionfish	S of 34°27' N. lat.	114				2	112.0
Chilipepper	S of 40º10' N. lat.	1,628		10	9	5	1,604.0
Dover sole	Coastwide	50,000	1,497		41.9	55	48,406.1
English sole	Coastwide	11,040	91		5.8	7	10,936.2
Lingcod	N of 40º10’ N. lat.	2,830	250	0.5	11.67	16	2,551.8
Lingcod	S of 40º10’ N. lat.	1,004		1.0	1.1	7	994.9
Longnose skate	Coastwide	2,000	56		13.18	3.8	1,927.0
Longspine thornyhead	N of 34º27' N. lat.	3,170	30		13.5	3	3,123.5
Longspine thornyhead	S of 34º27' N. lat.	1,001			1	2	998.0
Pacific cod	Coastwide	1,600	400		7.04	2	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205	1	2,500		204,040
Sablefish	N of 36º N. lat.	4,793		See Table 4-5			
Sablefish	S of 36º N. lat.	1,719			3	2	1,714.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,745	50		7.22	2	1,685.8
Shortspine thornyhead	S of 34º27' N. lat.	923			1	41	881.0
Spiny Dogfish	Coastwide	2,101	111.8	1	12.5	49.53	1926.2
Splitnose	S of 40º10' N. lat.	1,715		1.5	9		1,704.5
Starry flounder	Coastwide	1,534	2			8.3	1,523.7
Widow	Coastwide	2,000	60	9	7.9	3.3	1,919.8
Yellowtail	N of 40º10' N. lat.	11,213	677	10	16.6	3	10,506.4
Nearshore rockfish N.	N of 40º10' N. lat.	69					69.0
Nearshore rockfish S.	S of 40º10' N. lat.	1,114			2.6	1.4	1,110.0
Shelf rockfish N.	N of 40º10' N. lat.	1,944	30	3	13.4	26	1,871.6
Shelf rockfish S.	S of 40º10' N. lat.	1,624		30	9.6	9	1,575.4
Slope rockfish N.	N of 40º10' N. lat.	1,669	36	1	8.1	19	1,604.9
Slope rockfish S.	S of 40º10' N. lat.	687		1	2	17	667.0
Other Flatfish	Coastwide	8,620	60		19	125	8,416.0
Other Fish	Coastwide	242					242.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-2. Preferred Alternative. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2015 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	340.7	Biennial	N/A	81.9	N/A	258.8
CANARY	Coastwide	106.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	317.2	Amendment 21	95%	301.3	5%	15.9
POP	N of 40º10' N. lat.	143.0	Amendment 21	95%	135.9	5%	7.2
PETRALE SOLE	Coastwide	2,579.4	Biennial	N/A	2,544.4	N/A	35.0
YELLOWEYE	Coastwide	12.2	Biennial	N/A	1.0	N/A	11.2
Arrowtooth flounder	Coastwide	3,409.6	Amendment 21	95%	3,239.1	5%	170.5
Black	WA	388.0	None				
Black	OR and CA	999.0	None				
Cabezon	OR	47.0	None				
Cabezon	CA	154.0	None				
California scorpionfish	S of 34°27' N. lat.	112.0	None				
Chilipepper	S of 40º10' N. lat.	1,604.0	Amendment 21	75%	1,203.0	25%	401.0
Dover sole	Coastwide	48,406.1	Amendment 21	95%	45,985.8	5%	2,420.3
English sole	Coastwide	10,936.2	Amendment 21	95%	10,389.4	5%	546.8
Lingcod	N of 40º10’ N. lat.	2,551.8	Amendment 21	45%	1,148.3	55%	1,403.5
Lingcod	S of 40º10’ N. lat.	994.9	Amendment 21	45%	447.7	55%	547.2
Longnose skate	Coastwide	1,927.0	Biennial	90%	1,734.3	10%	192.7
Longspine thornyhead	N of 34º27' N. lat.	3,123.5	Amendment 21	95%	2,967.3	5%	156.2
Longspine thornyhead	S of 34º27' N. lat.	998.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting b/	Coastwide	0.0	Amendment 21	100%	0.0	0%	0.0
Sablefish	N of 36º N. lat.		See Table 1 c				
Sablefish	S of 36º N. lat.	1,714.0	Amendment 21	42%	719.9	58%	994.1
Shortbelly	Coastwide	48.0	None				0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,685.8	Amendment 21	95%	1,601.5	5%	84.3
Shortspine thornyhead	S of 34º27' N. lat.	881.0	Amendment 21	NA	50.0	NA	831.0
Spiny Dogfish	Coastwide	1,926.2	None				
Splitnose	S of 40º10' N. lat.	1,704.5	Amendment 21	95%	1,619.3	5%	85.2
Starry flounder	Coastwide	1,523.7	Amendment 21	50%	761.9	50%	761.9
Widow	Coastwide	1,919.8	Amendment 21	91%	1,747.0	9%	172.8
Yellowtail	N of 40º10' N. lat.	10,506.4	Amendment 21	88%	9,245.6	12%	1,260.8
Nearshore rockfish N.	N of 40º10' N. lat.	69.0	None				
Nearshore rockfish S.	S of 40º10' N. lat.	1,110.0	None				
Shelf rockfish N.	N of 40º10' N. lat.	1,871.6	Biennial	60.2%	1,126.7	39.8%	744.9
Shelf rockfish S.	S of 40º10' N. lat.	1,575.4	Biennial	12.2%	192.2	87.8%	1,383.2
Slope rockfish N.	N of 40º10' N. lat.	1,604.9	Amendment 21	81%	1,300.0	19%	304.9
Slope rockfish S.	S of 40º10' N. lat.	678.0	Amendment 21	63%	427.1	37%	250.9
Other flatfish	Coastwide	8,416.0	Amendment 21	90%	7,574.4	10%	841.6
Other Fish	Coastwide	242.0	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-3. Preferred Alternative. 2016 ACLs and estimates of tribal, EFP, research, and incidental open access (OA) mortality (in mt), used to calculate the fishery harvest guideline (HG).

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	362		3	4.6	0.7	353.7
CANARY	Coastwide	125	7.7	1	4.5	2	109.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	346	0.2	0.1	2.1	18.4	325.2
POP	N of 40º10' N. lat.	164	9.2		5.2	0.6	149.0
PETRALE SOLE	Coastwide	2,910	220		14.2	2.4	2,673.4
YELLOWEYE	Coastwide	19	2.3	0.03	3.3	0.2	13.2
Arrowtooth flounder	Coastwide	5,328	2,041		16.39	30	3,240.6
Black	WA	404	14				390.0
Black	OR and CA	1,000		1			999.0
Cabezon	OR	47					47.0
Cabezon	CA	151					151.0
California scorpionfish	S of 34°27' N. lat.	111				2	109.0
Chilipepper	S of 40º10' N. lat.	1,619		10	9	5	1,595.0
Dover sole	Coastwide	50,000	1,497		41.9	55	48,406.1
English sole	Coastwide	7,754	91		5.8	7	7,650.2
Lingcod	N of 40º10’ N. lat.	2,719	250	0.5	11.67	16	2,440.8
Lingcod	S of 40º10’ N. lat.	946		1.0	1.1	7	936.9
Longnose skate	Coastwide	2,000	56		13.18	3.8	1,927.0
Longspine thornyhead	N of 34º27' N. lat.	3,015	30		13.5	3	2,968.5
Longspine thornyhead	S of 34º27' N. lat.	952			1	2	949.0
Pacific cod	Coastwide	1,600	400		7.04	2	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205		2,500		204,040
Sablefish	N of 36º N. lat.	5,241		See Table 4-5			
Sablefish	S of 36º N. lat.	1,880			3	2	1,875.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,726	50		7.22	2	1,666.8
Shortspine thornyhead	S of 34º27' N. lat.	913			1	41	871.0
Spiny Dogfish	Coastwide	2,085	111.8	1	12.5	49.53	1,910.2
Splitnose	S of 40º10' N. lat.	1,746		1.5	9		1,735.5
Starry flounder	Coastwide	1,539	2			8.3	1,528.7
Widow	Coastwide	2,000	60	9	7.9	3.3	1,919.8
Yellowtail	N of 40º10' N. lat.	10,634	677	10	16.6	3	9,927.4
Nearshore rockfish N.	N of 40º10' N. lat.	69					69.0
Nearshore rockfish S.	S of 40º10' N. lat.	1,006			2.6	1.4	1,002.0
Shelf rockfish N.	N of 40º10' N. lat.	1,952	30	3	13.4	26	1,879.6
Shelf rockfish S.	S of 40º10' N. lat.	1,625		30	9.6	9	1,576.4
Slope rockfish N.	N of 40º10' N. lat.	1,683	36	1	8.1	19	1,618.9
Slope rockfish S.	S of 40º10' N. lat.	689		1	2	17	669.0
Other Flatfish	Coastwide	7,496	60		19	125	7,292.0
Other Fish	Coastwide	243					243.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-4. Preferred Alternative. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2016 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	353.7	Biennial	N/A	85.0	N/A	268.7
CANARY	Coastwide	109.8	Biennial	N/A	58.5	N/A	51.3
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	325.2	Amendment 21	95%	308.9	5%	16.3
POP	N of 40º10' N. lat.	149.0	Amendment 21	95%	141.6	5%	7.5
PETRALE SOLE	Coastwide	2,673.4	Biennial	N/A	2,638.4	N/A	35.0
YELLOWEYE	Coastwide	13.2	Biennial	N/A	1.1	N/A	12.1
Arrowtooth flounder	Coastwide	3,240.6	Amendment 21	95%	3,078.6	5%	162.0
Black	WA	390.0	None				
Black	OR and CA	999.0	None				
Cabezon	OR	47.0	None				
Cabezon	CA	151.0	None				
California scorpionfish	S of 34°27' N. lat.	109.0	None				
Chilipepper	S of 40º10' N. lat.	1,595.0	Amendment 21	75%	1,196.3	25%	398.8
Dover sole	Coastwide	48,406.1	Amendment 21	95%	45,985.8	5%	2,420.3
English sole	Coastwide	7,650.2	Amendment 21	95%	7,267.7	5%	382.5
Lingcod	N of 40º10’ N. lat.	2,440.8	Amendment 21	45%	1,098.4	55%	1,342.5
Lingcod	S of 40º10’ N. lat.	936.9	Amendment 21	45%	421.6	55%	515.3
Longnose skate	Coastwide	1,927.0	Biennial	90%	1,734.3	10%	192.7
Longspine thornyhead	N of 34º27' N. lat.	2,968.5	Amendment 21	95%	2,820.1	5%	148.4
Longspine thornyhead	S of 34º27' N. lat.	949.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting b/	Coastwide	0.0	Amendment 21	100%	0.0	0%	0.0
Sablefish	N of 36º N. lat.	0.0	See Table 1 c				
Sablefish	S of 36º N. lat.	1,875.0	Amendment 21	42%	787.5	58%	1,087.5
Shortbelly	Coastwide	48.0	None				0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,666.8	Amendment 21	95%	1,583.4	5%	83.3
Shortspine thornyhead	S of 34º27' N. lat.	871.0	Amendment 21	NA	50.0	NA	821.0
Spiny Dogfish	Coastwide	1,910.0	None				
Splitnose	S of 40º10' N. lat.	1,735.5	Amendment 21	95%	1,648.7	5%	86.8
Starry flounder	Coastwide	1,528.7	Amendment 21	50%	764.4	50%	764.4
Widow	Coastwide	1,919.8	Amendment 21	91%	1,747.0	9%	172.8
Yellowtail	N of 40º10' N. lat.	9,927.4	Amendment 21	88%	8,736.1	12%	1,191.3
Nearshore rockfish N.	N of 40º10' N. lat.	69.0	None				
Nearshore rockfish S.	S of 40º10' N. lat.	1,002	None				
Shelf rockfish N.	N of 40º10' N. lat.	1,879.6	Biennial	60.2%	1,131.5	39.8%	748.1
Shelf rockfish S.	S of 40º10' N. lat.	1,576.4	Biennial	12.2%	192.3	87.8%	1,384.1
Slope rockfish N.	N of 40º10' N. lat.	1,618.9	Amendment 21	81%	1,311.3	19%	307.6
Slope rockfish S.	S of 40º10' N. lat.	669.0	Amendment 21	63%	421.5	37%	247.5
Other Flatfish	Coastwide	7,292.0	Amendment 21	90%	6,562.8	10%	729.2
Other Fish	Coastwide	243.0	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-5. Preferred Alternative. Sablefish north of 36° N. latitude ACLs, off-the-top deductions from the ACL used to calculate the commercial harvest guideline (mt) for 2015-2016 under the Preferred Alternative.

Year	ACL	Tribal Share a/	Res.	Rec	EFP	Non-Tribal Comm. Share
2015	4,793	479	26	6.1	1	4,281
2016	5,241	524	26	6.1	1	4,684

a/ The sablefish allocation to Pacific coast treaty Indian Tribes is 10 percent of the sablefish ACL for the area north of 36° N. lat. This allocation represents the total amount available to the treaty Indian fisheries before deductions for discard mortality.

Table 4-6. Preferred Alternative: Allocations and projected mortality impacts (mt) of overfished groundfish species for 2015 and 2016 under the Preferred Alternative.

2015

Fishery	Bocaccio b/		Canary		Cowcod b/		Dkbl		Petrale		POP		Yelloweye	
Date: *5-23-14*	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/
Off the Top Deductions	8.3	8.3	15.2	15.2	2.0	2.0	20.8	20.8	236.6	236.6	15.0	15.0	5.8	5.8
EFPc/	3.0	3.0	1.0	1.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Research d/	4.6	4.6	4.5	4.5	2.0	2.0	2.1	2.1	14.2	14.2	5.2	5.2	3.3	3.3
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	18.4	18.4	2.4	2.4	0.6	0.6	0.2	0.2
Tribal f/			7.7	7.7			0.2	0.2	220.0	220.0	9.2	9.2	2.3	2.3
Trawl Allocations	81.9	11.3	56.9	23.6	1.4	0.1	301.3	127.0	2,544.4	2,410.0	135.9	68.1	1.0	0.0
-SB Trawl	81.9	11.3	43.3	9.9	1.4	0.1	285.6	111.3	2,539.4	2,405.0	118.5	50.7	1.0	0.0
-At-Sea Trawl			13.7	13.7			15.7	15.7	5.0	5.0	17.4	17.4		
a) At-sea whiting MS			5.6	5.6			6.5	6.5			7.2	7.2		
b) At-sea whiting CP			8.0	8.0			9.2	9.2			10.2	10.2		
Non-Trawl Allocation	258.8	118.0	49.9	30.9	2.6	1.2	15.9	4.9	35.0	0.3	7.2	0.3	11.2	9.7
Non-Nearshore	79.1	0.0	3.8	1.1				4.7		0.3		0.3	1.1	0.5
LE FG														
OA FG														
Directed OA: Nearshore	1.0	0.4	6.7	6.0				0.2		0.0		0.0	1.2	1.3
Recreational Groundfish														
WA			3.4	0.8				--		--		--	2.9	2.8
OR			11.7	3.2				--		--		--	2.6	2.2
CA (based on Option 2)	178.8	117.6	24.3	19.8		1.2		--		--		--	3.4	2.9
TOTAL	349.0	137.6	122.0	69.7	6.0	3.3	338.0	152.7	2,816.0	2,646.9	158.1	83.4	18.0	15.6
2015 Harvest Specification	349	359	122	122	10.0	10.0	338	338	2,816	2,816	158	158	18	18
Difference	0.0	221.4	0.0	52.4	4.0	6.7	0.0	185.3	0.0	169.1	-0.1	74.6	0.0	2.4
Percent of ACL	100.0%	38.3%	100.0%	57.1%	60.2%	33.2%	100.0%	45.2%	100.0%	94.0%	100.1%	52.8%	100.0%	86.4%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(cyan)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and would be specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended under the action Alternatives, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 15-16 biennial cycle.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2015-2016 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

g/ Projected impacts are derrived from GMT projection models.

2016

***Date*: 5 April 2014**	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/
Off the Top Deductions	8.3	8.3	15.2	15.2	2.0	2.0	20.8	20.8	236.6	236.6	15.0	15.0	5.8	5.8
EFPc/	3.0	3.0	1.0	1.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Research d/	4.6	4.6	4.5	4.5	2.0	2.0	2.1	2.1	14.2	14.2	5.2	5.2	3.3	3.3
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	18.4	18.4	2.4	2.4	0.6	0.6	0.2	0.2
Tribal f/			7.7	7.7			0.2	0.2	220.0	220.0	9.2	9.2	2.3	2.3
Trawl Allocations	85.0	85.0	58.5	58.5	1.4	1.4	308.9	308.9	2,638.4	2,499.0	141.6	141.6	1.1	1.1
-SB Trawl	85.0	11.8	44.5	10.2	1.4	0.1	292.8	114.1	2,633.4	2,494.0	124.0	53.1	1.1	0.0
-At-Sea Trawl			14.0	14.0			16.2	16.2	5.0	5.0	17.4	17.4		
a) At-sea whiting MS			5.8	5.8			6.7	6.7			7.2	7.2		
b) At-sea whiting CP			8.2	8.2			9.5	9.5			10.2	10.2		
Non-Trawl Allocation	268.7	118.0	51.3	31.0	2.6	1.2	16.3	5.4	35.0		7.5	0.3	12.1	9.6
Non-Nearshore	82.1	0.0	3.9	1.2		0.0		5.2		0.3		0.3	1.2	0.5
LE FG														
OA FG														
Directed OA: Nearshore	1.0	0.4	6.9	6.0				0.2		0.0		0.0	1.3	1.2
Recreational Groundfish														
WA			3.5	0.8				--		--		--	3.1	2.8
OR			12.0	3.2				--		--		--	2.8	2.2
CA (based on Option 2)	185.6	117.6	25.0	19.8		1.2		--		--		--	3.7	2.9
TOTAL	362.0	211.3	125.0	104.7	6.0	4.6	346.0	335.1	2,910.0	2,735.6	164.1	156.9	19.0	16.6
2015 Harvest Specification	362	362	125	125	10.0	10.0	346	346	2,910	2,910	164	164	19	19
Difference	0.0	150.7	0.0	20.4	4.0	5.4	0.0	10.9	0.0	174.4	-0.1	7.1	0.0	2.4
Percent of ACL	100.0%	58.4%	100.0%	83.7%	60.2%	46.2%	100.0%	96.8%	100.0%	94.0%	100.1%	95.7%	100.0%	87.2%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(light blue)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and are specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended in the 2013-14 EIS process, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 13-14 biennial cycle, which are currently specified in regulation.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2013-2014 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

g/ Projected impacts are derrived from GMT projection models.

4.2.2.2 Overview of Management Measures

The following bullet points summarize management measure changes by sector under the Preferred Alternative. A more detailed discussion of management measures by sector follows. New measures, discussed under Chapter 2, Section XXX and analyzed in Appendix B, would be implemented. New management measures that are specific to a sector are described below.

The Council is also considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the commercial nearshore (OR and CA) and recreational fisheries (WA, OR, and CA) that are necessary to stay within the range of state-specific HGs adopted by the Council at their April meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude, which would be implemented under the action alternatives, at the June Council meeting.

- The shorebased IFQ fishery would operate under the same management measures as No Action, with a few modifications. The No Action trawl RCA configuration (see Section XXX) would be modified to 100 fm shoreward and 150 fm seaward in the area 40°10 to 48°10' N. latitude, year-round. The IFQ would be issued based the 2015-2016 ACLs and resulting trawl allocations under the Preferred Alternative. Underutilized off-the-top deductions from the ACL (tribal, research, incidental open access, and EFPs) may be taken into consideration when considering the projections for surplus carryover. Legal-sized Pacific halibut IBQ would be limited to 15 percent of the Area 2A total constant exploitation yield (TCEY) for legal size halibut (net weight), not to exceed 100,000 pounds (45 mt) annually for legal size halibut (net weight), which is a 30,000 pound (14 mt) reduction from status quo. A scientific sorting requirement for rougheye/blackspotted would be implemented which would improve the data used in management. Further, deeper RCA boundary lines and/or bycatch reduction areas for midwater gears would be defined in regulation and would be available to reduce rougheye/blackspotted rockfish mortality inseason, if needed (e.g., boundary lines that approximate the 300 and 350 fm depth contours).
- The at-sea whiting co-ops would operate under the same management measures described under No Action with a few modifications. Allocations would be issued based the 2015-2016 ACLs and resulting at-sea trawl allocations under the Preferred Alternative. Adjustments to the at-sea whiting set-asides would be necessary to accommodate the restructuring of the Other Fish complex, which removed spiny dogfish from the complex. A scientific sorting requirement for rougheye/blackspotted could be implemented which could improve the data used in management. Further, bycatch reduction areas for midwater gears would be defined in regulation and would be available to reduce rougheye/blackspotted rockfish mortality inseason, if needed (e.g., boundary lines that approximate the 300 and 350 fm depth contours).
- The non-nearshore fixed gear fishery would operate under the same management measures as No Action, except trip limits increases for several species, including sablefish, bocaccio and shelf rockfish south of 34°27' N. latitude, are proposed to attain the ACLs under the Preferred Alternative. The prohibition on lingcod retention in Periods 1, 2, and 6 would be removed and trip limits increased for both limited entry and open access. Trip limit decreases for slope rockfish north of 40°10' N. latitude are proposed to reduce mortality of rougheye/blackspotted rockfish. A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.
- The nearshore fixed gear fishery would operate under the same management measures as No Action with a few modifications. Trip limit decreases or non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or the state-specific nearshore

rockfish HGs. The prohibition on lingcod retention in Periods 1, 2, and 6 may be removed and trip limits increased for both limited entry and open access.

- Tribal fisheries would operate under the harvest guidelines and allocations under the Preferred Alternative. Tribal fisheries would be managed using the same measures described under No Action. Additionally, a scientific sorting requirement for rougheye/blackspotted would be implemented which would improve the data used in management.
- Washington recreational fisheries would operate under the same management measures as No Action, except the season dates for the depth closure in the North Coast (Marine Areas 3 and 4) would be shorter than under No Action. In the South Coast (Marine Area 2), the prohibition on lingcod retention seaward of 30 fathoms in the area south of 46°58' N. latitude on Fridays and Saturdays from July to August 31 would be removed. Lastly, in the Columbia River Area (Marine Area 1), the southern boundary for the year-round lingcod closure would be moved three miles north. Changes to groundfish retention in Pacific halibut fisheries could also be proposed. Bag limit decreases or non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or state-specific nearshore rockfish HGs.
- Oregon recreational fisheries would operate under the same management measures as under the No Action Alternative except that the cabezon sub-bag limit would be removed, a one fish canary sub-bag limit would be implemented, and changes to groundfish retention in Pacific halibut fisheries could be proposed. Bag limit decreases or non-retention may also be required for nearshore rockfish to keep mortality at or within the complex ACL or state-specific nearshore rockfish HGs.
- Season lengths and depth restrictions were explored for the California recreational fisheries. The lingcod bag limit would be increased from two to three fish. Bag limit decreases, season length reduction, or non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or state-specific nearshore rockfish HGs. All other management measures would be the same as under No Action.

4.2.2.3 Impact (Groundfish Mortality) Shorebased IFQ – Preferred Alternative

The No Action trawl RCA configuration (see Section XXX) would be modified to 100 fm shoreward and 150 fm seaward in the area 40°10 to 48°10' N. latitude, year-round. The shorebased IFQ would be issued based the preferred 2015-2016 ACLs and resulting trawl allocations (Table 4-7 and Table 4-8). Notable IFQ increases from No Action include Dover sole, petrale, longspine thornyheads north, sablefish, shortpine thornyhead, widow rockfish, yellowtail, and Other Flatfish. Underutilized off-the-top deductions from the ACL (tribal, research, incidental open access, and EFPs) may be taken into consideration when considering the projections for surplus carryover (see Appendix B, Section XXX).

The shoreside trawl rationalization program keeps the trawl sector bycatch of halibut within expectations by requiring that trawlers account for their total mortality of all halibut in round weight (legal and sublegal sized). Therefore, to determine a trawl bycatch mortality limit the amount of halibut pounds available to the trawl fleet will be determined by expanding the expected legal sized halibut mortality (net weight) into a round weight legal+sublegal sized amount. To achieve this, the following conversions will be applied.

- Net weight to round weight conversion: multiply by the IPHC net weight to round weight conversion factor in use at the time of each year's the calculation.
- Legal to legal+sublegal sized conversion factor: multiply by the ratio of legal sized halibut to legal+sublegal sized halibut from the most up-to-date NMFS analysis of trawl fishery bycatch available at the time of each year's calculation.

After these conversions, 10 mt will be subtracted to cover bycatch mortality in the at-sea whiting fishery and trawl fishery south of 40°10’ N. lat, and the remainder will be issued as IBQ, to be used to cover Pacific halibut mortality by vessels operating in the shoreside trawl IFQ program. Under all action alternatives, legal-sized Pacific halibut IBQ would be limited to 15 percent of the Area 2A total constant exploitation yield (TCEY) for legal size halibut (net weight), not to exceed 100,000 pounds annually for legal size halibut (net weight), which is a 30,000 pound reduction from status quo.

A risk analysis was conducted to evaluate the risk of exceeding the spiny dogfish ACL (see Section XXX, Appendix B). The effectiveness of GCAs to reduce spiny dogfish mortality in the shorebased IFQ sector was also explored in Appendix B. Given the low risk of exceeding the spiny dogfish ACL, the Council recommended continuing with trip limit management of spiny dogfish in the shorebased IFQ sector and they did not recommend spiny dogfish GCAs.

Management measures to reduce rougheye/blackspotted rockfish catch, including rougheye/blackspotted GCAs and/or rockfish excluders for the at-sea whiting vessels were considered but rejected (see Chapter 2, Section XXX and Appendix B). Instead, the Council recommended that a scientific sorting requirement for rougheye/blackspotted could be implemented which could improve the data used in management. Further, management measures to reduce rougheye/blackspotted rockfish catch could be implemented, including 300 and 350 seaward trawl RCA boundaries and bycatch reduction areas for vessels using midwater gears, if necessary.

Table 4-7. Preferred Alternative – Shorebased IFQ. Projected mortality for IFQ species compared to the allocations or set-asides under the Preferred Alternative for 2015. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Preferred Alternative: 2015 Projected Mortality (mt)	Preferred Alternative: 2015 SB IFQ Allocation (mt) a/ b/	No Action: Projected Mortality (mt)	No Action: SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.3	81.9	10.9	79.0
CANARY	Coastwide	9.9	43.3	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	111.3	285.6	108.5	278.4
PETRALE	Coastwide	2,405.0	2539.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	50.7	118.5	48.0	112.3
YELLOWEYE	Coastwide	0	1.0	0	1.0
Arrowtooth flounder	Coastwide	2,436	3,194	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	308	1,203	291	1,067
Dover sole	Coastwide	15,935	45,981	7,713	22,235
English sole	Coastwide	152	10,384	137	5,261
Lingcod	North of 40°10' N. lat.	222	1,133	227	1,152
Lingcod	South of 40°10' N. lat.	79	448	84	743
Longspine thornyheads	North of 34°27' N. lat	1,531	2,962	936	1,811
Pacific cod	Coastwide	266	1,126	266	1,126
Pacific halibut a/	North of 40°10' N. lat.	N/A	45 max	N/A	45 max
Pacific halibut b/	South of 40°10' N. lat.	N/A	10	N/A	10
Pacific whiting	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	2,088	2,199	1,887	1,988
Sablefish	South of 36° N. lat.	339	720	307	653
Shortspine thornyheads	North of 34°27' N.	845	1,581	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	54	1,619	53	1,575
Starry flounder	Coastwide	9	757	9	756
Widow rockfish	Coastwide	673	1,457	426	994
Yellowtail rockfish	North of 40°10' N. lat.	2,484	8,946	816	2,939
Shelf rockfish	North of 40°10' N. lat.	60	1,127	28	508
Shelf rockfish	South of 40°10' N. lat.	27	192	12	81
Slope rockfish	North of 40°10' N. lat.	276	1,200	182	789
Slope rockfish	South of 40°10' N. lat.	110	420	98	379
Other flatfish	Coastwide	1,311	7,554	728	379

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)). There is no projection model for Pacific halibut bycatch.
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude. (estimated to 5 mt each). There is no projection model for Pacific halibut bycatch.
c/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-8. Preferred Alternative – Shorebased IFQ. Projected mortality for IFQ species compared to the allocations or set-asides under the Preferred Alternative for 2016. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Preferred Alternative		No Action	
		2016 Projected Mortality (mt)	2016 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.8	85.0	10.9	79.0
CANARY	Coastwide	10.2	44.5	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	114.1	292.8	108.5	278.4
PETRALE	Coastwide	2,494.0	2633.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	53.1	124.2	48.0	112.3
YELLOWEYE	Coastwide	0	1.1	0	1.0
Arrowtooth flounder	Coastwide	2,436	3,033	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	306	1,196	291	1,067
Dover sole	Coastwide	15,935	45,981	7,713	22,235
English sole	Coastwide	137	7,263	137	5,261
Lingcod	North of 40°10' N. lat.	215	1,083	227	1,152
Lingcod	South of 40°10' N. lat.	75	422	84	743
Longspine thornyheads	North of 34°27' N. lat	1,455	2,815	936	1,811
Pacific cod	Coastwide	266	1,126	266	1,126
Pacific halibut a/	North of 40°10' N. lat.	N/A	45 max	N/A	45 max
Pacific halibut b/	South of 40°10' N. lat.	N/A	10	N/A	10
Pacific whiting c/	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	2,289	2,411	1,887	1,988
Sablefish	South of 36° N. lat.	371	788	307	653
Shortspine thornyheads	North of 34°27' N.	835	1,563	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	55	1,649	53	1,575
Starry flounder	Coastwide	9	759	9	756
Widow rockfish	Coastwide	673	1,457	426	994
Yellowtail rockfish	North of 40°10' N. lat.	2,343	8,436	816	2,939
Shelf rockfish	North of 40°10' N. lat.	60	1,131	28	508
Shelf rockfish	South of 40°10' N. lat.	27	192	12	81
Slope rockfish	North of 40°10' N. lat.	279	1,211	182	789
Slope rockfish	South of 40°10' N. lat.	110	421	98	379
Other flatfish	Coastwide	1,136	6,543	728	379

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)). There is no projection model for Pacific halibut bycatch.
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10’ N. latitude. (estimated to 5 mt each). There is no projection model for Pacific halibut bycatch.
c/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

4.2.2.4 Impact (Groundfish Mortality) At-Sea Whiting Co-ops – Preferred Alternative

The at-sea whiting co-ops would operate under the same management measures described under No Action with a few modifications. The 2015-2016 allocations for the catcher-processor and mothership sectors under the Preferred Alternative for 2015-2016 are provided in Table 4-9 and compared to No Action.

At-sea whiting set-asides for some species would be increased compared to No Action (Table 4-10), based on recent fishery data. Further, adjustments would be necessary to accommodate the restructuring of the Other Fish complex, which removed spiny dogfish from the complex (Chapter 2, Section). The proposed Other Fish complex contains nearshore species which are not typically encountered in the at-sea whiting sectors. As such, the Council determined it was not necessary to specify an Other Fish complex set-aside. A range of spiny dogfish set-asides from 163 mt to 725 mt was analyzed along with a risk analysis for all sectors of exceeding the spiny dogfish ACL (see Section XXX, Appendix B). The effectiveness of GCAs to reduce spiny dogfish mortality was also explored in Appendix B. Given the low risk of exceeding the spiny dogfish ACL, the Council did not recommend spiny dogfish set-asides nor did they recommend spiny dogfish GCAs for the at-sea sectors.

Management measures to reduce rougheye/blackspotted rockfish catch, including rougheye/blackspotted GCAs and/or rockfish excluders for the at-sea whiting vessels were considered but rejected (see Chapter 2, Section XXX and Appendix B). Instead, the Council recommended a scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management. Further, management measures to reduce rougheye/blackspotted rockfish catch could be implemented, including bycatch reduction areas for vessels using midwater gears, if necessary.

Table 4-9. Preferred Alternative – At-Sea. Allocations for the catcher-processor (CP) and mothership sectors (MS) under the Preferred Alternative for 2015-2016. The No Action allocations are provided (right panel) for reference.

		Preferred Alternative				**No Action Allocations**	
		2015		**2016**			
Stock	**Area**	**CP All. (mt)**	**MS All. (mt)**	**CP All. (mt)**	**MS All. (mt)**	**CP All. (mt)**	**MS All. (mt)**
CANARY	Coastwide	8.0	5.6	8.2	5.8	7.6	5.4
DARKBLOTCHED	Coastwide	9.2	6.5	9.5	6.7	9.0	6.3
POP	N of 40º10' N. lat.	10.2	7.2	10.2	7.2	10.2	7.2
Pacific whiting a/	Coastwide	69,373	48,970	69,373	48,970	69,373	48,970
Widow	Coastwide	170.0	120.0	170.0	120.0	170.0	120.0

a/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-10. Preferred Alternative – At-Sea. At-sea whiting set-asides under the Preferred Alternative. The No Action set-aside values are provided for reference.

Stock	Area	Preferred Alternative Total Set-Asides (mt)	No Action Set-Asides Total Set-Asides (mt)
PETRALE SOLE	Coastwide	5	5
YELLOWEYE	Coastwide	0	0
Arrowtooth flounder	Coastwide	45	20
Dover sole	Coastwide	5	5
English sole	Coastwide	5	5
Lingcod	N of 40°10' N. lat.	15	15
Longnose skate	Coastwide	5	5
Longspine thornyhead	N of 34°27' N. lat.	5	5
Pacific cod	Coastwide	5	5
Pacific halibut a/	Coastwide	10	10
Sablefish	N of 36° N. lat.	50	50
Shortspine thornyhead	N of 34°27' N. lat.	20	20
Starry flounder	Coastwide	5	5
Yellowtail	N of 40°10' N. lat.	300	300
Shelf rockfish north	N of 40°10' N. lat.	35	35
Slope rockfish north	N of 40°10' N. lat.	100	100
Other Fish b/	Coastwide	N/A	520
Spiny Dogfish	Coastwide	N/A	N/A
Other flatfish	Coastwide	20	20

a/As stated in §660.55 (m), the Pacific halibut set-aside is 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10’ N. latitude (estimated to 5 mt each).
b/ In 2014, spiny dogfish was managed as part of the Other Fish complex. Starting in 2015-2016, spiny dogfish will be managed separately.

4.2.2.5 Limited Entry and Open Access Fixed Gear– Preferred Alternative

Impact (Groundfish Mortality) – Non-Nearshore North of 36° N. latitude

Management measures and projected mortality for the non-nearshore fishery north of 36° N. latitude under the Preferred Alternative is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.40 (Table 4-5), and the resulting sablefish allocations (Table 4-11 and Table 4-12). Trip limit increases for sablefish would be proposed (Table 4-13) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-11 and Table 4-12). The prohibition on lingcod retention in Periods 1, 2, and 6 would be removed and trip limits increased for both limited entry and open access fixed gears (see Appendix B, Section XXX). Trip limits for other species may also be adjusted to attain the ACL or achieve other conservation goals.

Trip limit decreases for slope rockfish north of 40°10’ N. latitude are proposed to reduce rougheye/blackspotted rockfish mortality (Table XXX and Appendix B, Section XXX). A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.

The overfished species mortality, as a result of harvesting the sablefish allocations, was evaluated using 2002-2012 WCGOP data in the non-nearshore model. Under the Preferred Alternative, trawl and non-trawl allocations were established for overfished species. Further, the non-nearshore fishery was also allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-14). Routine adjustments of the non-trawl RCA (same as No Action, See XXX) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (e.g., changing from 100 to 125 fm). RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm). Table 4-15 contains the projected mortality groundfish for the non-nearshore fishery.

Table 4-11. Preferred Alternative: Limited entry sablefish FMP allocations north of 36 N. latitude for 2015-2016.

Year	ACL	Sablefish Com. HG	Limited Entry Share	LEFG Share (mt)				Estimated Tier Limits (lbs) a/		
				Total Catch Share	Landed Catch Share a/	Primary Season Share	DTL Share	Tier 1	Tier 2	Tier 3
2015	4,793	4,281	3,878	1,629	1,571	1,336	236	41,175	18,716	10,695
2016	5,241	4,684	4,244	1,782	1,719	1,461	258	45,053	20,479	11,702

a/ The limited entry fixed gear total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-12. Preferred Alternative: Open access FMP allocations north of north of 36 N. latitude for 2015-2016.

Year	Open Access Total Catch Share (mt)	Open Access Landed Catch Share (mt) a/
2015	402	388
2016	440	425

a/ The open access total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-13. Preferred Alternative. Sablefish trip limits north of 36° N. latitude for limited entry and open access fixed gears for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	1,025 lb/week, not to exceed 3,075 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 1,800 lb/ 2 months					
2016	Limited Entry	1,275 lb/week, not to exceed 3,375 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 1,000 lb, not to exceed 2,000 lb/ 2 months					

Table 4-14. Preferred Alternative – Non-Nearshore. Overfished species projected mortality (mt), compared to the shares for the non-nearshore fixed gear fishery and the non-trawl allocations (mt), for 2015-2016.

	2015			2016		
Stock	**Projected Mortality**	**Non-Nearshore Share**	**Non-Trawl Allocation**	**Projected Mortality**	**Non-Nearshore Share**	**Non-Trawl Allocation**
BOCACCIO	0.0	79.1	258.8	0.0	82.1	268.7
CANARY	1.1	3.8	49.9	1.2	3.9	51.3
COWCOD	0.0		2.6	0.0		2.6
DARKBLOTCHED	4.7			5.2		
POP	0.3			0.3		
PETRALE SOLE	0.3			0.3		
YELLOWEYE	0.5	1.1	11.2	0.5	1.2	12.1

Table 4-15. Preferred Alternative. Projected groundfish mortality for the limited entry (LE) and open access (OA) fixed gear fisheries (in mt).

	2015			2016		
Stock	**LE**	**OA**	**Total**	**LE**	**OA**	**Total**
Arrowtooth flounder	44	7	51	48	7	55
Bank rockfish (South of 40°10' N. lat.)	0	0	0	0	0	0
Big skate	6	1	7	6	1	7
Black rockfish (Oregon/California)	0	0	0	0	0	0
Blackgill rockfish (South of 40°10' N. lat.)	12	5	17	13	5	19
Blue rockfish	0	0	0	0	0	0
Cabezon - (California)	0	0	0	0	0	0
Cabezon - (Oregon)	0	0	0	0	0	0
California skate	0	0	0	0	0	0

	2015			2016		
Stock	**LE**	**OA**	**Total**	**LE**	**OA**	**Total**
Chilipepper rockfish	0	0	0	0	0	0
Dover sole	6	1	7	7	1	8
English sole	0	0	0	0	0	0
Greenspotted rockfish	0	0	0	0	0	0
Greenstriped rockfish	1	0	1	1	0	2
Grenadiers	47	15	62	51	17	68
Kelp greenling	0	0	0	0	0	0
Lingcod - (California)	12	4	16	13	4	17
Lingcod - (Washington/Oregon)	3	0	3	3	0	4
Longnose skate	63	12	76	69	14	83
Longspine thornyhead (North Pt. Conception)	3	1	3	3	1	4
Mixed thornyheads	2	1	2	2	1	2
Pacific cod	2	0	2	2	0	2
Pacific hake	0	0	1	1	0	1
Redstripe rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Sharpchin rockfish	0	0	0	0	0	0
Shortbelly rockfish	0	0	0	0	0	0
Shortspine thornyhead (North Pt. Conception)	20	5	25	22	5	27
Silvergrey rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Spiny dogfish	149	24	173	163	26	189
Splitnose rockfish	0	0	0	0	0	0
Starry flounder	0	0	0	0	0	0
Unspecified skate	16	3	19	18	3	21
Widow rockfish	0	0	0	0	0	0
Yellowmouth (North of 40°10' N. lat.)	0	0	0	0	0	0
Yellowtail rockfish	1	0	1	1	0	1
Other flatfish	0	0	0	0	0	0
Other groundfish	3	1	4	4	1	4
Other nearshore rockfish	0	0	0	0	0	0
Other shelf rockfish	3	0	3	3	0	3
Other slope rockfish	101	18	119	110	20	130

Impact (Groundfish Mortality) Non-Nearshore South of 36° N. latitude

Management measures and projected groundfish mortality for the non-nearshore fishery south of 36° N. latitude under the Preferred Alternative is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.40 (Table 4-5). Anticipated catch of sablefish south of 36^{o} N latitude under the Preferred Alternative would be approximately equal to the 2015-2016 sablefish allocations and resulting landed catch shares for limited entry and open access fixed gears (Table 4-16). Increases to the sablefish trip limits would be proposed (Table 4-17) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-16). Additionally, trip limit increases are proposed for bocaccio and shelf rockfish south of 34°27’ N. latitude to increase attainment of the non-trawl allocations (Table 4-18, See Appendix B Section XXX for historical attainment). Trip limits for other species may also be adjusted to attain the ACL or achieve other conservation goals.

Under the Preferred Alternative, trawl and non-trawl allocations would be established for overfished species. Further, the non-nearshore fishery would be allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye to ensure that total non-trawl catches remained within the non-trawl allocations for these overfished species (Table 4-14). Routine adjustments of the non-trawl RCA (same as No Action, See Section XXX) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (Table 4-14). RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm).

A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.

Table 4-16 Preferred Alternative: Short-term sablefish allocations south of 36 N. latitude for the non-trawl sector, limited entry and open access for 2015-2016.

Year	Commercial HG	Non-Trawl Allocation	LE FG Total Catch Share	Directed OA Total Catch Share	LE FG Landed Catch Share a/	Directed OA Landed Catch Share a/
2015	1,714	994	547	447	531	432
2016	1,875	1,088	598	489	581	472

a/ The limited entry and open access fixed gear total catch shares are reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-17. Preferred Alternative. Sablefish trip limits south of 36° N. latitude for limited entry and open access fixed for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	2,100 lb/week					
	Open Access	315 lb/ day, or 1 landing per week of up to 1,575 lb, not to exceed 3,200 lb/ 2 months					
2016	Limited Entry	2,175 lb/week					
	Open Access	325 lb/ day, or 1 landing per week of up to 1,625 lb, not to exceed 3,250 lb/ 2 months					

Table 4-18. Preferred Alternative. Proposed trip limit increases for bocaccio and shelf rockfish south of 34°27' N. latitude.

Fishery Sector	Fleet	Alternative	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Bocaccio south 34°27'	LE	No Action	300	closed	300	500 lbs/2 months		
		Preferred	1,000	closed	1,000 lbs/2 months			
	OA	No Action	100	closed	100	200 lbs/2 months		
		Preferred	500	closed	500 lbs/2 months			
Shelf Rockfish Complex south 34°27'	LE	No Action	3,000	closed	3,000	4,000 lbs/2 months		
		Preferred	4,000	closed	4,000 lbs/2 months			
	OA	No Action	750	closed	750	1,000 lbs/2 months		
		Preferred	1,500	closed	1,500 lbs/2 months			

Impact (Groundfish Mortality) Nearshore – Preferred Alternative

There are Federal limits and state quotas (or harvest guideline) for nearshore species that constrain target species landings in the commercial nearshore fishery. State harvest guidelines between recreational and commercial fisheries may be adjusted by each state between or within years, so are not displayed herein. State harvest guidelines for each sector are established to ensure that the non-trawl allocation provided to each state is not exceeded while providing fishing opportunities for both sectors. The Preferred Alternative is based on the expectation that landings in the Oregon nearshore fishery (Table 4-19) will be equal to their allocations, except for lingcod where the historical average landings are assumed and except for black rockfish for which the state landing cap would have to be reduced from 137.9 mt to 120.0 mt to remain under the yelloweye rockfish catch share shown in Table 4-20. In California, nearshore fishery allocations are unable to be achieved given the current overfished species shares allocated to the nearshore fishery and state. As such, landings are reduced to stay within the nearshore fishery overfished species shares of the non-trawl allocation. Nearshore fishery landings are influenced by a variety of factors, including weather and market, and can vary annually. As such, there is substantial uncertainty surrounding the estimated landings under the action alternatives, which in turn influence the projected overfished species mortality and socioeconomic analysis. In the event fishery performance is lower than the allocations, mortality of groundfish species will be lower.

Trawl and non-trawl allocations for overfished species, would be implemented under the Preferred Alternative. Specifically, the nearshore fishery would be managed to stay within its share of the non-trawl allocation for bocaccio, canary, and yelloweye or the overall non-trawl allocations (Table 4-20). In the event the projected overfished species mortality is expected to exceed the nearshore share or non-trawl allocation, routine adjustments of the shoreward non-trawl RCA or reduced trip limits for nearshore species could occur. RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the nearshore share or non-trawl allocation (e.g., changing from 20 to 30 fm).

Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10’ N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the nearshore fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10’ N. latitude at the June Council meeting.

The Council is also considering removing the prohibition on lingcod retention in Periods 1, 2, and 6 and increasing trip limits for both limited entry and open access fixed gears (see Appendix B, Section XXX). In the event this option is selected for implementation, the estimated lingcod landings (Table 4-19) and the projected overfished species mortality would be updated (Table 4-20).

Table 4-19. Preferred Alternative. Expected landings under the Preferred Alternative (mt) in 2015-2016. Target species landings by area are also shown (far right panel).

Stock	Area	Total Landings	Landings by Area			
			OR Total	CA Total	40°10' – 42° N. lat.	S. of 40°10' N. lat.
Black rockfish	S. 46°16 N. lat.	179	120	59	55	4
Cabezon	OR	30	30			
Cabezon	CA	57		57	3	54
Kelp greenling	OR	23	23			
Kelp greenling	CA	21.2		21.2	0.2	21
Lingcod	N. 40°10 N. lat.	33	29	4	4	
Lingcod	S. 40°10 N. lat.	15		15		15
Nearshore rockfish N. a/	N. 40°10 N. lat.	25	18	7		
--Blue rockfish		*9*	*4*	*5*	*5*	
--Other nearshore rockfish		*16*	*14*	*2*	*2*	
Nearshore rockfish S.	S. 40°10 N. lat.	79		79		
--Blue rockfish		*2*		*2*		*2*
--Shallow nearshore rockfish b/		*53*		*53*		*53*
--Deeper nearshore rockfish c/		*24*		*24*		*24*

a/ Nearshore rockfish totals consists of black-and-yellow, blue rockfish, China, gopher, grass, kelp, brown, olive, copper, treefish, calico, and quillback. These species are part of the nearshore rockfish complex north and south of 40°10’ N. latitude.
b/Shallow nearshore rockfish consists of black and yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.
c/ Deeper nearshore consists of black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, and treefish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.

Table 4-20. Preferred Alternative. Total projected overfished species (OFS) mortality compared to the nearshore fishery share of the non-trawl allocation for 2015-2016 (mt). Projected overfished species mortality by area is also shown in the right panel and compared to the state specific shares, where applicable (in parenthesis). Overages of the allocations are indicated in bold.

Stock	Area	Total Projected OFS Mortality 2015-2016	Nearshore Fishery Share 2015/2016	Projected OFS Mortality by Area for 2015-2016			
				Oregon Total (Share 2015/2016)	CA Total (Share 2015/2016)	40°10' – 42° N. lat.	S. of 40°10' N. lat.
Bocaccio	S. 40°10	0.4	1.0/1.0	N/A	0.4	N/A	0.4
Cowcod	S. 40°10	0		N/A	0	N/A	0
Canary	Coastwide	6.0	6.7/6.9	1.1 (1.8/1.9)	4.9 (4.9/5.0)	0.5	4.4
Darkblotched	Coastwide	0.2		0.1	0.1	0	0.1
POP	N. 40°10	0		0	0	0	0
Petrale	Coastwide	0		0	0	0	0
Yelloweye	Coastwide	1.2	1.2/1.3	0.9 (0.9/0.9)	0.3 (0.3/0.35)	0.2	0.1

4.2.2.6 Impact (Groundfish Mortality) Tribal Fisheries – Preferred Alternative

Tribal fisheries would operate under the harvest guidelines and allocations displayed in Table 4-1, Table 4-3, and Table 4-5. Tribal fisheries would be managed using the same measures described under No Action.

4.2.2.7 Washington Recreational – Preferred Alternative

Primary catch controls for the Washington recreational fishery are season dates, depth closures, bag limits, and GCAs, including YRCAs. Under the Preferred Alternative, Washington recreational fisheries would operate under the 2015 and 2016 ACLs (Table 4-1 and Table 4-3) and Washington recreational harvest guidelines (HGs) for overfished species (Table 4-21).

Table 4-21. Preferred Alternative: Washington recreational harvest guidelines for 2015 and 2016.

Stock	2015	2016
CANARY ROCKFISH	3.4	3.5
YELLOWEYE ROCKFISH	2.9	3.1

Groundfish Season Structure

Under the Preferred Alternative, the Washington recreational fishery would be open year-round for groundfish, except lingcod. Washington would continue to prohibit the retention of canary and yelloweye rockfish in all areas.

Depth restrictions are the primary tool used to keep recreational mortality of yelloweye and canary rockfish within specified HGs. Restrictions limiting the depth where groundfish fisheries are permitted are more severe in the area north of the Queets River (Marine Areas 3 and 4) where yelloweye and canary rockfish abundance is higher and therefore caught incidentally at a higher rate. Depth restrictions are less restrictive moving south where incidental catch of yelloweye and canary becomes progressively less.

Management measures under the Preferred Alternative differ only slightly from the No Action Alternative. Under the Preferred Alternative, the depth closure in the North Coast (Marine Areas 3 and 4) would be in place from May 9th through Labor Day rather than from May 1 through September 30. In the South Coast (Marine Area 2), the prohibition on lingcod retention seaward of 30 fathoms in the area south of 46°58 on Fridays and Saturdays from July to August 31 would be removed and in the Columbia River Area (Marine Area 1), the southern boundary for the year round lingcod closure would be moved three miles north. The primary intent of these changes is to simplify management measures for recreational anglers while maintaining total mortality projections that stay within Washington's HGs for overfished species. Management measures, in addition to those analyzed in the 2013-14 EIS were implemented in 2013 through inseason action to respond to higher than anticipated encounters with yelloweye rockfish. These additional management measures reduced the potential for encounters with overfished species and provide some leeway to refine and streamline management measures described under the No Action Alternative. Table 4-22 summarizes key features of the Washington recreational regulations under the Preferred Alternative.

Table 4-22. Preferred Alternative. Washington Recreational Seasons and Groundfish Retention Restrictions.

<table>
<tr><th>Marine Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>3 & 4 (N. Coast)</td><td colspan="4">Open all depths</td><td colspan="5">Open <20 fm May 9-Labor Day a/</td><td colspan="3">Open all depths</td></tr>
<tr><td>2 (S. Coast)</td><td colspan="2">Open all depths e/</td><td colspan="4">Open <30 fm Mar 15 - June 15 b/, c/, d/, e/</td><td colspan="6">Open all depths e/</td></tr>
<tr><td>1 (Col. R.)</td><td colspan="4">Open all depths e/</td><td colspan="5">Open all depths e/, f/</td><td colspan="3">Open all depths e/</td></tr>
<tr><td colspan="13">a/ Groundfish retention prohibited >20 fm except, retention of lingcod, Pacific cod and sablefish is allowed seaward of 20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited in deepwater areas at all times.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board on days open to the all depth Pacific halibut fishery.</td></tr>
</table>

North Coast (Marine Areas 3 and 4)

The retention of bottomfish is prohibited seaward of a line approximating 20 fm from May 9th through the first Monday in September, except, lingcod, Pacific cod and sablefish can be retained seaward of 20 fm on days open to recreational fishing for Pacific halibut. Fishing for, retention, or possession of groundfish and Pacific halibut is prohibited in the C-shaped YRCA.

South Coast (Marine Area 2)

The retention of bottomfish, except rockfish, is prohibited seaward of 30 fm from March 15 through June 15, except sablefish and Pacific cod retention is allowed May 1 through June 15. Retention of lingcod is allowed seaward of 30 fm on days open to the primary Pacific halibut season. Fishing for, retention, or possession of lingcod is prohibited in deepwater areas seaward of a line extending from 47°31.70' N. latitude, 124°45.00' W. longitude to 46°38.17' N. latitude, 124°30.00' W. longitude year-round, except as allowed on days open to the Pacific halibut fishery (Figure 4-1). Fishing for, retention or possession of bottomfish or Pacific halibut is prohibited in the South Coast YRCA and Westport Offshore YRCA (See Section XXX).

Columbia River (Marine Area 1)

Retention of bottomfish, except sablefish and Pacific cod, is prohibited with Pacific halibut onboard during the all-depth recreational halibut fishery from May 1 through September 30. Fishing for, retention, or possession of lingcod in deepwater areas seaward of a line extending 46°38.17 N. latitude, 124°21.00' W. longitude to 46°28.00' N. latitude, 124°21.00' W. longitude is prohibited year-round (Figure 4-1).

Area Restrictions

Under the Preferred Alternative, fishing for, retention, or possession of groundfish and halibut during the Washington recreational groundfish and Pacific halibut fisheries would be prohibited in the C-shaped YRCA in the north coast and the South Coast and Westport YRCAs in the south coast.

Fishing for, retention, or possession of lingcod would be prohibited seaward of a line connecting the following coordinates from the Queets River (47°31.70' N. latitude, 124° 45.00' W. longitude) to 46°28.00' N. latitude, 124°21.00' W. longitude, year round except as allowed in Washington Marine Area 2 on days open to the primary Pacific halibut fishery (Figure 4-1).

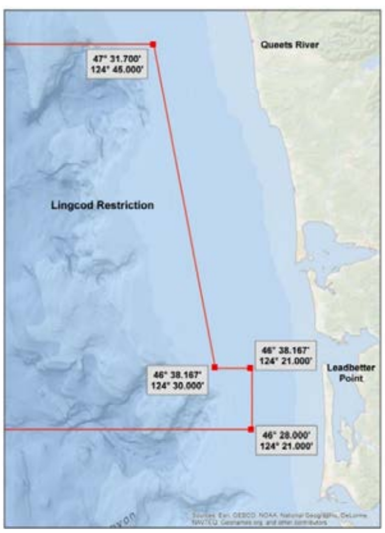


Figure 4-1. Preferred Alternative. Washington Lingcod Restricted Area.

Other Measures

Nearshore Rockfish HGs: Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the

ACL. Appendix B, Section XXX contains the management measures for the Washington recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10’ N. latitude at the June Council meeting.

Groundfish Bag Limits: Groundfish bag limits would be the same under the Preferred Alternative as they are under the No Action alternative. The recreational groundfish bag limit, including rockfish and lingcod, would be 12 fish per day. Of the 12 recreational groundfish allowed to be landed per day, sub-limits of 10 rockfish and, two lingcod apply. The recreational bag limit also includes a sub-limit of two cabezon in Marine Areas 1-3 and one cabezon in Marine Area 4.

Lingcod Seasons and Size Limits: Under the Preferred Alternative, the lingcod seasons would be the same as they are under the No Action Alternative. In Marine Areas 1 through 3 (Washington-Oregon border at 46°16’ N. latitude to Cape Alava at 48°10’ N. latitude) the lingcod season would be open from the Saturday closest to March 15 through the Saturday closest to October 15. In Marine Area 4, (Cape Alava to the U.S. Canadian border) the lingcod season would be open from April 16 through October 15, or the Saturday closest to October 15 if that Saturday comes before October 15, whichever is earlier. Lingcod seasons under the Preferred Alternative would be structured the same as they were under the No Action Alternative. Under the Preferred Alternative the lingcod seasons and size limits by area are as follows:

- Marine Areas 1-3: March 14 through October 17 in 2015 and March 12 through October 15 in 2016. Minimum size, 22 inches.
- Marine Area 4: April 16 through October 15 in 2015 and April 16 to October 15 in 2016. Minimum size, 22 inches.

Cabezon Size Limit: Under the Preferred Alternative, there is an 18 inch minimum size limit for cabezon in Marine Area 4 (Cape Alava to the U.S. Canadian border).

Pacific Halibut Seasons: It is expected that the Pacific halibut seasons in 2015 and 2016 would be similar to the halibut seasons in 2013 and 2014. There are no changes to the restrictions on groundfish retention during the Pacific halibut season proposed under the Preferred Alternative. However, modifications to the groundfish retention rules during the all-depth Pacific halibut openings may be proposed under the Pacific halibut Catch Sharing Plan process (see Appendix B, Section XXX).

Additional Management Measures Analyzed: No additional management measures were analyzed for the Preferred Alternative. Currently available management measures will be used to keep recreational harvests of overfished species within specified HGs for 2015-2016.

Impact (Groundfish Mortality)

Projected mortality for Washington’s recreational fishery is based upon the previous season’s harvest estimated by the Ocean Sampling Program (OSP) and incorporated in Recreational Fishery Information Network (RecFIN). Table 4-23 summarizes the projected mortality for overfished and non-overfished species under the Preferred Alternative.

It should be noted that the precision of recreational groundfish catch estimates based upon previous seasons will continue to be influenced by factors such as the length and success of salmon and halibut seasons, weather and unforeseen factors.

Washington’s Ocean Sampling Program is able to produce estimates of groundfish catch with a one month lag time. Management measures such as more restrictive depth closures, area closures, groundfish retention restrictions, or changes to seasons can be considered and implemented through emergency changes to state regulations if inseason catch reports indicate that recreational harvests of overfished or non-overfished species are exceeding pre-season projections to the point where HGs are at risk of being exceeded.

Table 4-23. Preferred Alternative: Washington recreational projected groundfish mortality in 2015 and 2016 (in mt).

Stock	2015/2016
CANARY ROCKFISH	0.75
YELLOWEYE ROCKFISH	2.83
Black Rockfish	251.54
Lingcod	125.61
Nearshore Rockfish	10.54
Blue Rockfish	2.58
Quillback Rockfish	2.23
Copper Rockfish	2.24
China Rockfish	3.49
Brown Rockfish	-
Grass Rockfish	-
Yellowtail Rockfish	28.32
Vermilion Rockfish	0.60
Cabezon	5.56
Kelp Greenling	1.90

4.2.2.8 Oregon Recreational – Preferred Alternative

Primary catch controls for the Oregon recreational fishery are season dates, depth closures, bag limits, and GCAs, including yelloweye rockfish conservation areas (YRCAs). The Preferred Alternative analyzes the Oregon recreational fishery with the 2015 and 2016 ACLs (Table 4-1 and Table 4-3), and Oregon recreational harvest guidelines (HGs) for overfished species (Table 4-24), which directly influence the recommended management measures. Key target species with a state quota or Federal HG are also shown, such as black rockfish which has a HG of 440.4 mt.[2] Projected mortality under the Preferred Alternative for the Oregon recreational fisheries is shown in Table 4-25.

[2] The black rockfish ACL is allocated 58 percent to Oregon and 42 percent to California. Of the Oregon portion, Oregon state rule specifies that 76 percent is allocated to the recreational fishery with 24 percent to the commercial fishery. Similarly for nearshore rockfish species, state regulations allocate 48.7 percent of the Oregon portion to the recreational fishery.

Table 4-24. Oregon recreational Federal harvest guidelines (in mt) and state quotas under the Preferred Alternative for 2015-2016.

Stock	HGs and State Quotas a/	
	2015	2016
CANARY ROCKFISH	11.7	12.0
YELLOWEYE ROCKFISH	2.6	2.8
Black Rockfish	440.4	440.4
Greenlings b/	5.2	5.2
Nearshore Rockfish N. of 40°10 N. lat.	TBD	TBD
--*Blue Rockfish*		
--*Other Nearshore Rockfish*		

a/ Federal HG are established for canary and yelloweye rockfish only. The state process in Oregon establishes quotas for black rockfish, blue rockfish, other nearshore rockfish, and greenlings (all species). Black and blue rockfish are managed to a combined state quota, the estimated quotas by species are represented in this table. The state quotas are not intended to be implemented in Federal regulation, they are only provided as information.
b/ Includes kelp and other greenlings

Table 4-25. Projected Mortality in the Oregon recreational fisheries under the action alternatives for 2015-2016.

Stock	Projected Mortality (mt)
CANARY ROCKFISH	3.2
YELLOWEYE ROCKFISH	2.2
Black Rockfish	322.2
Cabezon	35.8
Greenlings [a/]	6.4
Lingcod	132.0
Nearshore Rockfish N. 40°10 N. Lat.	30.5
--*Blue Rockfish*	*17.5*
--*Other Nearshore Rockfish*	*13.0*

[a/] Includes kelp and other greenlings.

Groundfish Season Structure

Under the Preferred Alternative, the Oregon recreational groundfish fishery would be open offshore year-round, except from April 1 to September 30 when fishing is only allowed shoreward of 40 fathoms, as defined by waypoints (Figure 4-2). Closing the fishery outside of 40 fathoms from April 1 to September 30, months when angler effort and yelloweye rockfish encounters are greatest, mitigates mortality of yelloweye rockfish. Projected mortality of yelloweye and canary rockfish are within the HG, therefore the shore-based fishery would be open year-round.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bottomfish Season	Open all depths			Open < 40 fm						Open all depths		
Marine Bag Limit [1]	Ten (10)											
Lingcod Bag Limit	Three (3)											
Flatfish Bag Limit [2]	Twenty Five (25)											

1 Marine bag limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine, and smelt.

2 Flounders, soles, sanddabs, turbots and halibuts except Pacific halibut.

Figure 4-2. Preferred Alternative. Oregon recreational groundfish season structure and bag limits under the Preferred Alternative.

Area Closures

The Stonewall Bank YRCA has been in place since 2006 and would also remain under the Preferred Alternative (Figure 4-3). The YRCA is located approximately 15 miles west of the Port of Newport and consists of the high-relief area of Stonewall Bank, an area of high yelloweye rockfish encounters. No recreational fishing for groundfish and Pacific halibut can occur within this YRCA, which is bounded by the following waypoints specified in Table 4-26.

Two options for extending the status quo Stonewall Bank YRCA for 2015-2016 recreational fisheries, should they become necessary, are also shown in Figure 4-3 and are defined by the coordinates in Table 4-26.

Table 4-26. Preferred Alternative. Coordinates for the Stonewall Bank currently as specified in regulation, Option 2 and Option 3 for the expanding the Stonewall Bank area closure under.

Current		Option 2		Option 3	
Latitude	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**
44°37.458’	124°24.918’	44°41.7594’	124°30.018’	44°38.544’ N	124°27.4122’
44°37.458’	124°23.628’	44°41.7348’	124°21.603’	44°38.544’ N	124°23.8554’
44°28.710’	124°21.798’	44°25.2456’	124°16.944’	44°27.132’ N	124°21.501’
44°28.710’	124°24.102’	44°25.2942’	124°30.1404’	44°27.132’ N	124°26.8944’
44°31.422’	124°25.500’	44°41.7594’	124°30.018’	44°31.302’ N	124°28.3476’

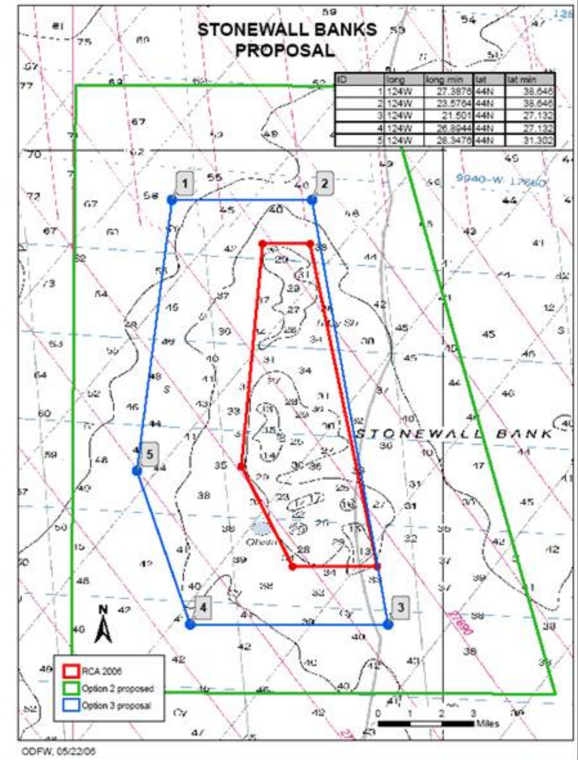


Figure 4-3. Preferred Alternative. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited.

Groundfish Bag Limits and Size Limits

Under the Preferred Alternative, a marine fish daily bag limit of 10 fish in aggregate would be implemented, the same as under No Action, for 2015-2016. The marine bag includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine and smelt. The seasonal one fish sub-bag limit for cabezon which was in place under No Action would be removed under the Preferred Alternative. Cabezon mortality would be limited via state regulations. A flatfish daily bag limit of 25, which includes all soles and flounders except Pacific halibut, would be allowed in addition to the marine fish daily bag limit. Additionally a three-fish bag limit would be allowed for lingcod. Retention of canary and yelloweye rockfish would continue to be prohibited under the Preferred Alternative.

The following minimum size limits applied to 2013-2014 Oregon recreational fisheries and would be carried forward under the Preferred Alternative:

- Lingcod – 22 in.
- Cabezon – 16 in.
- Kelp greenling – 10 in.

Under the Preferred Alternative, the recreational Pacific halibut fisheries should be able to proceed as in 2013 and 2014, in regards to days and areas open, etc., depending on the halibut quota. Since 2009, only sablefish and Pacific cod may be retained in the Pacific halibut fishery at any depth in the area north of Humbug Mountain, Oregon. South of Humbug Mountain, groundfish may be retained in areas open to groundfish (e.g., less than 30 fm) when halibut are onboard the vessel. There are no changes to the restrictions on groundfish retention during the Pacific halibut season proposed under the Preferred Alternative. However, modifications to the groundfish retention rules during the Pacific halibut openings may be proposed under the Pacific halibut Catch Sharing Plan process (see Appendix B, Section XXX).

Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the Oregon recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

Additional Management Measures Analyzed

Under the Preferred Alternative, two additional management measures were analyzed for the Oregon recreational fisheries: allowing limited retention of canary rockfish and modifying the groundfish species allowed to be retained during all-depth Pacific halibut openings. Additionally, a variety of season structure (depths and months) were modeled to determine potential mortality to overfished species.

Inseason Management Tools

Oregon has a responsive port-based monitoring program through the Ocean Recreational Boat Survey (ORBS) and regulatory processes in place to track mortality and take actions inseason, if necessary. The following are suggested management measures that could be implemented inseason if the fishery does not proceed as expected.

Inseason management tools, designed to mitigate mortality, include bag limit adjustments (including non-retention), length limit adjustments, gear restrictions, and season, days per week, depth, and area closures.

Season, depth, days open per week, and area closures are the primary inseason tools for limiting yelloweye rockfish and canary rockfish mortality, since retention of these species is already prohibited. If catch rates indicate that the bycatch harvest targets for yelloweye rockfish would be reached prematurely, offshore depth closures may be implemented inseason at 30, 25, or 20 fathoms as these two species are less abundant nearshore, and release survival rates are higher in shallow waters. Additionally, days per week may also be closed to reduce mortality. ODFW would monitor inseason progress toward recreational harvest targets for canary rockfish and yelloweye rockfish. Regulations would depend upon the timing of the determination for their need.

Adjustments to the marine fish daily bag limit to no more than 10 fish may be implemented to achieve season duration goals in the event of accelerated or decelerated black rockfish or other nearshore rockfish harvest. The lingcod daily bag limits may be adjusted to no more than 3 fish in the event the marine bag limit changes or the halibut catch limit is reduced from 2013 levels. Season and/or area closures may also be considered if harvest targets are projected to be attained. Closing one or more days per week is an inseason tool that could be used to limit mortality. Closing certain days each week would help lengthen the duration of a fishery approaching an HG.

Non-retention and/or length restrictions are the likely inseason tools to use for cabezon and kelp greenling, as release survival is very high. They may also be used to reduce mortality of nearshore species, such as nearshore rockfish species, especially when combined with the use of descending devices.

Gear restrictions and/or release technique requirements may be implemented to reduce the impact of overfished rockfish since a variety of descending devices are available. SSC recommended and Council-approved mortality rates for canary and yelloweye rockfish when descending devices are used will be implemented in 2014 (see Appendix A for documentation).

Directed yellowtail rockfish and/or flatfish fisheries may be implemented inseason, as were implemented in 2004, in the event of a closure of the recreational groundfish fishery due to attainment Federal or state HGs or targets. Specific gear restrictions may be implemented in the event that yellowtail rockfish and/or flatfish fisheries remain open during a groundfish closure. Additionally, the fishery may be expanded to waters seaward of the RCA, promoting directed yellowtail rockfish opportunity. Directed flatfish fisheries would be legal year round and open shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions (e.g., 40, 30, 25, 20, and 50 fathom lines). The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions. Fisheries would be monitored to ensure that mortality of yelloweye and canary rockfish are within the harvest targets/guidelines.

In the event that the duration of total season is reduced from 12 months; the nearshore waters are closed to groundfish fishing due to management of nearshore species; or the Pacific halibut catch limit is reduced from 2013 levels, the fishery may be expanded to waters seaward of the RCA that is in effect at the time, promoting directed yellowtail rockfish and offshore lingcod opportunity. Fisheries would be monitored to ensure that mortality of yelloweye rockfish and canary rockfish is not in excess of the HGs.

4.2.2.9 California Recreational – Preferred Alternative

The 2015-2016 California recreational groundfish projected mortality and season structure under the Preferred Alternative are based on CDFW's updated RecFISH model. Model projections were calculated for the five recreational groundfish management areas using updated 2011 and 2012 RecFIN estimates; overfished species mortality are reported statewide. Table 4-27 depicts the Preferred Alternative overfished species harvest guidelines for the 2015-2016 California recreational groundfish seasons.

Table 4-27. Preferred Alternative: California recreational allocations/harvest guidelines for 2015-2016.

Stock	**2015**	**2016**
BOCACCIO	178.8	185.6
CANARY	24.3	25.0
COWCOD*	2.6	2.6
YELLOWEYE	3.4	3.7

*Non-trawl allocation

Groundfish Seasons and Area Restrictions

Under the Preferred Alternative, tradeoffs between season lengths and depth restrictions were explored (Options 1, 2, and 3). Because the non-trawl allocation for cowcod will increase to 2.6 mt in 2015-2016, all three Options allow depth restrictions to be modified from 50 fm to 60 fm in the Southern Management Area. Under Option 1, longer seasons and status quo (or No Action) depth restrictions were examined. Option 2 explored longer seasons north of Point Conception and limited additional opportunity in deeper depths in the Northern and Mendocino Management Areas; the area where the depths restrictions are the most restrictive under status quo regulations (20 fm). Option 3 examined shorter seasons and deeper depths north of Point Conception. The three fish lingcod bag limit can be accommodated under all Options.

Option 1

Under Option 1, the depth restrictions would be the same as the No Action Alternative and the season lengths would be extended for all areas north of Point Conception from March 1 through December 31 (Figure 4-4). Due to lower yelloweye rockfish mortality in recent years the season lengths in the areas north of Point Conception can be extended. Black rockfish mortality limits the season length at the current depth restrictions. Under this option, the portion of the recreational catch share is exceeded by 1.7 mt, but could be accommodated by the residual from the commercial fishery. The mortality of cowcod and bocaccio in the Southern Management Area are projected to be far below the respective harvest guidelines. Season length in the Southern Management Area would remain the same as status quo, March 1st – December 31st, but the depth restriction would be modified from 50 fm to 60 fm to resume access to deeper depths allowed in 2012 prior to an inseason action.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed		Mar 1 – Dec 31 <20 fm									
Mendocino	Closed		Mar 1 –Dec 31 <20 fm									
San Francisco	Closed		Mar 1 – Dec 31 <30 fm									
Central	Closed		Mar 1 – Dec 31 <40 fm									
Southern	Closed		Mar 1 – Dec 31 <60fm									

Figure 4-4. Preferred Alternative (Option 1): California recreational groundfish season structure and depth restrictions for 2015-2016 with maximized season length.

Option 2

Due to lower yelloweye rockfish encounter rates in recent years, the season length north of Point Conception can be extended to April 1st through December 31st (Figure 4-5). In addition, under Option 2, deeper depth restrictions are analyzed in the Northern and Mendocino Management Areas for part of the year; the depth restriction would be 20 fm from April 1st through September 30th, then increase to 30 fm from October 1st through December 31st. The depth and season in all other areas would be unchanged from Option 1.

When depth restrictions are liberated, it becomes more challenging to predict angler behavior and uncertainty in the yelloweye rockfish projections increases. Further, the RecFISH model assumes proportion of catch by depth and those proportions of catch can change when depth is increased, which results in underestimates of mortality. The relatively low effort during October 1st through December 31st makes it possible to allow access to deeper depths without greatly increasing the risk of exceeding the yelloweye rockfish harvest guideline. Black rockfish mortality remains within the state recreational share under this option.

Management Area	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Northern	Closed			April 1 – Sep 30 <20 fm, Oct 1– Dec 31 <30 fm								
Mendocino	Closed			April 1 – Sep 30 <20 fm, Oct 1– Dec 31 <30 fm								
San Francisco	Closed			April 1 – Dec 31 <30 fm								
Central	Closed			April 1 – Dec 31 <40 fm								
Southern	Closed		Mar 1 – Dec 31 <60 fm									

Figure 4-5. Preferred Alternative (Option 2): California recreational groundfish season structure and depth restrictions for 2015-2016.

Option 3

Under Option 3, tradeoffs between increased depth and season lengths north of Point Conception were explored. By allowing access to deeper depths, encounters with overfished shelf rockfish species are expected to increase. In order to keep mortality of overfished species from exceeding harvest guidelines, season lengths north of Point Conception would be reduced (Figure 4-6). Similar to Option 2, when depth restrictions are modified uncertainty increases, as effort shifts to deeper depths may be greater than projected, resulting in mortality exceeding projected values.

Season length in the Southern Management Area would also be reduced to the May 15th to August 15th to explore reductions in catch savings on cowcod, bocaccio, or other species. In recent years, bocaccio and cowcod encounters have increased, making it more difficult to model projected mortality. Given these concerns, examining a shorter season in the Southern Management Area is prudent in the event inseason action would be necessary to keep catches within allowable levels. California scorpionfish would remain open year round to 60 fm.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May15–Aug15<30fm			Closed				
Mendocino	Closed				May15–Aug15<30fm			Closed				
San Francisco	Closed				May15–Aug15<40fm			Closed				
Central	Closed				May15–Aug15<50fm			Closed				
Southern	Closed				May15–Aug15<60fm			Closed				

Figure 4-6. Preferred Alternative (Option 3): California recreational groundfish season structure and depth restrictions for 2015-2016.

Other Measures

Nearshore Rockfish HGs: Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the California recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

Groundfish Bag Limits and Size Limits: Under The Preferred Alternative, the groundfish bag limits or size limits are the same as under No Action except for the following:

- Lingcod: The No Action bag limit for lingcod is two fish. Under the Preferred Alternative, lingcod bag limit would increase from two fish to three fish. The mortality (in metric tons) as a result of the increase in the bag limit for Options 1, 2, and 3 is provided in Table 4-28. An increase in the lingcod bag limit from two to three fish could be accommodated statewide with the aforementioned season and depth restrictions under all options. The Council is not proposing any changes to the lingcod minimum size restriction. Increases to overfished species mortality as a result of this increase are expected to be minimal (if any).

Additional Management Measures Analyzed: None

Table 4-28. Preferred Alternative: California recreational projected mortality of non-overfished species for 2015-2016 under Option 1, Option 2, and Option 3. Results in parenthesis reflect lingcod mortality with a three fish bag limit.

	Projected Mortality (mt)		
Stock	**Option 1**	**Option 2**	**Option 3**
Black Rockfish	232.5*	219.7	110.3
Blue Rockfish	65.2	62.2	22.9
Cabezon	42.5	40.2	16.9
California scorpionfish	81.1	81.1	13.3
Greenlings	24.7	22.4	8.7
Lingcod	296.2 (356.4)	280.9 (338.0)	111.0 (134.0)
Minor Nearshore Rockfish North	15.6	15.4	6.7
Minor Nearshore Rockfish South	376.5	365.4	118.6
Widow Rockfish	4.2	3.8	1.5

**Mortality exceeds the recreational portion of the California catch share of 230.8 mt. Further discussion provided under the text describing Option 1.*

Impact (Groundfish Mortality)

Projected mortality for bocaccio, canary rockfish, cowcod, and yelloweye rockfish for all Options under the Preferred Alternative can be found in Table 4-29. Under all the Options contemplated under the Preferred Alternative the projected mortality of cowcod, bocaccio, canary and yelloweye rockfish increases compared to the No Action alternative, due to the increased season lengths or deeper depth restrictions. The number of angler trips is expected to increase under the Options allowing for increased opportunity for both private/rental boats (PR) and commercial passenger fishing vessels (CPFV). Projections for non-overfished species for the Preferred Alternative under each Option are provided in Table 4-28.

Similar to the No Action Alternative, if overfished species encounters are tracking higher or lower than projected, inseason action could be taken, which could include closing one or more recreational groundfish management areas, restricting recreational fishery seasons and/or modifying depth restrictions. As in the No Action Alternative, the YRCAs would be available and could be implemented inseason if catches are projected to exceed harvest guidelines.

Table 4-29. Preferred Alternative: California recreational projected mortality of overfished species for 2015-2016 under Option 1, Option 2 and Option 3.

Stock	California Recreational 2015 HG (mt)	California Recreational 2016 HG (mt)	Projected Mortality (mt)		
			Option 1	Option 2	Option 3
BOCACCIO	178.8	185.6	117.5	117.6	23.5
CANARY	24.3	25.0	19.8	19.8	10.6
COWCOD			1.2	1.2	0.3
YELLOWEYE	3.4	3.7	2.8	2.9	2.7

a/The non-trawl allocation of cowcod is 2.6 mt.

**Agenda Item F.7.a
Attachment 4 (Electronic Only)
June 2014**

GROUNDFISH HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES AND AMENDMENT 24: DRAFT ENVIRONMENTAL IMPACT STATEMENT

Evaluation of Harvest Specifications and Management Measures for the 2015-2016 Biennial Management Period and Biennial Periods Thereafter Including the Reorganization of Groundfish Stock Complexes, Designation of Ecosystem Component Species and Amending the Pacific Coast Groundfish Fishery Management Plan to Establish a Process for Determining Default Harvest Specifications

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Table of Contents

Table of Tables

Table of Figures

Executive Summary

INTRODUCTION

This document provides information about, and analyses of, setting groundfish harvest specifications and establishing related management measures for 2015 and subsequent years for fisheries covered by the Pacific Coast Groundfish Fishery Management Plan (hereafter, Groundfish FMP or FMP), which are developed by the Pacific Fishery Management Council (Council) in collaboration with the National Marine Fisheries Service (NMFS). Groundfish harvest specifications are set every 2 years for a 2-year period. In addition to harvest specifications and management measures for the 2015-16 biennial period, this document evaluates the impacts of setting harvest specifications and management measures over the long term. These actions must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore. The states manage their fisheries, including nearshore rockfish fisheries in the territorial sea, in a manner consistent with, or more restrictive than, the Groundfish FMP and Federal implementing regulations.

THE PROPOSED ACTIONS

The proposed action has three components: 1) Establishing harvest specifications and management measures for the 2015-2016 biennial management period, 2) changing groundfish stock complexes and designating ecosystem component species, and 3) amending the Groundfish FMP to describe how the Council would use default harvest control rules (HCRs) in their decision-making process in future biennial cycles and to clarify what are considered new and routine management measures during the biennial process. In all cases the alternative of No Action is also considered. This EIS includes an analysis of the long-term impacts of biennial harvest specifications and foreseeable adjustments to routine management measures to support decision-making in future biennial periods.

ALTERNATIVES

Table ES-1 summarizes the alternatives and options evaluated in this EIS.

Establishing Harvest Specifications and Management Measures for the 2015-2016 Biennial Management Period

Harvest specifications are established for each managed stock or stock complex in the Grondfish FMP. Specifications include the overfishing limit (OFL), the allowable biological catch (ABC), and the annual catch limit (ACL). Catch above the OFL constitutes overfishing. The ABC is a precautionary reduction from the OFL to account for scientific uncertainty in the OFL specification and management error. Section 4.4 in the Groundfish FMP describes the method usually used to determine this precautionary reduction. It involves two quantities, sigma (σ) and P*. Sigma represents variability in stock assessment results and P* represents the probability of catch at the ABC resulting in overfishing. A formula incorporating these two values produces a percentage value representing the precautionary reduction. Sigma is determined by the SSC while the Council chooses P*, which according to the Groundfish FMP, cannot exceed 0.45.

Overall catch is managed to the ACL. For most stocks the ACL is set equal to the ABC but the ACL may be set below the ABC for a variety of reasons. The Council may also set an annual catch target (ACT) to establish a higher level of precaution, particularly if there is greater uncertainty about the true level of catch due to estimation error.

Management measures include adjustments to and allocations of ACLs, adjustments to existing management measures including those designated as routine, and adoption of new management measures. During the biennial cycle existing, routine measures may be adjusted and new measures established. These management measures are mainly intended to control groundfish catch and improve monitoring of the fishery. Allocations establish overall limits for different groundfish fishery sectors (segments of the overall fishery distinguished by gear type, permit programs, target species, and other factors) as a basis for controlling catch. Many allocations have been included in the FMP and the same proportions are applied from period to period; others may be modified biennially based on conditions in the fishery. Harvest guidelines may also be used to aid the implementation of management measures that takes into account fishing opportunity in different fishery sectors. Catch control tools for the commercial groundfish fishery include individual fishing quota (IFQ), vessel allocations of sablefish catch opportunity to certain fixed gear, cumulative landing (or trip) limits, and closed areas to reduce bycatch of species of concern, predominantly overfished species. Recreational catch control tools include time and area closures and bag limits. Catch monitoring is accomplished by at-sea observers and dockside accounting for commercial catch and landings, and sampling and observation of recreational fisheries. Management measure alternatives are structured to provide sufficient fishing opportunity to achieve but not exceed ACLs. The alternatives are:

The Council considered four alternatives for 2015-2016 harvest specifications and management measures.

No Action

Harvest specifications values in place on January 1, 2014, would remain in effect for the 2015-2016 period (see Table 2-2 for the numerical values and basis for these harvest specifications). Management measures in place on December 31, 2014 would remain in place during the 2015-2016 biennial period. However, the Council may take inseason action to adjust routine management measures during the biennium.

The Preferred Alternative

Annual catch limits (ACLs) for most species are determined based on the ACLs being set equal to the ABCs with a P* value of 0.45. The ACLs for arrowtooth, lingcod south of 40°10 N. lat., longspine thornyhead north and south of 34°27 N. lat., sablefish north and south of 36° N. lat., shortspine thornyhead north and south of 34°27 N. lat., spiny dogfish, and starry flounder would be determined based on the ACLs being set equal to the ABCs with a P* value of 0.40. For some stocks ACLs are set below the ABC, in which case the P* value does necessarily determine the ACL. Overfished species ACLs are set based on rebuilding plans except for cowcod south of 40º10' N. lat., for which a new stock assessment is available. The ACL is increased from 3 mt to 10 mt and an annual catch target (ACT) of 4 mt is established. For this stock Constant catch ACLs for Dover sole and widow rockfish are increased from their 2014 values. Table 2-3 contains the preferred 2015 and 2016 harvest specifications.

Under the Preferred Alternative enhanced accountability measures to control mortality of rougheye rockfish and a sorting requirement for rougheye and blackspotted rockfish are implemented. These measures allow catch to be more accurately and responsively tracked while the rougheye rockfish/blackspotted rockish stock remains within the current slope rockfish complexes. Stocks are removed from the Other Fish complex; most are designated ecosystem component species while spiny dogfish is managed separately with its own harvest specifications. The Washington, Oregon, and California kelp greenling stocks, the Washington cabezon stock, and leopard shark remain in the Other

Fish complex. Some species currently not in the Groundfish FMP are designated EC species.[1] The EC classification is described in National Standard 1 Guidelines. EC species are monitored but not actively managed. They are species that are caught incidentally in relatively small amounts. If monitoring indicates an increasing trend in catch for an EC species, reclassification and/or appropriate management measures may be considered. In addition to moving many of the species in the Other Fish complex to the EC species designation, the Council designated several species not currently in the Groundfish FMP as EC species.

Catch control measures are established and adjusted in order to attain but not exceed the Preferred Alternative ACLs.

Alternative 1

Where applicable, ABCs are determined based on a P* value of 0.45, and the ACL is set equal to the ABC. For several stocks the ACL is set below the ABC and so the P* value does not necessarily determine the ACL. Instances where the ACL is below the ACL include specification of a fixed or constant catch level, precautionary adjustments using the 40-10 and 25-5 rules, and the use of the harvest rate specified in a rebuilding plan. Table 2-4 shows the harvest specifications for each stock under Alternative 1.

Catch control measures are established and adjusted in order to attain but not exceed the Alternative 1 ACLs.

Alternative 2

Where applicable, ACLs are determined based on the ACLs being set equal to the ABCs with a P* value of 0.25. As described above for Alternative 1, ACLs may be set below the ABC, in which case the P* value does necessarily determine the ACL. Table 2-5 contains the harvest specifications under Alternative 2.

Catch control measures are established and adjusted in order to attain but not exceed the Alternative 2 ACLs.

Amendment 24

This amendment would incorporate a description of the default harvest control rule (HCR) concept into the Groundfish FMP, which is intended to make clear that if the Council does not take action to modify an HCR, the default HCR is used, applying the best available scientific information, to calculate harvest specification numerical values. This approach helps make clear that most of the time the Council is either reapplying existing harvest policies or making modest changes within the framework set out in the Groundfish FMP and consistent with the Magnuson-Stevens Act. This action also provides an opportunity to evaluate the long-term impacts of biennial harvest specifications and management measures process in this EIS. This is intended to allow more focused analyses of future biennial actions. The description of the types of management measures that are established and adjusted during the biennial process would also be clarified as part of Amendment 24. As part of the biennial process new management measures may be implemented and existing, “routine” management measures adjusted; for example, existing catch control tools are usually changed in response to changes in ACLs. Routine measures are already part of the regulations and the effects of using these measures were previously

[1] Designating EC species requires amending in Groundfish FMP to change the classification of currently managed species and incorporate species not currently included in the FMP. These changes would be part of Amendment 24, described below.

analyzed. This allows National Marine Fisheries Service to use a simpler process to implement these regulatory changes under applicable law. Four alternatives are evaluated.

No Action

The Groundfish FMP is not amended.

Alternative 1

The default HCRs would use a P* value of **0.45** to determine the ABC, where applicable, using the best available scientific information. During the biennial harvest specifications process the Council can take action to modify the HCR and harvest specifications for the next biennial period would be based on the new HCR. FMP language describing the types of management measures developed and implemented as part of the biennial process is revised for clarification.

Alternative 2

The default HCRs would use a P* value of **0.25** to determine the ABC, where applicable, using the best available scientific information. During the biennial harvest specifications process the Council can take action to modify the HCR and harvest specifications for the next biennial period would be based on the new HCR. FMP language describing the types of management measures developed and implemented as part of the biennial process is revised for clarification.

Alternative 3

The default HCRs are the HCRs used during the previous biennial cycle. Harvest specifications are computed using the best available scientific information (such as the most recent stock assessment). During the biennial harvest specifications process the Council can take action to modify the HCR and harvest specifications for the next biennial period would be based on the new HCR. FMP language describing the types of management measures developed and implemented as part of the biennial process is revised for clarification.

Table ES-1. Schematic of the elements of the alternatives.

Element	No Action	Preferred Alternative	Alternative 1	Alternative 2
2015-16 harvest specifications and management measures	Rollover 2014 harvest specifications and management measures	Council preferred harvest specifications; adjust management measures as necessary	Harvest specifications based on p*=0.45; adjust management measures as necessary	Harvest specifications based on p*=0.25; adjust management measures as necessary

	No Action	The Preferred Option	Option 1
Stock complex reorganization and designation of Ecosystem Component Species	Slope Rockfish and Other Fish complexes not reorganized; EC species not designated	Slope Rockfish complex not reorganized; measures to monitor and manage rougheye and blackspotted rockfish catch implemented; spiny dogfish removed from Other Fish complex and managed; other species removed and designated EC species; some species not already in the FMP added as EC species	Rougheye rockfish (including blackspotted rockfish) and shortraker rockfish removed from the slope rockfish complexes and managed as a new coastwide rougheye-blackspotted-shortraker (RBS) complex

	No Action	Alternative 1	Alternative 2	Alternative 3
Amendment 24 (default HCRs and management measure process)	No Amendment	Default HCR with ABC based on **P*=0.45**; amend Section 6.2 to clarify “new” vs. “routine” measures	Default HCR with ABC based on **P*=0.25**; amend Section 6.2 to clarify “new” vs. “routine” measures	Default HCR with ABC based on **current P***; amend Section 6.2 to clarify “new” vs. “routine” measures

IMPACTS OF THE PROPOSED ACTIONS

Groundfish

Table 2-2 through Table 2-5 show 2015-2016 harvest specifications under each of the alternatives including No Action. Under the Preferred Alternative harvest control rules change for seven of the 40 stocks or stock complexes (not including Pacific whiting) for which ACLs are established. These changes are:

- The Dover sole constant catch ACL is increased from 25,000 mt to 50,000 mt
- The ACLs for shortspine thornyhead stocks north and south of 34º27' N. lat. are proportions of the coastwide ABC; the ABC is determined using a P* value of 0.4 rather than 0.45
- Spiny dogfish is removed from the Other Fish complex and managed with its own ACL, which is set equal to the ABC using a P* value of 0.4
- The constant catch ACL for widow rockfish is increased from 1,500 mt to 2,000 mt
- For the Nearshore Rockfish North complex the 40-10 precautionary adjustment is applied to determine the China rockfish contribution to the stock complex ACL (which is determined as the sum of constituent species’ ACL contributions)
- The Other Fish complex ACL is equal to the complex ABC set equal 0.45 consistent with the removal of many species from the complex, including spiny dogfish

Based on a new stock assessment, harvest specifications for cowcod, an overfished species, are changed. The Council will chooses a new target rebuilding year for the stock at its June 2014 meeting. The

Council chose a 10 mt ACL for this stock, which is consistent with the current rebuilding plan SPR-based harvest rate of 82.7%. The Council also established an annual catch target (ACT) of 4 mt as an additional precautionary measure. Catch will be managed to stay below the ACT.

ACLs for 14 of the stocks or stock complexes would increase in 2015 compared to 2014 ACLs (No Action).

Section 4.1 evaluates the biological impacts of preferred 2015-2016 harvest specifications on a select list of groundfish stocks focusing on 1) overfished stocks currently managed under rebuilding plans, 2) stocks where the Council chose a range of alternative ACLs for analysis, 3) stocks and stock complexes where total catches in recent years have been at least 80 percent of specified ACLs, and 4) stocks preferred to be removed from a status quo stock complex and managed with stock-specific harvest specifications.

Section 4.2 evaluates deductions from and allocations of the ACLs and modifications to routine management measures to control catch so that the ACLs established under the alternatives are not exceeded. Commercial fishery management measures subject to modification include catch control tools including individual fishing quota (IFQ) annual quota pound issuance, establishing tier limits for the limited entry sablefish primary season, modifying cumulative landing limits for other fisheries and species, and changes to the boundaries of time area closures to control bycatch of overfished species and other species where there is a conservation concern. Recreational management measures subject to modification include bag limits and time/area closures (seasons). At its June meeting the Council will also consider adopting several new management measures related to harvest specifications.

Section 4.8 evaluates the long-term biological impacts of setting harvest specifications and Section 4.9 describes the impacts of the range of potential modifications to routine management measures that may be made in the foreseeable future.

Socioeconomic Environment (Fishing Communities)

Under the Preferred Alternative coastwide non-whiting ex-vessel revenue is projected to increase by $16 million in 2015 compared to No Action 2014 ACLs and management measures. This represents a $19.3 million increase from annual average inflation-adjusted ex-vessel revenue, 2003-2012. Recreational angler trips are expected in increase between 167,000 and 3.9 million marine angler trips depending on the management option chosen under the Preferred Alternative. Resulting commercial and recreational income accruing to fishing communities under the Preferred Alternative would increase by between $27.3 million and $49.3 million depending on the option chosen.

For the foreseeable future changes in ex-vessel revenue, net revenue (a proxy for commercial fishery profits), recreational angler trips, and personal income will be partly a function of fishing opportunity determined by stock yield and management measures. Based on assumptions about yield and potential policies for setting harvest specifications (as described in the Amendment 24 alternatives) catches are expected to increase under most model scenarios, assuming management succeeds in achieving management objectives for stock biomass size and related fishing mortality levels. Fishing opportunity could decline if stock yields are below the most likely conditions and more conservation management policies, such as using a P* value of 0.25 to determine the ABC, were used for all stocks. Recent average catch is in most cases lower than projected ACLs under scenarios combining different assumptions about potential yield and policies for determining ABCs. These scenarios suggest that revenue and personal income is likely to increase over the long term. However, historically there has been a lot of inter-annual volatility in ex-vessel revenue in both a positive and negative direction. Declines in revenue can occur because of unaccounted for changes in yield and changing market conditions affecting prices.

Essential Fish Habitat

Over both the short and long term the adverse impacts of fishing on groundfish essential fish habitat (EFH) is expected to be similar to adverse impacts experienced in the past. These adverse impacts result from fishing gear coming in contact with the seafloor, disrupting both physical characteristics and biogenic habitat such as corals and sponges. The Council has implemented a variety of mitigation measures to address adverse impacts, and other management measures, such as Groundfish Closed Areas to control bycatch, have mitigated adverse impacts as an ancillary effect. The Council is currently reviewing the groundfish EFH designation and mitigation measures established by Amendment 19 and could establish additional mitigation measures as part of the review process. The review process will not be completed before the 2015-2016 biennial period begins.

California Current Ecosystem

The Atlantis California Current Ecosystem Model was used to simulate the effects of the range of harvest policies that may be implemented in the foreseeable future. Since ecosystem effects take a long time to be manifested, it is not possible to distinguish between short- and long-term policy choices. The alternatives considered for the 2015-2016 biennial harvest specifications parallel those considered under Amendment 24 so in general the alternatives with a more conservative policy (2015-2016 Alternative 2 and Amendment 24 Alternative 2, P*=0.25) can be equated as can the alternatives with the most risk prone policy (2015-2016 Alternative 1, Amendment 24 Alternative 1, P*=0.45). Scenarios bracketing the range of harvest policies and ecosystem productivity regimes were modeled. Scenarios with very high harvest levels and low ecosystem productivity had the most pronounced effects, resulting in significant direct effects (effects of fishing on harvested stocks) and detectable indirect effects (effects on other ecosystem components in response to changes in the abundance of harvested stocks). It is important to note that these scenarios are deterministic, in other words there is no provision for a management response to new information about stock status. In the real world, the Council and NMFS would respond to new information showing that substantial adverse effects are occurring by reducing catch limits.

Total system biomass, a general measure of indirect effects, ranged from a decline of 8% from the benchmark scenario (recent average catch, most likely ecosystem productivity state) for the low productivity-high catch scenario to an increase of 5% under high productivity-low catch scenario. For most stocks low catch was represented by recent average catch streams. Thus if catch does not change substantially from recent levels few if any indirect effects would be predicted.

One important caveat to these simulations is that catch levels for Pacific whiting were not varied, since the alternatives evaluated within this EIS do not include varying whiting harvest. However, this species has an important structuring role in the California Current Ecosystem both as forage during early life stages and a piscivore (fish eater) when adult. Pacific whiting stock size is highly variable in response to conditions affecting recruitment of juveniles into the fishable, adult population. Though the model does not include these episodic recruitment events, the high and low ecosystem productivity states considered here may bracket the productivity of Pacific whiting, as well as the other groundfish stocks evaluated within this EIS. For Pacific whiting, by years 25-30, the high productivity scenarios (under recent average catches) yields abundance that is 1.16 times higher than base productivity, and low productivity yields abundance that is 0.78 times that of base productivity. Therefore, the model results address alternative levels of whiting productivity, though not alternative whiting harvest levels.

Protected Species

Protected species include those listed under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). NMFS has also agreed to consider the effects of actions on seabirds not listed under the ESA. ESA-listed species of concern include several kinds of fish (eulachon, green sturgeon, salmon), the humpback whale, leatherback sea turtle, and the short-tailed albatross.

Similar to other environmental components, the impacts of the proposed action on protected species during the 2015-2016 biennial period, measured in terms of take and resulting mortality, is only relevant within a long-term context considering the effect of such take on population size and viability. For ESA-listed species NMFS Protected Resources Division and the US Fish and Wildlife Service have consulted on the effects of the groundfish fishery. Information on effects is provided in Biological Opinions, which contain Incidental Take Statements (ITSs). The ITSs include estimates of the number of listed species likely to be taken, a determination of whether take levels jeopardize the continued existence of the species and measures that NMFS must implement to mitigate estimated levels of take. If these take levels are exceeded consultations may be reinitiated and new mandatory measures identified.

All marine mammals are protected under the MMPA. The objective of the Act is to allow marine mammals to reach their optimum sustainable population level and to reduce human caused serious injury and mortality to the maximum extent practicable. Through periodic stock assessments the potential biological removal level of a stock is estimated. A marine mammal population can meet or sustain the optimum population when human caused mortality is below this level. Takes for all segments of the groundfish fishery, except for the sablefish pot fishery, have been determined to have a remote likelihood of or no known serious injuries or mortalities. The sablefish pot fishery has been determined to cause occasional serious injury or mortality.

At-sea observer coverage allows total marine mammal interactions to be estimated. Non-ESA listed species taken in the groundfish fishery include

- California sea lion: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake (Pacific whiting)[2]
- Harbor seal: California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake (Pacific whiting)
- Northern elephant seal: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, at-sea hake (Pacific whiting)
- Harbor porpoise: California halibut trawl
- Dall’s porpoise: At-sea hake (Pacific whiting)
- Pacific white-sided dolphin: Shoreside groundfish trawl
- Risso’s dolphin: Shoreside groundfish trawl
- Common bottlenose dolphin: Non-nearshore fixed gear

If estimated takes substantially increase such that overall human caused serious injury or mortality exceeded potential biological removal remedial actions would be taken.

Non-ESA listed seabirds are also taken in the groundfish fishery. The only species with more than negligible observed takes is the black-footed albatross. Mitigation measures in the process of being implemented to reduce the risk of takes of ESA-listed short-tailed albatross will likely have a mitigating effect for this species as well.

There is no information to conclude that under any of the alternatives the level of take of protected species will change substantially from historical baseline levels in either the short or long term.

[2] California halibut trawl is a state managed fishery and only subject to the proposed action with respect to catch accounting to ensure that ACLs are not exceeded.

Non-Groundfish Species

Groundfish fisheries catch a range of non-groundfish species in small amounts proportional to catch of groundfish. Some of these species—such as Pacific halibut, Dungeness crab, and salmon—are commercially valuable and have directed fisheries. Commercially valuable species are managed under other Council FMPs, other Federal authority, or by the states. Fishing mortality in the groundfish fishery is taken into account when managing such directed fisheries. Catch of non-groundfish species as a percent of total catch during 2003-2011 varied between 1.4% (3,801 mt) iand 5.9% (8,551 mt). Non-groundfish catch amounts did not correlate with total catch so it is not possible to predict how changes in target species fishing opportunity would affect non-groundfish catch. There is no information is conclude that non-groundfish catch is likely to exceed the historical range of catch over either the short or long term. Fishery observer data allows catch levels to be estimated so that if a substantial change in catch is detected, such that a conservation concern arises, mitigation measures could be implemented.

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Chapter 1 INTRODUCTION

1.1 How this Document is Organized

This document provides information about, and analyses of, setting groundfish harvest specifications and establishing related management measures for 2015 and subsequent years for fisheries covered by the Pacific Coast Groundfish Fishery Management Plan (hereafter, Groundfish FMP or FMP), which are developed by the Pacific Fishery Management Council (Council) in collaboration with the National Marine Fisheries Service (NMFS). Groundfish harvest specifications are set every 2 years for a 2-year period. In addition to harvest specifications and management measures for the 2015-16 biennial period, this document evaluates the impacts of setting harvest specifications and management measures over the long term. These actions must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore. The states manage their fisheries, including nearshore rockfish fisheries in the territorial sea, in a manner consistent with, or more restrictive than, the Groundfish FMP and Federal implementing regulations.

In addition to addressing MSA mandates, this document is an environmental impact statement (EIS), pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. This document is organized so that it contains the analyses required under NEPA. The proposed action must also comply with other applicable laws, which are enumerated in Chapter 6. While this EIS provides supporting information, the procedural and analytical requirements for legal mandates other than NEPA (including findings made by NMFS) may be addressed in other documents (see Chapter 6).

The EIS is organized in the following chapters and appendices:

- Chapter 1 explains why the action is being considered for the groundfish fisheries in 2015-16 and subsequent biennial cycles, including revisions to established groundfish rebuilding plans. The purpose and need statement defines the scope of the subsequent analysis.

- Chapter 2 outlines the No Action and action alternatives that have been considered to address the defined purpose and need. The Council recommends a preferred alternative from among these alternatives, which provides the basis for establishing or revising the harvest specifications and management measure regulations governing groundfish fisheries in 2015–16 and beyond. A second set of alternatives is used to evaluate a decision-making framework for establishing harvest specifications, which would be incorporated into the FMP through Amendment 24. This set of alternatives serves as the basis for evaluating the long-term impacts of setting harvest specifications and management measures.

- Chapter 3 describes the environmental components affected by the proposed action, which are groundfish and other marine fish, fishery sectors, fishing communities, protected species, essential fish habitat (EFH), and the marine ecosystem.

- Chapter 4 describes the direct, indirect, and cumulative effects of the proposed action, including the No Action and preferred alternatives, on the environmental components described in Chapter 3.

- Chapter 5 details how this action meets 10 National Standards set forth in the MSA (Section 301(a)) and groundfish FMP goals and objectives, as well as MSA-related scoping requirements and public meeting opportunities afforded through the Council process.

- Chapter 6 provides information on those laws and executive orders, in addition to the MSA, with which an action must be consistent. This chapter also describes in greater detail the NEPA process for this action, including all of the steps (Notice of Intent, scoping process under NEPA, etc.) required by the Council on Environmental Quality (CEQ) and NOAA Administrative Order (NAO) 216-6.

- Chapter 7 is the bibliography.

- Appendix A, Model Documentation, documents the models and methods used to estimate potential catches (harvest impacts) under the alternatives, and related effects on personal income and employment in fishing communities.

- Appendix B, Detailed Analysis of Management Measures, contains a focused evaluation of the performance and effects of new management measures or adjustment to existing management measures and the range of options considered by the Council and NMFS.

- Appendix C, FMP Amendment Language, contains changes to the Groundfish FMP proposed by the Council as part of the proposed action.

When implemented, the 2015-16 harvest specifications and management measures will succeed those established for the 2013-2014 biennial period and stay in place until subsequent changes are made in future biennial cycles.

1.2 Proposed Actions, Purpose and Need

1.2.1 The Proposed Action

The proposed actions are in three components: 1) Establishing harvest specifications and management measures for the 2015-2016 biennial management period, 2) changing groundfish stock complexes and designating ecosystem component species, and 3) amending the Groundfish FMP to describe how the Council would use default harvest control rules (HCRs) in their decision-making process in future biennial cycles and to clarify what are considered new and routine management measures during the biennial process. In all cases the alternative of No Action is also considered. This EIS includes an analysis of the long-term impacts of biennial harvest specifications and foreseeable adjustments to routine management measures to support decision-making in future biennial periods.

1.2.1.1 2015-2016 Biennial Harvest Specifications and Management Measures

Using the “best available scientific information,” the proposed action is to establish harvest specifications every 2 years, including the overfishing limits (OFLs), acceptable biological catches (ABCs), and annual catch limits (ACLs) for each management unit[3], consistent with the policies and procedures the Council has established for these actions and the requirements of the Pacific Coast Groundfish Fishery Management Plan (Groundfish FMP); the Magnuson-Stevens Act (MSA)—particularly the 10 National Standards enumerated in §301(a) of the MSA; and other applicable law.

Seven Pacific Coast groundfish species are currently "overfished" and managed under rebuilding plans implemented by Secretarial amendment. Within the rebuilding plans, T_{TARGET} is the key rebuilding parameter. T_{TARGET} is the projected year by which an overfished species will be rebuilt. Any change to T_{TARGET} must be demonstrated by the need to rebuild the stock in as short a time as possible, taking into account the status and biology of the stock, the needs of fishing communities, and the interaction of the stock within the marine ecosystem. Every 2 years the Council considers the best available scientific information (principally new or updated stock assessments) and determines whether it is necessary to adjust any of the existing harvest specifications or management measures necessary to achieve but not exceed ACLs. Adjustments to harvest specifications may involve changing the underlying harvest control rule.[4] These adjustments must be consistent with the MSA and the Groundfish FMP. The proposed action includes setting harvest specifications and management measures for the 2015-2016 biennial period and revising Federal regulations at 50 CFR 660, Subparts C through G accordingly.

1.2.1.2 Stock Complex Reorganization and Designation of Ecosystem Component Species

The proposed action is also to change the organization of the Slope Rockfish and Other Fish stock complexes used to manage west coast groundfish fisheries. National Standard 1 Guidelines at 50 CFR 660.310(d)(8) describe stock complexes and reasons for using them in management. A stock complex is "a group of stocks that are sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks is similar." Stocks may be grouped into complexes for various reasons, including where stocks in a multispecies fishery cannot be targeted independent of one another and MSY cannot be defined on a stock-by-stock basis; where there is insufficient data to measure their stock status; or when it is not feasible for fishermen to distinguish individual stocks among their catch. Most groundfish species are managed in a stock complex are data poor stocks without full stock assessments. However, some stocks within the complexes have been assessed.

The Other Fish complex historically contained various non-target species that were often bycatch (not retained, landed, sold, or kept for personal use). The ecosystem component (EC) species designation is described in National Standard 1 Guidelines at 50 CFR 600.310(d)(5). EC species should be a non-target stock; not subject to overfishing determined to be overfished, or approaching the overfished threshold or become so in the absence of management measures; and not generally retained for sale or personal use. Because many of the species in the Other Fish complex fit the criteria for designating EC species, it makes sense to reclassify them in this category. EC species are not considered "in the fishery" and ACLs are not set for them. Other species not currently included in the Groundfish FMP are considered for EC species designation, because they are occasionally caught and closer monitoring of these catches could help identify potential conservation problems, for example if catches began to dramatically increase.

[3] Management units are stocks occurring throughout the west coast EEZ ("coastwide"), geographic subdivisions of stocks in the EEZ, and geographically subdivided stock complexes composed of more than one managed species.

[4] "Harvest control rule" means the methods adopted to determine harvest specifications, based on criteria in the MSA and Groundfish FMP. Harvest specifications are the numerical values determined by applying the harvest control rule (or harvest policy) to the best available scientific information about the status and characteristics of a stock or management unit.

1.2.1.3 Default Harvest Control Rules and Rebuilding Plan Revision Criteria

The proposed action includes Amendment 24 to the Groundfish FMP, which modifies the harvest specification procedures described in the Plan so that, in the absence of Council action, harvest specification values based on default harvest control rules for one or more stocks may be established. During any biennial decision-making process the Council may depart from these default values by deciding to modify the harvest control rule for one or more management unit. Such changes would form the basis of the "action alternatives" in future impact analyses. Reducing the number of decision points is expected to reduce the amount of Council and committee time spent on harvest specification deliberations as well as reduce the scope of action and analysis needed for implementation

1.2.1.4 Evaluation of the Long-Term Impacts of Setting Biennial Harvest Specifications and Management Measures

To evaluate environmental impacts of these periodic changes over a longer time period, estimates of harvest specification values for a 10-year sample period (2015-24) are evaluated in Chapter 4. The ability to establish and adjust harvest levels is the first major tool at the Council's disposal to exercise its resource stewardship responsibilities. Each biennial fishing period, the Council assesses the biological, social, and economic condition of the groundfish fishery and updated MSY estimates or proxies for specific stocks (management units) where new information on the population dynamics is available. Based upon the best scientific information available, the Council will evaluate the current level of fishing relative to the MSY level for stocks where sufficient data are available and recommend harvest specifications for the subsequent 2-years. The Council recommended harvest specification are published in Federal regulation. The evaluation of the long-term impacts of setting harvest specifications and related management measures for the foreseeable future is intended to encompass the range of likely impacts that could occur over more than just the next biennial management period (2015-16). Section 6.6 discusses the methods that will be use to evaluate unforeseen environmental impacts in future biennial periods (2017-18 and subsequent).

1.2.2 Purpose and Need

The purpose of the proposed action is to conserve and manage groundfish fishery resources to prevent overfishing, to rebuild overfished stocks, to ensure conservation, to facilitate long-term protection of essential fish habitat (EFH), and to realize the full potential of the Nation's fishery resources (MSA §2(a)(6)). These harvest specifications are set consistent with the optimum yield (OY) harvest management framework described in Chapter 4 of the Groundfish FMP.

In addition to the above conservation objective, the use of default HCRs (Amendment 24) coupled with the evaluation of the long-term impacts of the action is needed to streamline the administrative and regulatory processes involved in setting specifications for the Pacific Coast groundfish fishery, while, at the same time, maintaining consistency with the MSA and other applicable law. Evaluating the environmental impacts of setting harvest specifications and apportionment of harvest levels (described in Groundfish FMP Chapter 5) and related fishery regulations (described in Groundfish FMP Section 6.2), as needed, over the long term will make the regulatory process more efficient and provide more information to stakeholders about the future status and management of fisheries. The initial evaluation of the range of impacts expected over the long term will be followed up with focused evaluation when regulations are periodically adjusted. This two tier approach to evaluating harvest specifications should meet the following objectives:

- Maintain or improve the timeliness of scientific input into the decision-making process.
- Articulate and apply adaptive management principles, which are embodied in the Groundfish FMP, when evaluating the effects of periodic changes.

- Build workload assessment and priority setting into the process for identifying and recommending management measures, consistent with administrative resources and conservation objectives.
- Incorporate guidance on preparing efficient and timely NEPA reviews, including tiering of environmental documents and incorporation by reference.[5]
- Include decision-making procedures for setting harvest specifications that allow reasonably accurate forecasts of impacts for a period longer than 2 years. This could involve the Council adopting default procedures for setting harvest specifications (which the Council could override if circumstances warrant).
- Present information to decision-makers and the public in an effective and usable format.
- Ensure a transparent process where decisions and their rationale are clearly explained to the public before Council decisions so that the public has the opportunity to provide meaningful input.
- Build an administrative record that effectively explains the rationale for the decision.

To the degree possible, periodic adjustments to these harvest specifications should involve small changes from the harvest management objectives of the previous period so as to minimize socioeconomic disruption.

Reorganizing stock complexes needs to be considered to ensure that overfishing is not occurring on stocks managed within complexes. This supports the objectives of the MSA described above. Stock complex harvest specifications are set consistent with the harvest management framework described in Chapter 4 of the Groundfish FMP.

1.2.3 Geographic Context

Federally-managed Pacific groundfish fisheries occurring within the EEZ off the coasts of Washington, Oregon, and California (WOC) establish the geographic context for the proposed action. West coast communities engaged in these fisheries are also part of the context (see Figure 1-1). Although this is the Federal fishery management area, the states manage the fisheries in the territorial sea to meet the goals and objectives of the Groundfish FMP.[6]

[5] See the March 6, 2012 Memorandum from Nancy H. Sutley, Chair, Council on Environmental Quality, on this topic.

[6] The impact evaluation focuses on the Federal fishery management area, which is distinct from the action area as defined by the Endangered Species Act and specified in applicable Biological Opinions.

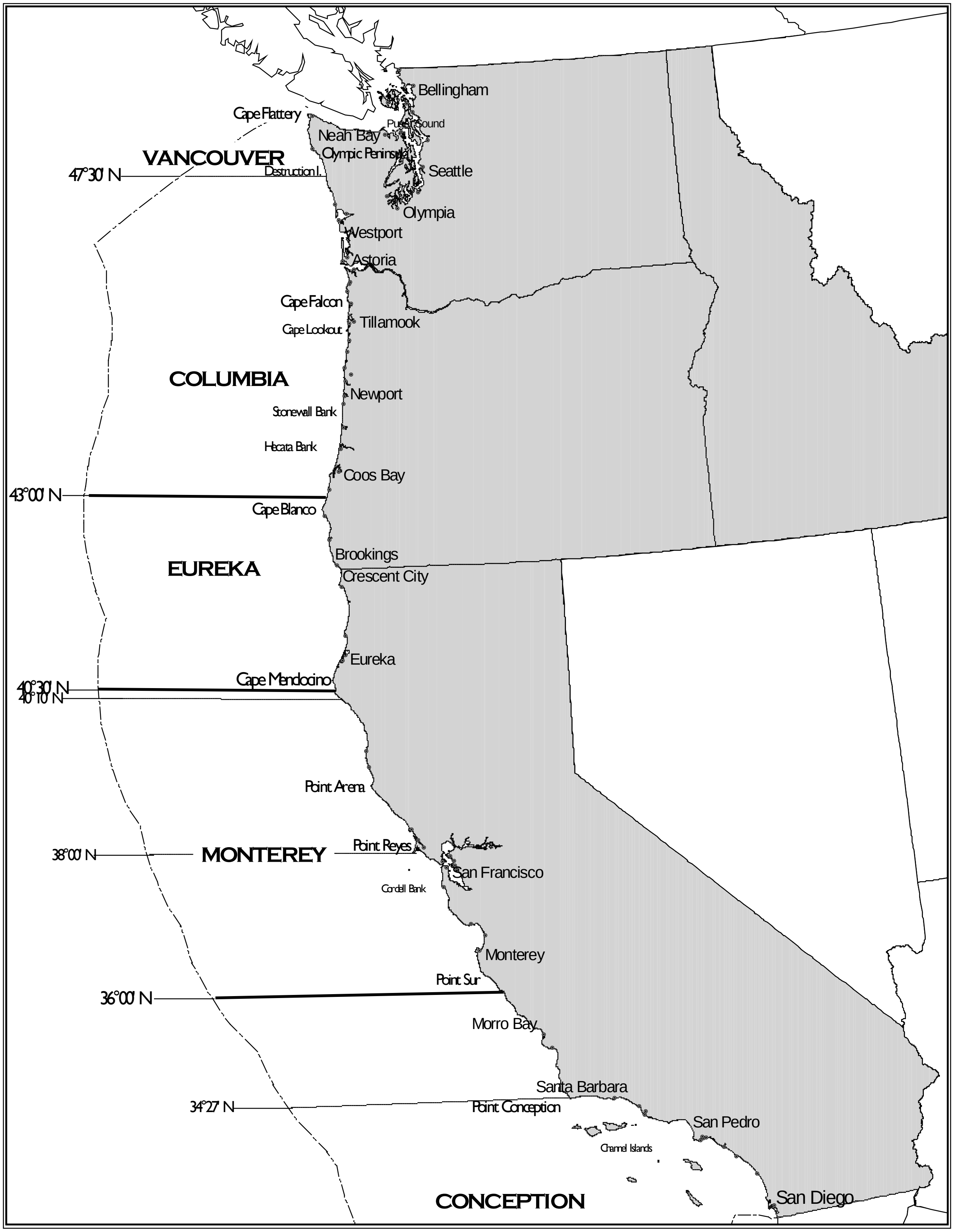

Figure 1-1.The action area, showing major coastal communities and groundfish management areas.

Chapter 2 ALTERNATIVES

The alternatives are based on the proposed actions described in Section 1.2.1:

> Harvest Specifications and Management Measures for the 2015-2016 Biennial Period: Recommending harvest specifications and management measures for the 2015-2016 biennial period, which would be published in Federal regulations and remain effective until changed.
>
> Reorganizing the Other Fish and Slope Rockfish Complexes and Designating Ecosystem Component Species: Changing the composition of the Other Fish and Slope Rockfish stock complexes, creating a new stock complex for some current constituents of the Slope Rockfish complexes, removing stocks from the Other Fish complex for single stock management or designation as EC species, and designating species not already in the FMP as EC species.
>
> Amend the Groundfish FMP to Describe Default Harvest Control Rules and Management Measures Considered during the Biennial Decision Cycle: Default harvest control rule (HCR) framework used to calculate default ACLs. Default ACLs represent a starting point for Council decision-making on catch limits for the next biennial period. Management measures considered during the biennial management and regulatory amendment processes better described

Stock complex reorganization and EC species are considered options nested under the range of alternatives for the biennial and FMP amendment actions. Table 2-1 summarizes the alternatives, which are described in subsequent sections.

Table 2-1. Schematic of the elements of the alternatives.

Element	No Action	Preferred Alternative	Alternative 1	Alternative 2
2015-16 harvest specifications and management measures	Rollover 2014 harvest specifications and management measures	Council preferred harvest specifications; adjust management measures as necessary	Harvest specifications based on p*=0.45; adjust management measures as necessary	Harvest specifications based on p*=0.25; adjust management measures as necessary
	No Action	**The Preferred Option**		**Option 1**
Stock complex reorganization and designation of Ecosystem Component Species	Slope Rockfish and Other Fish complexes not reorganized; EC species not designated	Slope Rockfish complex not reorganized; measures to monitor and manage rougheye and blackspotted rockfish catch implemented; spiny dogfish removed from Other Fish complex and managed; other species removed and designated EC species; some species not already in the FMP added as EC species		Rougheye rockfish (including blackspotted rockfish) and shortraker rockfish removed from the slope rockfish complexes and managed as a new coastwide rougheye-blackspotted-shortraker (RBS) complex
	No Action	**Alternative 1**	**Alternative 2**	**Alternative 3**
Amendment 24 (default HCRs and management measure process)	No Amendment	Default HCR with ABC based on **P*=0.4**5; amend Section 6.2 to clarify "new" vs. "routine" measures	Default HCR with ABC based on **P*=0.25**; amend Section 6.2 to clarify "new" vs. "routine" measures	Default HCR with ABC based on **current P***; amend Section 6.2 to clarify "new" vs. "routine" measures

2.1 Alternatives for the 2015-2016 Biennial Period

The components of the proposed action described above are long-term changes to the biennial decision-making process that will be incorporated into the Groundfish FMP by amendment. The Council must also adopt harvest specifications and management measures for the 2015-2016 biennial period.

This section describes four "integrated" alternatives, including the No Action alternative, that could be implemented to manage groundfish fisheries during the 2015-2016 period. They are integrated in the sense that each alternative includes a suite of harvest specifications and related management measures, thus comprising a complete management program. These measures are described in more detail in Chapter 4, because they are the mechanism by which harvest specifications and other Groundfish FMP policies are implemented. These management measures regulate the behavior of fishery participants, which determines the environmental impacts. In this sense they are part of the impact mechanism connecting the objectives of the action (described in Chapter 1) to the expected effects on the human environment.

These integrated alternatives are described in Sections 2.1.1.1 through 2.1.1.2.

Harvest specifications include ACLs for all stocks and stock complexes managed under the Pacific Coast Groundfish FMP (PFMC and NMFS 2011). Management measures are designed to keep the mortality of these stocks and stock complexes at or below the catch limits. Many Pacific Coast groundfish stocks are caught together in the fishery, and the MSA requires the Council and NMFS to rebuild overfished stocks in a time period "as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities … and the interaction of the overfished stock of fish within the marine ecosystem…" (MSA, sec. 304(e)(4)(A)). Given the nature of the fishery and this mandate, integrated alternatives, which describe the management program (i.e., harvest specifications and management measures), are used for the impact evaluation.

Harvest specifications comprise three metrics applied to all groundfish stocks and stock complexes using the best available scientific information:

- The overfishing limit (OFL), indicating a level of catch mortality above which overfishing is occurring;
- The acceptable biological catch (ABC), a reduction from the OFL to account for scientific uncertainty in estimates, based on Scientific and Statistical Committee (SSC) recommendations; and
- The ACL set at or below the ABC and the basis for managing catch mortality.

Existing management measures include deductions from the ACLs which are used to account for catch in research activities, tribal, recreational, and incidental catch in non-groundfish fisheries; allocation of fishing opportunity to various components or "sectors" of the fishery (long-term formal allocations in the FMP or short-term two-year allocations); and various management measures that may be adjusted through regulatory action (described in detail as part of No Action, see Section 4.2). The Council is also proposing several new accountability measures to improve program performance and fishing opportunity, among other purposes.

The management programs represented by each of the integrated alternatives are assembled in step-wise fashion. The Council and NMFS first decide the harvest specifications and then management measures are proposed to keep total catch mortality within the ACLs specified for each alternative. The analysis of the integrated alternatives provides a better understanding of how the amount of allowable species harvest affects different fisheries and coastal fishing communities.

2.1.1 Harvest Specifications

The harvest specifications alternatives for 2015-16 are constructed to be consistent with the Amendment 24 alternatives described in Section 2.3:

- No Action: 2014 harvest specifications and management measures as of January 1, 2014.
- Preferred: Council-preferred harvest specifications for 2015-16.
- Alternative 1: Where applicable, ACLs determined based on a P* value of 0.45. For ACLs set below to the ABC, the P* value does not necessarily determine the ACL.
- Alternative 2: Where applicable, ACLs determined based on a P* value of 0.25.

Under any of the default HCR frameworks considered for Amendment 24 (described in Alternatives 1-3), the Council has the flexibility to choose ACLs that are different from the defaults for use in the next biennial period, as long as they are consistent with the framework in the Groundfish FMP and the MSA. This framework is described in Chapter 4 of the Groundfish FMP. Groundfish FMP Section 4.4 describes methods for determining the OFL and ABC values according to three categories related to the amount of information available for the stock. Groundfish FMP Sections 4.6 and 4.7 describe adjustments to the ABC to determine the ACL; the annual catch target (ACT), if used; and the application of the optimum yield concept. This includes the 25-5 and 40-10 precautionary reductions and procedures for developing and revising rebuilding plans for overfished species. Procedures for such adjustments vary according to the same three categories described in FMP Section 4.4

2.1.1.1 No Action

Under the No Action alternative, the harvest specifications values in place on January 1, 2014, would remain in effect for the 2015-2016 period (Table 2-2). A detailed description of existing management measures and their associated impacts to groundfish stocks under No Action is presented by fishery in Section 4.2.

2.1.1.2 Preferred Alternative

Table 2-3 contains the preferred 2015 and 2016 harvest specifications. The ACLs for most species are determined based on the ACLs being set equal to the ABCs with a P* value of 0.45. The ACLs for arrowtooth, lingcod south of 40°10 N. lat., longspine thornyhead north and south of 34°27 N. lat., sablefish north and south of 36° N. lat., shortspine thornyhead north and south of 34°27 N. lat., spiny dogfish, and starry flounder would be determined based on the ACLs being set equal to the ABCs with a P* value of 0.40. As described above for Alternative 1, ACLs may be set below the ABC, in which case the P* value does necessarily determine the ACL. The impacts of adjusting and implementing new management measures (described in Section 2.1.2) in response to the harvest specifications under The Preferred Alternative are presented by fishery in Section 4.2.

The preferred alternative changes the ACLs for Dover sole and widow rockfish, from the No Action constant catch strategies of 25,000 mt and 1,500 mt, respectively for the two species to 50,000 mt and 2,000 mt, respectively. An additional ACL alternative of 3,000 mt for widow rockfish is analyzed in Chapter 4.

The status quo slope rockfish complexes north and south of 40º10’ N lat. are preferred; however, unlike status quo, a sorting requirement would be specified for rougheye and blackspotted rockfish. An alternative structure for the slope rockfish complexes where rougheye, blackspotted, and shortraker rockfish are removed from the current complexes and managed in a new coastwide complex is analyzed in this EIS in Chapter 4.

The preferred alternative for the Other Fish complex also differs from No Action. Spiny dogfish is removed from the status quo Other Fish complex and managed with stock-specific harvest specifications. All the skates and Pacific grenadier currently managed under the Other Fish complex, along with all other endemic skates and grenadiers are designated as Ecosystem Component (EC) species. Additionally, spotted ratfish, soupfin shark, and finescale codling are designated as EC species under the preferred alternative. The remaining stocks managed under the preferred Other Fish complex are the California, Oregon, and Washington stocks of kelp greenling; the Washington stock of cabezon; and leopard shark.

Section 2.2 further describes these options.

2.1.1.3 Alternative 1 – Default HCRs use a P* Value of 0.45

Table 2-4 contains the harvest specifications under Alternative 1. Where applicable, ABCs are determined based on a P* value of 0.45, and the ACL is set equal to the ABC. The rightmost column in Table 2-4 shows the ACL harvest control rule for each stock under Alternative 1. For several stocks the ACL is set below the ABC and so the P* value does not necessarily determine the ACL. Instances where the ACL is below the ACL include specification of a fixed or constant catch level, precautionary adjustments using the 40-10 and 25-5 rules, and the use of the harvest rate specified in a rebuilding plan. The impacts of adjusting and implementing new management measures (described in Section 2.1.2) in response to the harvest specifications under Alternative 1 are presented by fishery in Section 4.2.

The No Action ACLs of 25,000 mt and 1,500 mt for Dover sole and widow rockfish, respectively are analyzed under Alternative 1.

The slope rockfish and Other Fish complexes under Alternative 1 are structured the same as under the preferred alternative.

2.1.1.4 Alternative 2 – Default HCRs use a P* Value of 0.25

Table 2-5 contains the harvest specifications under Alternative 2. Where applicable, ACLs are determined based on the ACLs being set equal to the ABCs with a P* value of 0.25. As described above for Alternative 1, ACLs may be set below the ABC, in which case the P* value does necessarily determine the ACL. The impacts of adjusting and implementing new management measures (described in Section 2.1.2) in response to the harvest specifications under Alternative 2 are presented by fishery in Section 4.2.

The No Action ACLs of 25,000 mt and 1,500 mt for Dover sole and widow rockfish, respectively are analyzed under Alternative 2.

The slope rockfish and Other Fish complexes under Alternative 2 are structured the same as under the preferred alternative, but the ACLs are based on setting the contribution ABCs of component stocks based on a P* of 0.25.

Table 2-2. Harvest specifications for stocks and stock complexes for 2015-2016 under No Action. The harvest control rule used to calculate the ACLs are shown in the right column.

Stock*	Area	OFL	ABC	ACL	ACL Harvest Control Rule
BOCACCIO	S of 40º10' N. lat.	881	842	337	SPR = 77.7%
CANARY	Coastwide	741	709	119	SPR = 88.7%
COWCOD	S of 40º10' N. lat.	12	9	3	SPR = 82.7% (F = 0.007); ACT =- 4 mt
DARKBLOTCHED	Coastwide	553	529	330	SPR = 64.9%
PACIFIC OCEAN PERCH	N of 40º10' N. lat.	838	801	153	SPR = 86.4%
PETRALE SOLE	Coastwide	2,774	2,652	2,652	25-5 rule (P* = 0.45)
YELLOWEYE	Coastwide	51	43	18	SPR = 76.0%
Arrowtooth flounder	Coastwide	6,912	5,758	5,758	ACL = ABC (P* = 0.4)
Black	N of 46º16' N. lat.	428	409	409	ACL = ABC (P* = 0.45)
Black	S of 46º16' N. lat.	1,166	1,115	1,000	1,000 mt constant catch
Cabezon	46º16' to 42º N. lat.	49	47	47	ACL = ABC (P* = 0.45)
Cabezon	S of 42º N. lat.	165	158	158	ACL = ABC (P* = 0.45)
California scorpionfish	S of 34°27' N. lat.	122	117	117	ACL = ABC (P* = 0.45)
Chilipepper	S of 40º10' N. lat.	1,722	1,647	1,647	ACL = ABC (P* = 0.45)
Dover sole	Coastwide	77,774	74,352	25,000	25,000 mt constant catch
English sole	Coastwide	5,906	5,646	5,646	ACL = ABC (P* = 0.45)
Lingcod	N of 40'10º N. lat.	3,162	2,878	2,878	ACL = ABC (P* = 0.45)
Lingcod	S of 40'10º N. lat.	1,276	1,063	1,063	ACL = ABC (P* = 0.45)
Longnose skate	Coastwide	2,816	2,692	2,000	2,000 mt constant catch
Longspine thornyhead	Coastwide	3,304	2,752	NA	NA
	N of 34º27' N. lat.	NA	NA	1,958	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 34º27' N. lat.	NA	NA	347	ACL = prop. of coastwide ABC (P* = 0.4)
Pacific cod	Coastwide	3,200	2,221	1,600	1,600 mt constant catch
Pacific whiting	Coastwide	NA	NA	NA	NA

Stock*	Area	OFL	ABC	ACL	ACL Harvest Control Rule
Sablefish	Coastwide	7,158	6,535	NA	NA
	N of 36º N. lat.	NA	NA	4,349	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 36º N. lat.	NA	NA	1,560	ACL = prop. of coastwide ABC (P* = 0.4)
Shortbelly	Coastwide	6,950	5,789	50	50 mt constant catch
Shortspine thornyhead	Coastwide	2,310	2,208	NA	NA
	N of 34º27' N. lat.	NA	NA	1,525	ACL = prop. of coastwide ABC (P* = 0.45)
	S of 34º27' N. lat.	NA	NA	393	ACL = prop. of coastwide ABC (P* = 0.45)
Splitnose	S of 40º10' N. lat.	1,747	1,670	1,670	ACL = ABC (P* = 0.45)
Starry flounder	Coastwide	1,834	1,528	1,528	ACL = ABC (P* = 0.4)
Widow	Coastwide	4,435	4,212	1,500	1,500 mt constant catch
Yellowtail	N of 40º10' N. lat.	4,584	4,382	4,382	ACL = ABC (P* = 0.45)
Nearshore Rockfish N	N of 40º10' N. lat.	110	94	94	ACL = ABC (P* = 0.45); 40-10 adj. for blue in CA
Nearshore Rockfish S	S of 40º10' N. lat.	1,160	1,001	990	ACL = ABC (P* = 0.45); 40-10 adj. for blue N of Pt. Con.
Other Fish	Coastwide	6,802	4,697	4,697	ACL = ABC (P* = 0.4; P* = 0.3 for spiny dogfish)
Other Flatfish	Coastwide	10,060	6,982	4,884	ACL = ABC (P* = 0.4)
Shelf Rockfish N	N of 40º10' N. lat.	2,195	1,932	968	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted in CA
Shelf Rockfish S	S of 40º10' N. lat.	1,913	1,620	714	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted N of Pt. Con.
Slope Rockfish N	N of 40º10' N. lat.	1,553	1,414	1,160	ACL = ABC (P* = 0.45)
Slope Rockfish S	S of 40º10' N. lat.	685	622	622	ACL = ABC (P* = 0.45); 40-10 adj. for blackgill

*Overfished stocks in CAPs; stock complexes in *italics*.

Table 2-3. Preferred harvest specifications for stocks and stock complexes for 2015-2016. The harvest control rule used to calculate the ABCs and ACLs are shown in the right column.

Stock*	Area	2015			2016			Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
BOCACCIO	S of 40º10' N. lat.	1,444	1,380	349	1,351	1,291	362	SPR = 77.7%
CANARY	Coastwide	733	701	122	729	697	125	SPR = 88.7%
COWCOD	S of 40º10' N. lat.	67	60	10	68	62	10	SPR = 82.7% (E = 0.007); ACT =- 4 mt
DARKBLOTCHED	Coastwide	574	549	338	580	554	346	SPR = 64.9%
POP	N of 40º10' N. lat.	842	805	158	850	813	164	SPR = 86.4%
PETRALE SOLE	Coastwide	2,946	2,816	2,816	3,044	2,910	2,910	25-5 rule (P* = 0.45)
YELLOWEYE	Coastwide	52	47	18	52	47	19	SPR = 76.0%
Arrowtooth flounder	Coastwide	6,599	5,497	5,497	6,396	5,328	5,328	ACL = ABC (P* = 0.4)
Black	WA	421	402	402	423	404	404	ACL = ABC (P* = 0.45)
Black	OR & CA	1,176	1,124	1,000	1,183	1,131	1,000	1,000 mt constant catch
Cabezon	OR	49	47	47	49	47	47	ACL = ABC (P* = 0.45)
Cabezon	CA	161	154	154	158	151	151	ACL = ABC (P* = 0.45)
California scorpionfish	S of 34°27' N. lat.	119	114	114	117	111	111	ACL = ABC (P* = 0.45)
Chilipepper	S of 40º10' N. lat.	1,703	1,628	1,628	1,694	1,619	1,619	ACL = ABC (P* = 0.45)
Dover sole	Coastwide	66,871	63,929	50,000	59,221	56,615	50,000	50,000 mt constant catch
English sole	Coastwide	12,092	11,040	11,040	8,493	7,754	7,754	ACL = ABC (P* = 0.45)
Lingcod	N of 40'10º N. lat.	3,010	2,830	2,830	2,891	2,719	2,719	ACL = ABC (P* = 0.45)
Lingcod	S of 40'10º N. lat.	1,205	1,004	1,004	1,136	946	946	ACL = ABC (P* = 0.4)
Longnose skate	Coastwide	2,449	2,341	2,000	2,405	2,299	2,000	2,000 mt constant catch
Longspine thornyhead	Coastwide	5,007	4,171	NA	4,763	3,968	NA	NA
	N of 34º27' N. lat.	NA	NA	3,170	NA	NA	3,015	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 34º27' N. lat.	NA	NA	1,001	NA	NA	952	ACL = prop. of coastwide ABC (P* = 0.4)
Pacific cod	Coastwide	3,200	2,221	1,600	3,200	2,221	1,600	1,600 constant catch
Pacific whiting	Coastwide	NA	NA	NA	NA	NA	NA	NA
Sablefish	Coastwide	7,857	7,173	NA	8,526	7,784	NA	NA
	N of 36º N. lat.	NA	NA	4,793	NA	NA	5,241	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 36º N. lat.	NA	NA	1,719	NA	NA	1,880	ACL = prop. of coastwide ABC (P* = 0.4)

Stock*	Area	2015			2016			Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
Shortbelly	Coastwide	6,950	5,789	50	6,950	5,789	50	50 mt constant catch
Shortspine thornyhead	Coastwide	3,203	2,668	NA	3,169	2,640	NA	NA
	N of 34º27' N. lat.	NA	NA	1,745	NA	NA	1,726	ACL = prop. of coastwide ABC (P* = 0.4)
	S of 34º27' N. lat.	NA	NA	923	NA	NA	913	ACL = prop. of coastwide ABC (P* = 0.4)
Spiny Dogfish	Coastwide	2,523	2,101	2,101	2,503	2,085	2,085	ACL = ABC (P* = 0.4)
Splitnose	S of 40º10' N. lat.	1,794	1,715	1,715	1,826	1,746	1,746	ACL = ABC (P* = 0.45)
Starry flounder	Coastwide	1,841	1,534	1,534	1,847	1,539	1,539	ACL = ABC (P* = 0.4)
Widow	Coastwide	4,137	3,929	2,000	3,990	3,790	2,000	2,000 mt constant catch
Yellowtail	N of 40º10' N. lat.	12,281	11,213	11,213	11,647	10,634	10,634	ACL = ABC (P* = 0.45)
Nearshore Rockfish N	N of 40º10' N. lat.	88	77	69	88	77	69	ACL = ABC (P* = 0.45); 40-10 adj. for blue in CA + China
Nearshore Rockfish S	S of 40º10' N. lat.	1,313	1,169	1,114	1,288	1,148	1,006	ACL = ABC (P* = 0.45); 40-10 adj. for blue N of Pt. Con.
Shelf Rockfish N	N of 40º10' N. lat.	2,209	1,944	1,944	2,218	1,953	1,952	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted in CA
Shelf Rockfish S	S of 40º10' N. lat.	1,918	1,625	1,624	1,919	1,626	1,625	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted N of Pt. Con.
Slope Rockfish N	N of 40º10' N. lat.	1,804	1,669	1,669	1,818	1,683	1,683	ACL = ABC (P* = 0.45)
Slope Rockfish S	S of 40º10' N. lat.	806	698	687	807	699	689	ACL = ABC (P* = 0.45); 40-10 adj. for blackgill
Other Flatfish	Coastwide	11,298	8,620	8,620	9,948	7,496	7,496	ACL = ABC (P* = 0.4)
Other Fish	Coastwide	291	242	242	291	243	243	ACL = ABC (P* = 0.45)

*Overfished stocks in CAPs; stock complexes in *italics*.

Table 2-4. Harvest specifications for stocks and stock complexes for 2015-2016 under Alternative 1. The harvest control rule used to calculate the ACLs are shown in the right column. Overfished stocks are designated in all caps.

Stock*	Area	2015			2016			ACL Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
BOCACCIO	S of 40º10' N. lat.	1,444	1,380	349	1,351	1,291	362	SPR = 77.7%
CANARY	Coastwide	733	701	122	729	697	125	SPR = 88.7%
COWCOD	S of 40º10' N. lat.	67	60	10	68	62	10	SPR = 82.7% (E = 0.007); ACT =- 4 mt
DARKBLOTCHED	Coastwide	574	549	338	580	554	346	SPR = 64.9%
POP	N of 40º10' N. lat.	842	805	158	850	813	164	SPR = 86.4%
PETRALE SOLE	Coastwide	2,946	2,816	2,816	3,044	2,910	2,910	25-5 rule (P* = 0.45)
YELLOWEYE	Coastwide	52	47	18	52	47	19	SPR = 76.0%
Arrowtooth flounder	Coastwide	6,599	6,025	6,025	6,396	5,840	5,840	ACL = ABC (P* = 0.45)
Black	WA	421	402	402	423	404	404	ACL = ABC (P* = 0.45)
Black	OR & CA	1,176	1,124	1,000	1,183	1,131	1,000	1,000 mt constant catch
Cabezon	OR.	49	47	47	49	47	47	ACL = ABC (P* = 0.45)
Cabezon	CA	161	154	154	158	151	151	ACL = ABC (P* = 0.45)
California scorpionfish	S of 34°27' N. lat.	119	114	114	117	111	111	ACL = ABC (P* = 0.45)
Chilipepper	S of 40º10' N. lat.	1,703	1,628	1,628	1,694	1,619	1,619	ACL = ABC (P* = 0.45)
Dover sole	Coastwide	66,871	63,929	25,000	59,221	56,615	25,000	25,000 mt constant catch
English sole	Coastwide	12,092	11,040	11,040	8,493	7,754	7,754	ACL = ABC (P* = 0.45)
Lingcod	N of 40'10º N. lat.	3,010	2,830	2,830	2,891	2,719	2,719	ACL = ABC (P* = 0.45)
Lingcod	S of 40'10º N. lat.	1,205	1,100	1,100	1,136	1,037	1,037	ACL = ABC (P* = 0.45)
Longnose skate	Coastwide	2,449	2,341	2,000	2,405	2,299	2,000	2,000 mt constant catch
Longspine thornyhead	Coastwide	5,007	4,571	NA	4,763	4,349	NA	NA
	N of 34º27' N. lat.	NA	NA	3,474	NA	NA	3,305	ACL = prop. of coastwide ABC (P* = 0.45)
	S of 34º27' N. lat.	NA	NA	1,097	NA	NA	1,044	ACL = prop. of coastwide ABC (P* = 0.45)
Pacific cod	Coastwide	3,200	2,669	1,600	3,200	2,669	1,600	1,600 constant catch
Pacific whiting a/	Coastwide	626,364	NA	269,745	626,364	NA	269,745	The U.S. 2013 TAC is used as the ACL proxy
Sablefish	Coastwide	7,857	7,511	NA	8,526	8,151	NA	NA
	N of 36º N. lat.	NA	NA	5,012	NA	NA	5,467	ACL = prop. of coastwide ABC (P* = 0.45)
	S of 36º N. lat.	NA	NA	1,798	NA	NA	1,961	ACL = prop. of coastwide ABC (P* = 0.45)
Shortbelly	Coastwide	6,950	6,345	50	6,950	6,345	50	50 mt constant catch

Stock*	Area	2015			2016			ACL Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
Shortspine thornyhead	Coastwide	3,203	2,924	NA	3,169	2,893	NA	NA
	N of 34º27' N. lat.	NA	NA	1,913	NA	NA	1,892	ACL = prop. of coastwide ABC (P* = 0.45)
	S of 34º27' N. lat.	NA	NA	1,012	NA	NA	1,001	ACL = prop. of coastwide ABC (P* = 0.45)
Spiny Dogfish	Coastwide	2,523	2,303	2,303	2,503	2,286	2,285	ACL = ABC (P* = 0.45)
Splitnose	S of 40º10' N. lat.	1,794	1,715	1,715	1,826	1,746	1,746	ACL = ABC (P* = 0.45)
Starry flounder	Coastwide	1,841	1,681	1,681	1,847	1,686	1,686	ACL = ABC (P* = 0.45)
Widow	Coastwide	4,137	3,929	1,500	3,990	3,790	1,500	1,500 mt constant catch
Yellowtail	N of 40º10' N. lat.	12,281	11,213	11,213	11,647	10,634	10,634	ACL = ABC (P* = 0.45)
Nearshore Rockfish N	N of 40º10' N. lat.	88	77	69	88	77	69	ACL = ABC (P* = 0.45); 40-10 adj. for blue in CA + China
Nearshore Rockfish S	S of 40º10' N. lat.	1,313	1,169	1,114	1,288	1,148	1,006	ACL = ABC (P* = 0.45); 40-10 adj. for blue N of Pt. Con.
Shelf Rockfish N	N of 40º10' N. lat.	2,209	1,944	1,944	2,218	1,953	1,952	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted in CA
Shelf Rockfish S	S of 40º10' N. lat.	1,918	1,625	1,624	1,919	1,626	1,625	ACL = ABC (P* = 0.45); 40-10 adj. for greenspotted N of Pt. Con.
Slope Rockfish N	N of 40º10' N. lat.	1,804	1,669	1,669	1,818	1,683	1,683	ACL = ABC (P* = 0.45)
Slope Rockfish S	S of 40º10' N. lat.	806	698	687	807	699	689	ACL = ABC (P* = 0.45); 40-10 adj. for blackgill
Other Flatfish	Coastwide	11,298	9,865	9,865	9,948	8,633	8,633	ACL = ABC (P* = 0.45)
Other Fish	Coastwide	291	242	242	291	243	243	

*Overfished stocks in CAPs; stock complexes in *italics*.
a/ The 2013 Pacific whiting TAC was analyzed under Alternative 1.

Table 2-5. Harvest specifications for stocks and stock complexes for 2015-2016 under Alternative 2. The harvest control rule used to calculate the ACLs are shown in the right column.

Stock*	Area	2015			2016			ACL Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
BOCACCIO	S of 40º10' N. lat.	1,444	1,132	349	1,351	1,059	362	SPR = 77.7%
CANARY	Coastwide	733	575	122	729	572	125	SPR = 88.7%
COWCOD	S of 40º10' N. lat.	67	38	10	68	39	10	SPR = 82.7% (E = 0.007); ACT =- 4 mt
DARKBLOTCHED	Coastwide	574	450	338	580	455	346	SPR = 64.9%
POP	N of 40º10' N. lat.	842	660	158	850	666	164	SPR = 86.4%
PETRALE SOLE	Coastwide	2,946	2,310	2,310	3,044	2,386	2,386	25-5 rule (P* = 0.25)
YELLOWEYE	Coastwide	52	32	18	52	32	19	SPR = 76.0%
Arrowtooth flounder	Coastwide	6,599	4,058	4,058	6,396	3,934	3,934	ACL = ABC (P* = 0.25)
Black	WA	421	922	330	423	332	332	ACL = ABC (P* = 0.25)
Black	OR & CA	1,176	330	922	1,183	927	927	ACL = ABC (P* = 0.25)
Cabezon	OR	49	38	38	49	38	38	ACL = ABC (P* = 0.25)
Cabezon	CA	161	126	126	158	124	124	ACL = ABC (P* = 0.25)
California scorpionfish	S of 34°27' N. lat.	119	93	93	117	91	91	ACL = ABC (P* = 0.25)
Chilipepper	S of 40º10' N. lat.	1,703	1,335	1,335	1,694	1,328	1,328	ACL = ABC (P* = 0.25)
Dover sole	Coastwide	66,871	52,427	25,000	59,221	46,429	25,000	25,000 mt constant catch
English sole	Coastwide	12,092	7,437	7,437	8,493	5,223	5,223	ACL = ABC (P* = 0.25)
Lingcod	N of 40'10º N. lat.	3,010	2,172	2,172	2,891	2,089	2,089	ACL = ABC (P* = 0.25)
Lingcod	S of 40'10º N. lat.	1,205	741	741	1,136	699	699	ACL = ABC (P* = 0.25)
Longnose skate	Coastwide	2,449	1,920	1,920	2,405	1,885	1,885	2,000 mt constant catch
Longspine thornyhead	Coastwide	5,007	3,079	NA	4,763	2,929	NA	NA
	N of 34º27' N. lat.	NA	NA	2,340	NA	NA	2,226	ACL = prop. of coastwide ABC (P* = 0.25)
	S of 34º27' N. lat.	NA	NA	739	NA	NA	703	ACL = prop. of coastwide ABC (P* = 0.25)
Pacific cod	Coastwide	3,200	1,213	1,213	3,200	1,213	1,213	1,600 constant catch
Pacific whiting	Coastwide	NA	NA	NA	NA	NA	NA	NA
Sablefish	Coastwide	7,857	6,160	NA	8,526	6,684	NA	NA
	N of 36º N. lat.	NA	NA	4,114	NA	NA	4,540	ACL = prop. of coastwide ABC (P* = 0.25)

Stock*	Area	2015			2016			ACL Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
	S of 36° N. lat.	NA	NA	1,475	NA	NA	1,629	ACL = prop. of coastwide ABC (P* = 0.25)
Shortbelly	Coastwide	6,950	4,274	50	6,950	4,274	50	50 mt constant catch
Shortspine thornyhead	Coastwide	3,203	1,970	NA	3,169	1,949	NA	NA
	N of 34°27' N. lat.	NA	NA	1,288	NA	NA	1,275	ACL = prop. of coastwide ABC (P* = 0.25)
	S of 34°27' N. lat.	NA	NA	682	NA	NA	674	ACL = prop. of coastwide ABC (P* = 0.25)
Spiny Dogfish	Coastwide	2,523	1,551	1,551	2,503	1,540	1,540	ACL = ABC (P* = 0.25)
Splitnose	S of 40°10' N. lat.	1,794	1,406	1,406	1,826	1,432	1,432	ACL = ABC (P* = 0.25)
Starry flounder	Coastwide	1,841	1,132	1,132	1,847	1,136	1,136	ACL = ABC (P* = 0.25)
Widow	Coastwide	4,137	3,138	1,500	3,990	3,026	1,500	1,500 mt constant catch
Yellowtail	N of 40°10' N. lat.	12,281	7,553	7,553	11,647	7,163	7,163	ACL = ABC (P* = 0.25)
Nearshore Rockfish N	N of 40°10' N. lat.	88	45	40	88	45	41	ACL = ABC (P* = 0.25); 40-10 adj. for blue in CA + China
Nearshore Rockfish S	S of 40°10' N. lat.	1,313	725	693	1,288	710	694	ACL = ABC (P* = 0.25); 40-10 adj. for blue N of Pt. Con.
Shelf Rockfish N	N of 40°10' N. lat.	2,209	1,142	1,142	2,218	1,148	1,148	ACL = ABC (P* = 0.25); 40-10 adj. for greenspotted in CA
Shelf Rockfish S	S of 40°10' N. lat.	1,918	802	802	1,919	803	803	ACL = ABC (P* = 0.25); 40-10 adj. for greenspotted N of Pt. Con.
Slope Rockfish N	N of 40°10' N. lat.	1,804	1,215	1,215	1,818	1,227	1,227	ACL = ABC (P* = 0.25)
Slope Rockfish S	S of 40°10' N. lat.	806	386	384	807	387	386	ACL = ABC (P* = 0.25); 40-10 adj. for blackgill
Other Flatfish	Coastwide	11,298	5,606	5,606	9,948	4,775	4,775	ACL = ABC (P* = 0.25)
Other Fish	Coastwide	291	110	110	291	110	110	ACL = ABC (P* = 0.25)

*Overfished stocks in CAPs; stock complexes in *italics*.

2.1.2 Management Measures

Management measures considered as part of the biennial process, fall into three broad categories: adjustments to and allocations of ACLs, adjustments to existing management measures including those designated as routine, and adoption of new management measures. Existing measures include:

- Limited entry permits which restrict the number of vessels that may use specified gear types to catch allocated groundfish. Limited entry permits define the groundfish trawl sector (further subdivided among vessels delivering catch shoreside, catcher vessels delivering Pacific whiting to at-sea mothership processors, and at-sea Pacific whiting catcher-processors) and the limited entry fixed gear sector, which uses longline and pot gear, mainly to catch sablefish.
- Groundfish closed areas, principally Rockfish Conservation Areas (RCAs), imposed to exclude fishing vessels from areas of high bycatch of species of concern, predominantly overfished species. Enforcement of these closed areas is supported by requirements for commercial vessels retaining groundfish to carry a vessel monitoring system (VMS) that transmits their position to enforcement officials.
- Catch control tools including IFQs in the shoreside trawl sector, co-ops and associated allocations in the at-sea whiting sectors, permit and vessel-specific sablefish allocations in the limited entry fixed gear sector (called "tier limits"), and 2-month cumulative landing limits used in all sectors for certain species and/or at certain times of the year. Bycatch in the at-sea whiting fishery is accommodated by set-asides from the trawl allocation. Recreational catch is primarily controlled by time/area closures, bag limits, and size limits.

Several new management measures or adjustments to existing measures, including routine measures, are recommended for implementation in 2015, designed to meet the goals and objectives specified in the FMP. The following section provides an overview of the new measures which are evaluated under all action alternatives. A focused evaluation of the performance and effects of the new management measures and range of options considered can be found in Appendix B. The impacts of adjusting exiting management measures under the action alternatives, including routine measures, can be found in Section 4.2. Section 2.5.7 contains the measures that were considered but rejected for implementation at this time.

2.1.2.1 Modifications to the Boundaries Defining Existing RCAs

RCAs are large area closures intended to protect a complex of species, such as overfished shelf rockfish species. The boundaries for RCAs are defined by straight lines connecting a series of latitude and longitude coordinates that approximate depth contours. A set of coordinates are defined for each depth contour used as a management line and the RCA structures are implemented by gear and/or fishery (e.g., trawl RCA, a non-trawl RCA, and recreational RCAs). Under the action alternatives, changes to selected coordinates are proposed that more closely approximate the boundaries with depth contours based on the best available data. These modifications would maintain the intent of the RCAs by providing improved and more efficient access to target species while minimizing interactions with overfished species.

Changes to the boundaries defining RCAs in Oregon and California are proposed and are designed to better approximate depth which is consistent with the original methodology used to establish the coordinates. Starting on January 1, 2013 new waypoints, designed to better approximate depth, were implemented for the 200 fm line in Oregon. This resulted in some unintended consequences relative to the 200 fm line that is modified to provide greater access to petrale sole (referred to in regulation as the modified 200 fm line). Updated coordinates for the modified 200 fm line are proposed to resolve this problem. In California, adjustments are proposed off Del Mar (six waypoints) and San Diego (two waypoints) to better approximate the actual depth.

2.1.2.2 New Trawl RCAs Boundaries Approximating 300 and 350 fm

Management measures designed to reduce the catch of rougheye/blackspotted rockfish for all commercial sectors are proposed under the action alternatives. A recent rougheye/blackspotted rockfish assessment indicates that the west coast stock is currently 47 percent of the unexploited biomass (above the B_{MSY} proxy of $B_{40\%}$). Harvest rates of rougheye/blackspotted rockfish have been close to or above the F_{MSY} proxy of $F_{50\%}$ for rockfish since the mid-1980s, including four of the last 10 years. The Council recommended analysis of new trawl RCAs boundaries approximating the 300 and 350 fm depth contours as a measure to reduce rougheye/blackspotted rockfish mortality.

2.1.2.3 *A*llow Retention of Lingcod by Fixed Gear Vessels in Periods 1, 2, and 6

Since the 1990s lingcod retention has been prohibited in Periods 1, 2, and 6 for both the limited entry and open access fixed gear sectors to reduce catch of male lingcod during the nest-guarding season. There are no seasonal closures for lingcod for the shorebased IFQ or Oregon recreational fisheries. Under the action alternatives, it is proposed that lingcod retention be allowed during Periods 1, 2, and 6 at a level which would reduce discarding but prevent targeting.

2.1.2.4 Shorebased IFQ Surplus Carry-Over

Current regulations provide for a carry-over provision that allows a limited amount of surplus QP or IBQ pounds in a vessel account to be carried over from one year to the next or allows a deficit in a vessel account in one year to be covered with QP or IBQ pounds from a subsequent year, up to a carry-over limit (50 CFR 660.140(e)(5)). The carry-over provision was designed to increase individual flexibility for harvesters, improve economic efficiency, and achieve optimum yield (OY) while preserving the conservation of stocks. This proposed measure would consider unused amounts that were set-aside for tribal, recreational and incidental catch in non-groundfish fisheries relative to the issuance of carry-over for the trawl IFQ fishery, in the event the trawl allocation for a species has been exceeded, but there is surplus quota eligible for carry-over.

2.1.2.5 Oregon Recreational Fisheries: Canary Rockfish Bag Limit

Canary rockfish is an overfished species managed under a rebuilding plan. For the recreational fisheries, canary retention is prohibited. A sub-bag limit for canary rockfish in Washington, Oregon, and California was analyzed. The preferred alternative is to only allow retention in the Oregon recreational fisheries to minimize discards of canary rockfish and inform the stock assessment, while preventing targeting.

2.1.2.6 Washington and Oregon Recreational - Allow Retention of Bottom Fish during All-Depth Halibut Seasons

Retention of all groundfish, lingcod only, or flatfish only during the Pacific halibut fishery is currently allowed in both the Pacific halibut and groundfish regulations. This management measure would change the retention allowances by area to reduce discards of incidentally caught groundfish during the Pacific halibut fishery.

2.1.2.7 Washington Recreational – Modify or Eliminate Boundaries for Lingcod Closures

Yelloweye rockfish is an overfished species currently managed under a rebuilding plan. In 2012, deep-water lingcod closures were implemented in Washington to reduce encounters with yelloweye rockfish in the South Coast (Marine Catch Area 2) and Columbia River (Marine Catch Area 1) management areas. Under the action alternatives, modifications of the boundary lines are proposed to more effectively reduce encounters with yelloweye and canary rockfish and streamline regulations making them easier for anglers to understand.

2.2 Stock Complex Reorganization and Designation of Ecosystem Component Species

After consideration at the June and September 2013 Council meetings, the Council adopted three options for restructuring the slope rockfish complexes north and south of 40º10' N lat. However, at the March 2014 Council meeting NMFS recommended narrowing analysis to one option. Council deliberations focused on concern with fishing mortality on rougheye rockfish; a new stock assessment (Hicks, *et al.* 2013) indicates that spawning biomass declined relatively steeply in the 1980s and 1990s while cumulative coastwide catch since 2008 has exceeded the rougheye OFL contribution to the slope rockfish complexes.

The Other Fish complex historically contained various non-target species that were often bycatch (not retained, landed, sold, or kept for personal use). Stock complexes composed of species with similar distribution and/or life history characteristics are preferable so that the constituent stocks are similar in terms of vulnerability to overfishing and susceptibility to particular fisheries (by gear type, for example). The ecosystem component (EC) species designation is described in National Standard 1 Guidelines at 50 CFR 600.310(d)(5). EC species should be a non-target stock; not subject to overfishing determined to be overfished, or approaching the overfished threshold or become so in the absence of management measures; and not generally retained for sale or personal use. Because many of the species in the Other Fish complex fit the criteria for designating EC species, it makes sense to reclassify them in this category. EC species are not considered "in the fishery" and ACLs are not set for them.

2.2.1 No Action

Under No Action the Slope Rockfish and Other Fish complexes are not reorganized and no EC species are designated

2.2.2 The Preferred Option

The Preferred Option, maintains the slope rockfish stock complexes as they are currently structured north and south of 40°10' N. lat. Management measures that could control mortality of rougheye rockfish while it remains within the current slope rockfish complexes are described in Section 4.2 and include a sorting requirement for rougheye and blackspotted rockfish in order to more accurately and responsively track catch.

The Council considered but rejected establishing a rougheye and blackspotted fishery harvest guideline, identifying "hotspots" closures where rougheye CPUE is higher, and mandating rockfish excluder devices in midwater trawl nets designed to target Pacific whiting (see Appendix B, Section XXX and Section 2.5).

The Other Fish complex is reorganized. Spiny dogfish is removed from the complex and managed as a separate stock with its own harvest specifications. Several other species are removed from the Other Fish complex and the list of management unit species and designated EC species (see Table 2-6). Additional species not currently in the FMP are designated EC species. The Washington, Oregon and California kelp greenling stocks; the Washington Cabezon stock; and leopard shark remain in the Other Fish complex.

Table 2-6 Groundfish species proposed to be designated as Ecosystem Component species.

Proposed EC Species	Previous Status

Aleutian skate (*Bathyraja aleutica)*	Not previously in the FMP
Bering/sandpaper skate (*B. interrupta)*	Not previously in the FMP
Big skate (*Raja binoculata)*	MUS (Other Fish)
California skate (*R. inornata)*	MUS (Other Fish)
Roughtail/black skate (*Bathyraja trachura)*	Not previously in the FMP
All other skates (Endemic species in the family *Arhynchobatidae)*	Not previously in the FMP
Pacific grenadier (*Coryphaenoides acrolepis)*	MUS (Other Fish)
Giant grenadier (*Albatrossia pectoralis)*	Not previously in the FMP
All other grenadiers (Endemic species in the family *Macrouridae)*	Not previously in the FMP
Finescale codling (aka Pacific flatnose) (*Antimora microlepis)*	MUS (Other Fish)
Ratfish (*Hydrolagus colliei)*	MUS (Other Fish)
Soupfin shark (*Galeorhinus zyopterus)*	MUS (Other Fish)

2.2.3 Option 1

Under this option, rougheye rockfish (including blackspotted rockfish) and shortraker rockfish would be removed from the slope rockfish complexes north and south of 40°10' N lat. and managed as a new coastwide rougheye/blackspotted/shortraker (RBS) complex. An OFL, ABC, and ACL would be established for the proposed RBS complex. These species are for the complex because it is difficult to differentiate them based on appearance alone.

Managing RBS as a new complex would increase the range of potential management measures that could more directly control catch of these species. For example, IFQ specific to the stock could be issued. On the other hand, establishing an ACL for a complex with these species could raise various allocation-related issues.

2.3 Alternatives for Using Default Harvest Control Rules to Compute ACLs (Amendment 24)

An HCR is used to determine the numerical value of an ACL based on a reduction from the overfishing limit (OFL). Chapter 4 in the Groundfish FMP describes the policies and procedures used to establish HCRs and determine the numerical values for harvest specifications (OFLs, ABCs, and ACLs).[7] HCRs include the following elements (although not all elements apply to all stocks):

- Harvest rate (unless a different ACL adjustment is used, see below)
- Reduction from the OFL to the ABC (P*-Sigma adjustment)
- ACL adjustment below the ABC based on overfished species rebuilding plans, fixed reductions from the overfishing limit, constant catch policies, precautionary reduction for stocks where biomass is below B_{MSY}, etc. Table 2-7 summarizes the typical adjustments that are based on stock status

[7] Annual catch targets (ACTs) and harvest guidelines (HGs) are used to identify harvest management objectives but are considered accountability (management) measures rather than specifications.

Table 2-7. Default harvest control rules framework for ACL reduction from ABC applied according to stock status.

Healthy Stocks (Biomass above the MSY proxy)	Precautionary Zone Stocks (Biomass below the MSY proxy but above the overfished threshold)	Overfished Stocks (Biomass below the overfished threshold)
ACL=ABC (no adjustment)	Precautionary reduction[8] from the ABC: • 40-10 for non-flatfish • 25-5 for flatfish	Implement rebuilding plan

The action alternatives for Amendment 24 require amending the Groundfish FMP to describe a "default harvest control rule (HCR) framework" used to determine default ACLs. Under this framework, unless the Council takes explicit action to change a default HCR, the ACL implemented for a stock is based on the default HCR applied to the best scientific information. In the event of a change in stock status, the HCR appropriate for the stock's new status would be applied as shown in Table 2-7. For stocks managed under the Groundfish FMP the most recent stock assessment approved by the Council is usually considered the best scientific information. During the biennial harvest specifications process the November Council meeting usually serves as a cutoff point for introducing new scientific information into the decision-making process.

Under the action alternatives the default HCRs include a specified P* value used to compute default ACLs. Default ACLs are initially computed but the Council can then choose a harvest specification value different from the default value as long as the new value complies with the Groundfish FMP and the MSA, and the rationale for the change is sufficiently documented.

2.3.1 No Action – The Groundfish FMP is Not Amended

Under No Action the FMP is not amended to describe the default HCR framework, to provide a decision framework for determining adequate progress on rebuilding plans, or to establish a process for considering management measures not considered during the biennial process.

For the purpose of analysis, it is assumed that, under no action, management measures and harvest specifications in place on December 31, 2014, would remain in effect for the 2015-2016 period. For the evaluation of the long-term impacts of setting harvest specifications and management measures average catch from the recent past is used to approximate fishing mortality and revenue.

2.3.2 Alternative 1 – Default HCRs Use a P* Value of 0.45

Under this alternative the Groundfish FMP would be amended to describe the HCR framework and better describe the types of management measures considered during the biennial management and regulatory amendment processes.

Default ABCs would be computed using P*=0.45. Default ACLs would be computed based on the HCR currently in place (e.g., ACL=ABC, constant catch, precautionary reduction from the ABC) unless a new

[8] Section 4.6.1 in the Groundfish FMP describes the 40-10 and 25-5 precautionary reductions. These numbers define the linear reduction in the ACL from the ABC in relation to stock depletion. In the case of 40-10 this means that the linear reduction begins when depletion is at 40% and the ACL reaches zero when depletion is at 10% (note however, that a rebuilding plan would be implemented when depletion falls below 25%). Similarly, 25-5 defines a linear reduction starting at 25% depletion and a zero ACL at 5% depletion (likewise superseded by an overfished threshold of 12.5%).

assessment shows that stock biomass has changed such that a different procedure is specified in the FMP and a different HCR applies (see Table 2-7). For example, if stock biomass has fallen below the MSY proxy, the appropriate precautionary adjustment would be applied (e.g., 40-10 or 25-5 rules applied to the ABC) to compute the default ACL or if stock biomass falls below the overfished/rebuilding threshold the interim rebuilding rule would be used to determine the default ACL. Likewise, if an increase in stock biomass changes stock status the procedure for the updated status would be used to compute the default ACL. These changes in how the default ACL is calculated based on the stock's status would not automatically trigger the need for a new NEPA analysis to amend the ACLs in Federal regulations.

2.3.3 Alternative 2 – Default HCRs Use a P* Value of 0.25

Under this alternative the Groundfish FMP is amended to describe the HCR framework, provide a decision framework for determining adequate progress on rebuilding plans, and better describe the types of management measures considered during the biennial management and regulatory amendment processes.

Default ABCs would be computed using P*=0.25. Default ACLs would be computed based on the HCR currently in place (e.g., ACL=ABC, constant catch, precautionary reduction from the ABC). Like Alternative 1, a change in stock status would trigger a change in the default ACL.

2.3.4 Alternative 3 (Preliminary Preferred Alternative) – Use the HCRs in Place in the Previous Period as the Defaults

Under this alternative the Groundfish FMP is amended to describe the HCR framework, provide a decision framework for determining adequate progress on rebuilding plans, and better describe the types of management measures considered during the biennial management and regulatory amendment processes.

Default ABCs would be computed using the current P*. Default ACLs would be computed based on the HCR currently in place (e.g., ACL=ABC, constant catch, precautionary reduction from the ABC). Like Alternative 1, a change in stock status would trigger a change in the default ACL.

The Council chose preferred harvest specifications for the 2015-2016 period at its April 2014 meeting. This is the final preferred alternative so the HCRs used to determine 2015-16 harvest specifications would be the default HCRs for the next (2017-2018) biennial period. In addition, these harvest specifications are used as the defaults to analyze this alternative.

2.4 Management Measures Considered During the Biennial Decision Cycle (Amendment 24)

Section 6.2 in the Groundfish FMP describes the process for establishing and adjusting management measures. New management measures may be adopted during the biennial specifications process and may also be classified as routine measures. Routine management measures are those that the Council determines are likely to be adjusted on an annual or more frequent basis to effectively achieve the intended purpose. Routine management measures may be adjusted as part of the biennial decision-making process and "inseason" during any biennial management period.

There is an important procedural difference between new management measures and those that have already been classified as routine. All measures are "new" when first proposed. The need, impacts, and rationale for a new measure must be analyzed before it can be classified as routine. Once classified as routine, it is assumed that the effects of subsequent adjustments have been largely evaluated so the threshold for needing additional analysis when adjustments are made is set higher.

Evaluating the impacts of new management measures can add substantially to the overall workload associated with the biennial harvest specifications process. One way to streamline the harvest specification process would be to prioritize new management measures that the Council deems necessary for the next biennial cycle and those for which analysis and Council consideration could be deferred to a separate process. As part of this prioritization process the Council would consider whether the measure is necessary to meet conservation objectives for the next biennial cycle or these objectives can be achieved by adjusting routine measures. Section 6.2 in the Groundfish FMP describes the regulatory amendment process, which is a two-meeting process that can occur at any time according to Council discretion. A regulatory amendment process could occur periodically according to an agreed schedule outside those Council meetings devoted to the biennial process. After completing the biennial process, the Council could prioritize management measures proposed, but not taken up, during the biennial process for consideration under the upcoming regulatory amendment process.

Under Amendment 24 Section 6.2 in the FMP would be amended to better describe processes. In addition, the Council adopted Council Operation Procedure 9, better describing the biennial process.

2.5 Alternatives Considered but Rejected from Further Analysis

2.5.1 Revising Rebuilding Plans (Amendment 24)

Groundfish FMP section 4.6.3.4 describes guidelines for revising rebuilding plans in response to new information about progress towards rebuilding. Consideration was given to revising this section to describe more specific decision rules based on based an overfished species management strategy evaluation (MSE) being developed by Dr. Andre Punt, University of Washington and Council SSC. This MSE tool is not yet complete; it is anticipated that results may be available to address the question of decision rules during a future biennial management cycle.

2.5.2 P* Values Outside of the 0.25 – 0.45 Range

P* values greater than 0.45 are not sanctioned under the FMP, so ABCs based on P* values greater than 0.45 are not analyzed in this EIS. The Council also formally adopted Alternative 2 for analysis in this EIS, which contemplates setting all 2015 and 2016 ABCs using a P* value of 0.25. Lower P* values were not considered in the analysis.

2.5.3 Reorganizing Nearshore Rockfish Stock Complexes

The Council initially considered alternative structures for the nearshore rockfish complexes north and south of 40º10’ N lat., but rejected any alternatives to the status quo complexes because it was judged the status quo nearshore rockfish complexes were comprised of species with similar life histories and distributions, and were managed under relatively conservative state nearshore FMPs and/or management strategies.

2.5.4 Reorganizing the Shelf Rockfish Stock Complexes

The Council initially considered alternative structures for the shelf rockfish complexes north and south of 40º10’ N lat., but rejected any alternatives to the status quo complexes because it was judged there was no compelling need to restructure these complexes given the stocks are currently well protected from overfishing by the current RCA configurations.

2.5.5 Additional Alternatives for Reorganizing the Slope Rockfish Stock Complexes

The Council initially considered additional alternative structures for the slope rockfish complexes north and south of 40º10' N lat., but rejected these additional alternatives to the status quo complexes because it was judged this would cause an unnecessary delay in completing the analyses in this EIS and risked delaying implementation of new regulations beyond January 1, 2015. The additional alternatives rejected from detailed analysis are documented in Agenda Item C.8.a, Attachment 1 in the April 2014 Council briefing book.

2.5.6 Reorganizing the Other Flatfish Stock Complexes

The Council initially considered alternative structures for the Other Flatfish complex, but rejected any alternatives to the status quo complex because it was judged the status quo Other Flatfish complex was comprised of species with similar life histories, distributions, and vulnerabilities to potential overfishing.

2.5.7 Various New Management Measures

Several new management measures were considered by the Council but rejected for implementation in the 2015-2016 regulatory package. Some measures were rejected all together while others were forwarded for consideration in the off-year management measures process. Descriptions of the management measures are provided below and detailed analysis can be found in Appendix B.

New Groundfish Conservation Areas (GCAs)

Management measures designed to reduce the catch of rougheye/blackspotted rockfish for all commercial sectors are proposed under the action alternatives. A recent rougheye/blackspotted rockfish assessment indicates that the west coast stock is currently 47 percent of the unexploited biomass (above the B_{MSY} proxy of B40%). Harvest rates of rougheye/blackspotted have been close to or above the F_{MSY} proxy of $F_{50\%}$ for rockfish since the mid-1980s, including four of the last 10 years. The Council initially considered establishing new Groundfish Conservation Areas (GCAs) to reduce mortality of rougheye/blackspotted rockfish for one or more commercial sectors if other existing management measures prove ineffective. The Council's Scientific and Statistical Committee (SSC) reviewed the initial analysis of a rougheye/blackspotted rockfish GCA, contained in Appendix B, and made several recommendations for improving the methodology before it is used in management. The Council considered the draft analysis but rejected it for implementation in the 2015-2016 regulatory package since the methodological changes could not be accomplished in a timely manner. The Council is scheduled to further consider development of GCAs for rougheye/blackspotted rockfish in the off-year management measures process.

Similarly, under the action alternatives, spiny dogfish is proposed to be removed from the Other Fish complex and managed with stock-specific harvest specifications. GCAs were initially considered to reduce mortality of spiny dogfish for one or more fishing sectors if other existing management measures prove ineffective. The Council considered but rejected implementation of spiny dogfish GCAs given the results of an analysis that indicates a very low probability of exceeding the proposed spiny dogfish ACL (see Appendix B). That is, the Council believes the existing management measures should be sufficient to keep spiny dogfish catch within the proposed ACLs and thus rejected further consideration of spiny dogfish GCAs.

Modify or Remove Commercial Gear Restrictions when Targeting Flatfish in Selected Groundfish Conservation Areas

In California, commercial vessels using a specific gear configuration designed to target flatfish species are authorized to fish in several GCAs, including the non-trawl RCA, Cowcod Conservation Area, Farallon Islands, and Cordell Banks. The Council considered the draft analysis of these measures but rejected them for implementation in the 2015-2016 regulatory package, given several complex issues that could not be resolved in a timely manner. The Council is scheduled to consider these measures in the off-year management measures process.

Rockfish Excluder for Trawl Vessels Targeting Pacific Whiting

As noted previously, the Council is exploring management measures designed to reduce the catch of rougheye/blackspotted rockfish for all commercial sectors. Initially, the Council considered requiring excluder devices to reduce the catch of rougheye rockfish in whiting fisheries (i.e., Pacific whiting IFQ trips, catcher processor, and mothership trawl sectors). While some research on rockfish excluders in the west coast Pacific whiting fisheries has been conducted, additional work is needed to resolve performance issues (e.g., clogging when Pacific whiting catch rates are high) and to explore the efficacy of the excluder on a broader range of vessel lengths (e.g., catcher-processers). Further, additional time is needed to conduct an appropriate impact analysis, including estimated costs to purchase an excluder if the regulation was implemented. The Council considered the draft analysis of this measure but rejected it for implementation in the 2015-2016 regulatory package, given several complex issues that could not be resolved in a timely manner.

Washington and Oregon Recreational: Implement a 50 Fathom Management Line

Depth restrictions are commonly used in the Washington and Oregon recreational fisheries to reduce mortality of overfished species while providing access to target species. Initially the proposed measure analyzed implementing the necessary coordinates for establishing a 50 fm management line in Oregon. After further consideration, the Council recommended such consideration for Washington as well. The Council considered but rejected implementing the 50 fm management line in the 2015-2016 regulatory package, given complexities in the analysis which could not be resolved in a timely manner. The Council is scheduled to consider these measures in the off-year management measures process.

Harvest Guidelines for China Rockfish North of 40º10’ N lat.

The Council initially considered an analysis of state-specific or regional harvest guidelines (HGs) of China rockfish north of 40º10’ N lat. given its status in the precautionary zone. The Council rejected a detailed analysis of HGs for China rockfish north of 40º10’ N lat. The HGs were so low they would have caused a significant disruption of nearshore groundfish fisheries. The lack of confidence in the data-moderate assessment results for China rockfish compelled the Council to prioritize a full assessment or a more thorough data-moderate assessment) of China rockfish next year before considering the necessity of a more conservative management strategy for this stock.

Chapter 3 AFFECTED ENVIRONMENT

NMFS and Council staff scoped the range of environmental components that could be significantly affected by the proposed actions. This chapter describes the affected environment in terms of these components. The affected environment reflects conditions as they exist before the proposed actions are implemented and provides a baseline for considering effects. This chapter is organized into the following sections:

Section 3.1: Groundfish
Section 3.2: The socioeconomic environment
Section 3.3: The California Current Ecosystem
Section 3.4: Essential fish habitat
Section 3.5: Protected species
Section 3.6: Non-groundfish

3.1 Groundfish

Section 3.1 in the Groundfish FMP enumerates the management unit species. All species in the family *Scorpaenidae* occurring in state and Federal waters off of Washington, Oregon, and California are considered part of the management unit. The systematics of this family is not completely settled and there are known to be cryptic species, so it is assumed that more than the 89 species listed in Section 3.1 of the FMP comprise the management unit. Informally, species are grouped morphologically as roundfish (6 species), rockfish (62 species enumerated but likely more in the management unit), and flatfish (12 species). There are nine other species outside these categories, including sharks, rays, ratfish, and morids. However, under the proposed action most of these species would be designated Ecosystem Component (EC) species, which are monitored as bycatch but do not require harvest specifications. Of these nine, only leopard shark, longnose skate, and spiny dogfish would remain managed species ("in the fishery") under the proposed action.

The species managed under the FMP are distributed throughout the EEZ and occupy diverse habitats at all stages in their life history.[9] In addition, many of the stocks have geographic ranges that extend beyond the U.S. EEZ into Canadian or Mexican waters. The life history traits of the groundfish species have important implications on stock assessment and how the stocks are managed. This is because fishing changes population abundance of the target species, as well as affects life-history traits and population dynamics and may also affect yield.

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[9] For management purposes species occurrence and habitat are identified at a gross level according to latitudinal and depth boundaries. Nearshore and continental shelf and slope zones define depth-habitat regions (with the latter two commonly referred to as the shelf and the slope). Important latitudinal biogeographic boundaries incorporated into management include Point Conception (34°27' N. lat.) and Cape Mendocino including the undersea Cape Mendocino Ridge (for management, a line just south of the Cape at 40°10' N. lat. is a primary boundary).

Rockfish vary greatly in their morphological and behavioral traits, with some species being semi-pelagic and found in mid-water schools, and others leading solitary, sedentary, bottom-dwelling lives. Rockfish inhabit a wide range of depths, from nearshore kelp forests and rock outcrops to varied deepwater (greater than 150 fm) habitats on the continental slope. Despite the range of behaviors and habitats, most rockfish share general life history characteristics, which include slow growth rates, bearing live young, and large but infrequent recruitment events. These life history characteristics contribute to relatively low average productivity that may reduce their ability to withstand heavy exploitation, especially during periods of unfavorable environmental conditions.

Roundfish managed under the FMP include lingcod, cabezon, kelp greenling Pacific cod, sablefish, and Pacific whiting. In general, the species referred to as roundfish are faster growing with shorter life spans then many of the rockfish, and have external fertilization with some species having large and highly variable recruitment events.

Cabezon and kelp greenling are found in nearshore habitats and are targets in recreational and nearshore commercial fisheries. Lingcod occur coastwide in rocky shelf and nearshore habitats. They too are popular targets in recreational and commercial hook-and-line fisheries.

Sablefish is the most commercially valuable groundfish species, and they occur in deeper waters, being most abundant between 200 and 1,000 m, and found as deep as 3,000 m. Adult sablefish commonly occur over sand and mud in deep marine waters, but have also been found over hard-packed mud and clay bottoms in the vicinity of submarine canyons.

The coastal stock of Pacific whiting is semi-pelagic and is the most abundant single-species groundfish population in the California Current system, making it both commercially and ecologically important. The stock is characterized by highly variable recruitment patterns and a relatively short lifespan.

Flatfish (order *Pleuronectiformes*) are so called because they have asymmetrical skulls with both eyes on the same side of the head. Of the 12 flatfish species in the FMP arrowtooth flounder, Dover sole, English sole, petrale sole, and starry flounder stocks have been assessed and are managed to stock-specific ACLs while the remaining, unassessed species (butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole) are managed within the Other Flatfish complex. Most of the flatfish species are distributed coastwide in waters of the continental shelf with the exception of arrowtooth flounder, butter sole, and flathead sole, which are found on the continental shelf in waters north of central California. Starry flounder, Pacific sanddab, butter sole, curlfin sole, sand sole, and rock sole are primarily found in more nearshore areas while Dover sole, flathead sole, and petrale sole are found in deeper waters. The remaining species show more variation in depth distribution. Many flatfish species migrate seasonally from shallow water summer feeding grounds on the continental shelf to deep water spawning grounds over the continental slope . Though there are variations between species, most of the flatfishes are found on soft bottom such as sand or sandy gravel substrates and mud; however, some are found in eelgrass habitats and, in the case of arrowtooth flounder, occasionally over low-relief rock-sponge bottoms .

For each groundfish species, detailed information on habitat utilization patterns, fisheries that harvest the species, geographic range, migrations and movements, reproduction, growth and development, and trophic interactions are fully described in Appendix B2 to the final EIS titled "The Pacific Coast Groundfish Fishery Management Plan, EFH Designation and Minimization of Adverse Impacts.

The 2014 Stock Assessment and Fishery Evaluation (SAFE) document (PFMC 2014), available on the Council website at www.pcouncil.org, describes distribution and life history, stock status and management history, stock productivity, and fishing mortality attributes of each assessed stock in detail.

The SAFE also describes of stock assessment methods employed and the harvest specification framework including methods used to determine these specifications.

3.2 Socioeconomic Environment

Section 3.2 in the 2013-14 Groundfish Harvest Specifications FEIS (as well as EISs for earlier biennial periods) describes commercial fisheries targeting groundfish and characterizes west coast fishing communities with respect to groundfish fisheries. That information is a useful resource upon which the current description is based. The 2014 Groundfish SAFE document contains a series of tables summarizing landings and ex-vessel revenue in groundfish fisheries, landings and revenue by port, and indicators of fishery participation. These data may be summarized here to highlight current fishery trends. Both long-term historical landings, revenue, and price data (the full PacFIN database time series) and a recent a 10-year baseline period of 2003-2012 are used to characterize fisheries and communities.

3.2.1 Revenue Trends for Commercially Important Groundfish

Although more than 90 species are managed under the Groundfish FMP, the ten highest ranked species (or species groups[10]) accounted for 92% of nominal shoreside ex-vessel revenue during the baseline period, as seen in Figure 3-1. (The revenues used to produce the figure do not include Pacific whiting processed at-sea; if included, whiting would represent a larger share. These at-sea fisheries are described below.) Furthermore, just five species—sablefish, Pacific whiting, Dover sole, petrale sole, and shortspine thornyhead accounted for 84% of all revenue. For that reason, when considering commercial fisheries, the socioeconomic evaluation in this EIS will focus on these relatively few species and the major rockfish species groups (managed as stock complexes). There are other groundfish species that have greater value in recreational fisheries and are discussed below in section 3.2.5. Furthermore, other species may have greater economic importance within particular groundfish fisheries. In the summaries of trends in these fisheries, or "sectors," below, these species with greater economic importance are highlighted.

Figure 3-2, Table 3-1, and Figure 3-3 provide an overview of ex-vessel revenue trends for these economically important species. Figure 3-2 shows the trend in inflation-adjusted revenue for all groundfish landings (including at-sea whiting) in terms of the deviation from the long-term mean (the shoreside data series goes back to 1981 while the at-sea series begins in 1997).[11] The panels in Figure 3-3 present trends in the same way for each of the 10 highest revenue earning species referenced above. Table 3-1 shows the long-term (1981-2012) and recent past (2003-2012) values for landings, revenue, and price-per-pound, and the ratio of recent past values and long-term values.

As seen in Table 3-1, the long-term trend in shoreside groundfish revenue shows a sharp decline in the 1990s into the early 2000s, principally in reaction to management measures imposed when several groundfish were declared overfished and put under rebuilding plans. The 2003-2012 baseline period represents an increasing trend from the low point (shown in terms of the deviation from the mean in Figure 3-2) in 2002. Average annual landings for all shoreside groundfish were about the same in the recent past (2003-2012) compared to the long-term, while the average revenue ratio is 77% due to declines in average price-per-pound (Table 3-1). Examining changes by groundfish species and groups shows a mix of trends. Perhaps the most notable long-term trend is the increasing importance of sablefish and Pacific whiting relative to total shoreside groundfish revenue. For example, in 1981 sablefish accounted for just 12% of shoreside revenue while in 2012 the share was 38%. The domestic Pacific

[10] Rockfish species comprising these groups may be found in [reference docs with PacFIN info].

[11] Shoreside data was obtained from the PacFIN vdrfd table while at-sea data compes from the npac4900_spcomp table.

whiting fishery did not develop until the early 1990s; in 1992 shoreside whiting had an 8% share, in 2012 it was 38%. (As noted above, this does not include at-sea whiting revenues, which are recorded in a different database. Adding revenues from those fisheries would boost whiting's relative importance.) Other species, particularly rockfish, have substantially declined as a share of revenue. In total these species have fallen from a 48% share of revenue in 1981 to an 8% share in 2012 (PFMC 2014, Table 2b).

Looking more closely at Table 3-1, four species show increases in revenue comparing the recent past to the long term: sablefish, Pacific whiting, nearshore rockfish, and black rockfish. Except for Pacific whiting, no species shows an increase in average annual landings, so revenue increases are driven by changes in price per pound. Revenues from sablefish show a spike in 2011. Japan is an important market for west coast sablefish; because the 2011 earthquake and tsunami disrupted Japanese domestic fisheries, increased demand for west coast product drove prices higher. Over the long-term (see the panel for sablefish in Figure 3-3) sablefish revenue has been somewhat volatile but an increasing trend since 2002 is apparent even without the 2011 revenue spike.

Table 3-2 shows the coefficient of variation (CV) for inflation-adjusted, annual ex-vessel revenue over the long-term (1981-2012) and the baseline period (2003-2012) for the highest revenue species and species groups. The coefficient of variation is simply the standard deviation divided by the mean and provides an indicator of inter-annual volatility in revenues. The right hand column shows the ratio of the baseline period CV to the long-term CV. Taken together, these metrics allow comparison among species and species groups of any trends in volatility. Because the CV values are usually smaller for the baseline period, these values may be more useful for comparisons between species rather than over time within a species. However, the ratio values present a relative measure of magnitude. A ratio close to one indicates about the same level of variation in the short term (baseline) as in the long term; values less than one suggest less variation in the short term compared to the long term. Only one species, petrale sole, has a ratio greater than one. This may be due to the sharp decline in catches beginning in 2011. Comparing these values to the panels in Figure 3-3 suggests that some of the high CV values (otherwise interpreted as instances of "volatility") are more likely driven by long-term declines in catch. Dover sole offers a good example of a long-term decline that has flattened during the baseline period, resulting in a relatively high CV value for the long term but a relatively low value in the short term.

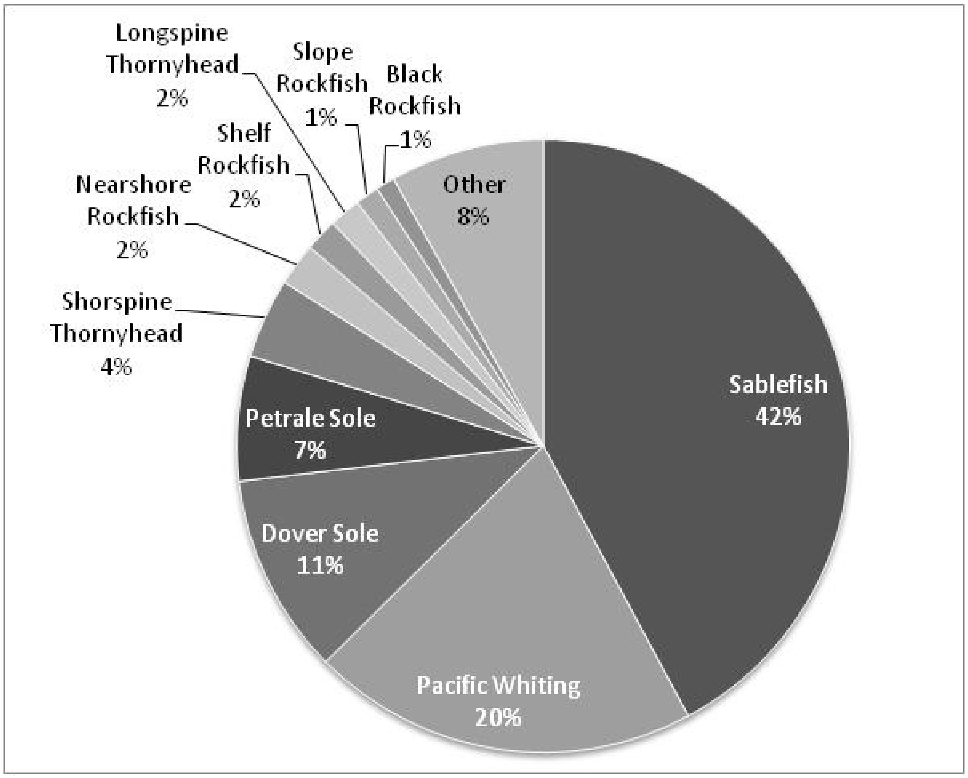


Figure 3-1. Proportion 2003-2012 nominal shoreside commercial and tribal groundfish ex-vessel revenue by species and species groups. Source: PacFIN vdrfd table, 8/7/13.

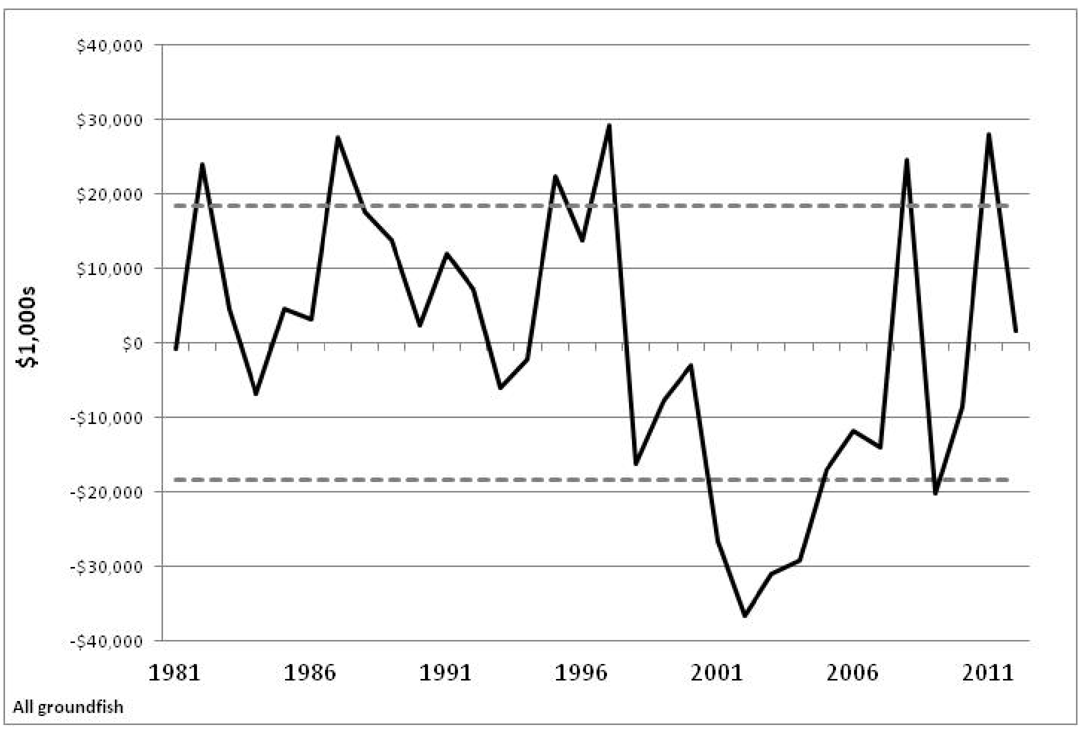


Figure 3-2. Deviation from long-term mean (1981-2012) for total groundfish ex-vessel revenue ($1,000s inflation adjusted, 2012). Dashed lines are +/- one standard deviation from the mean.

Table 3-1. Average annual landings (mt), ex-vessel revenue (inflation adjusted $1,000s, 2012), and price-per-pound (inflation adjusted, 2012) for 32-year and 10-year historical periods, and ratio of 10-year values to 32-year values. Source: PacFIN vdrfd, 8/7/2013.

	Sablefish	P. Whiting	Dover Sole	Petrale Sole	Shortspine Thornyhead	Nearshore Rockfish	Longspine Thornyhead	Slope Rockfish	Shelf Rockfish	Black Rockfish	All species
1981-2012 Annual Averages											
Metric tons	8,581	52,876	12,525	1,851	1,829	238	2,038	2,828	6,829	266	110,581
Revenue	$23,609	$7,631	$12,253	$5,092	$3,472	$1,418	$3,729	$3,459	$8,449	$515	$90,159
Price	$1.46	$0.09	$0.44	$1.26	$1.04	$3.46	$0.71	$0.59	$0.59	$1.06	$0.38
2003-2012 Annual Averages											
Metric tons	6,038	83,070	8,448	1,845	1,012	113	1,003	602	866	168	110,236
Revenue	$28,969	$13,982	$7,345	$4,647	$2,929	$1,555	$1,180	$880	$1,173	$692	$69,064
Price	$2.16	$0.08	$0.40	$1.18	$1.36	$6.24	$0.54	$0.66	$0.64	$1.89	$0.29
Ratios											
Metric tons	0.70	1.57	0.67	1.00	0.55	0.47	0.49	0.21	0.13	0.63	1.00
Revenue	1.23	1.83	0.60	0.91	0.84	1.10	0.32	0.25	0.14	1.34	0.77
Price	1.48	0.90	0.92	0.94	1.31	1.80	0.76	1.13	1.08	1.77	0.77

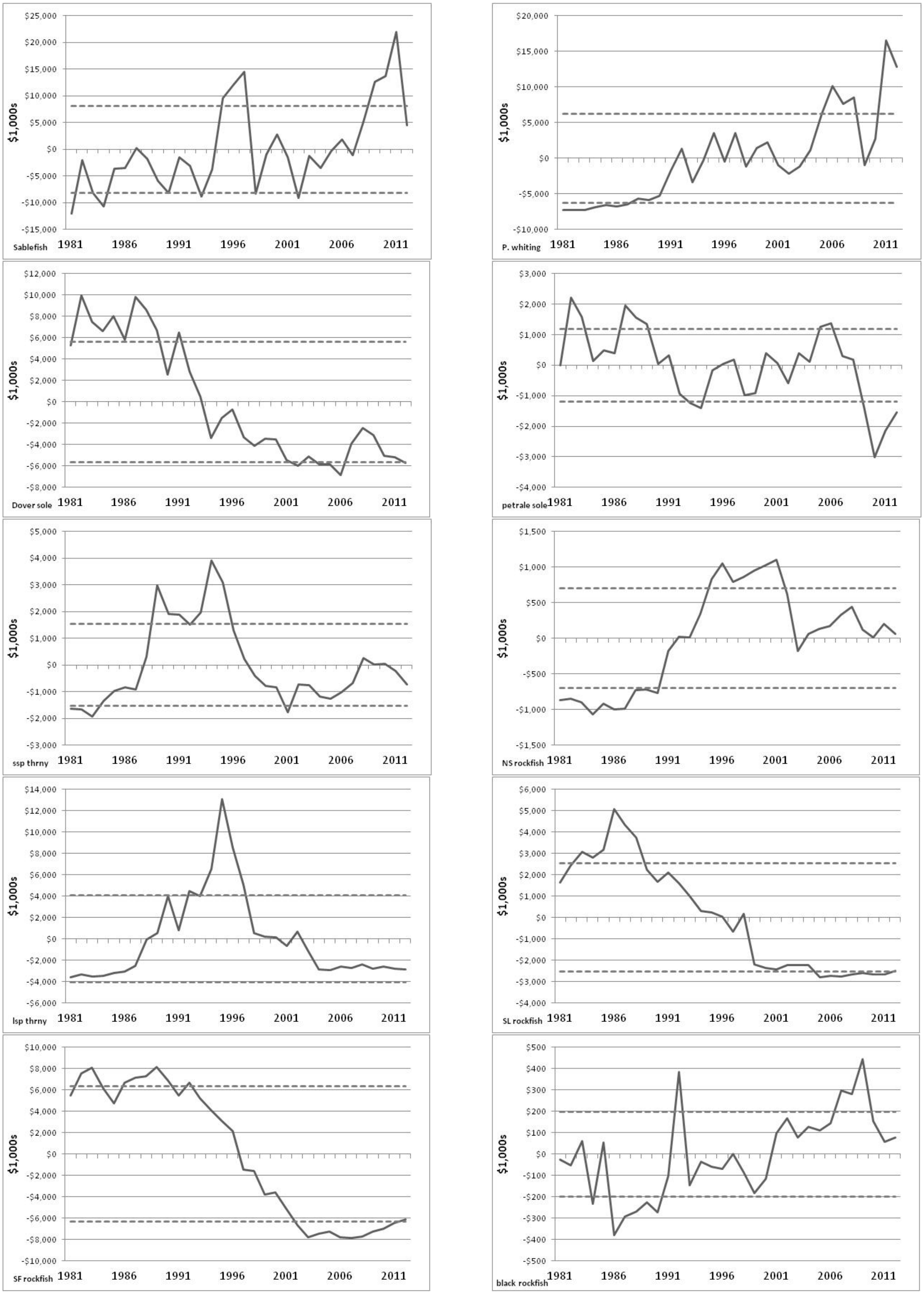


Figure 3-3. Deviation from long-term mean (1981-2012) of ex-vessel revenue ($1,000s inflation adjusted, 2012) for selected groundfish species and groups. Dashed lines are +/- one standard deviation from the mean.

Species/Sp. Group	A 1981-2012 (longterm)	B 2003-2012 (baseline)	B/A Ratio
Sablefish	0.341	0.268	0.788
P. whiting	0.805	0.402	0.500
Dover Sole	0.253	0.173	0.382
Petrale Sole	0.231	0.302	1.304
Shortspine Thornyhead	0.436	0.176	0.403
Nearshore Rockfish	0.486	0.105	0.215
Longspine Thornyhead	1.071	0.431	0.402
Slope Rockfish	0.721	0.218	0.303
Shelf Rockfish	0.738	0.473	0.640
Black Rockfish	0.380	0.171	0.250

Table 3-2. Coefficient of variation for inflation-adjusted ex-vessel revenue for selected species and species groups by two time periods.

3.2.2 Revenue Trends in Commercial Groundfish Fishery Sectors

Fishery managers frequently view groundfish fisheries in terms of fishery "sectors."[12] These sectors are defined by the permit status of participating vessels, gear type, target species, and various other historical factors. The Council allocates fishing opportunity (or the amount of fish vessels in a particular sector may harvest) either as part of the biennial process or through rules that have been established in the Groundfish FMP. Fishery sectors may receive a fixed allocation of the ACL for particular management units (stocks, geographic subdivisions of stocks, and stock complexes); in other cases fishery managers may identify a catch amount as a management objective (e.g., a harvest guideline, "HG") or simply as an accounting mechanism to prevent ACLs from being exceeded. Section 4.2 describes the allocation schemes under consideration as part of the proposed action.

The characterization of commercial groundfish fisheries here is presented in terms of the following fishery sectors:

- **Pacific whiting trawl** is composed of at-sea and shoreside fisheries (which is a segment of the IFQ fishery, described below). The at-sea sector is subdivided between mothership processing vessels accepting fish from catcher boats and catcher-processor vessels. The shoreside fishery deliverers to processing plants on land with Westport and Ilwaco, Washington, and Astoria, Oregon, being the principal ports for shoreside landings.
- **Non-whiting trawl/shorebased IFQ** catches a variety of other species, although sablefish and some flatfish are the main revenue earners. Beginning in 2011 this fishery has been managed under an individual fishing quota (IFQ) program. This fishery is now usually referred to as "shorebased IFQ," because an important feature of this management program is a relaxation on allowed gear types used by these permitted vessels. As a result, landings of sablefish by gear types other than trawl have emerged as an important part of the revenue earned by permitted vessels in this sector. In addition, midwater trawl is being used to target non-whiting species.
- **Fixed gear (longline and pot) fisheries** are divided between "limited entry" and "open access" from a regulatory standpoint, but fishery managers more commonly characterize the "non

[12] Data presented in this section use sector definitions included in the PacFIN vdrfd table. The coding is based on data available within the database including gear type, species composition of landings, and Federal permit status. Global criteria for these sectors are landings from within the Pacific Council management area landed in west coast ports. Relatively small amounts of groundfish coming from other areas, such as Puget Sound, Canada or Alaska, but landed in a west coast port are thus not included in the landings figures for these sectors.

nearshore" sector—primarily targeting sablefish—and a "nearshore" sector targeting various nearshore groundfish species.

- A variety of other sectors have been characterized for the purpose of management and data presentation, but in aggregate they account for a very small proportion of landings and revenue.

Figure 3-4 shows the share of landings (top panel) and inflation-adjusted ex-vessel revenue (bottom panel) by groundfish fishery sector for the 2003-2012 baseline period. Pacific whiting fisheries dominate in terms of landings, accounting for 88% of the total. However, because whiting fetches a low price per pound, those sectors accounted for only 39% of inflation-adjusted ex-vessel revenue. Shorebased IFQ accounts for the next largest share of landings and revenue, 10% and 34% respectively. Fixed gear landings fetch a relatively higher price so while those sectors accounted for only a little more than 2% of landings, they garnered a quarter of groundfish revenue, primarily in the non nearshore sector that targets sablefish.[13]

Figure 3-5 shows revenue trends for groundfish sectors over the baseline period. Revenues have been more stable for non-whiting sectors compared to whiting. One way of assessing variability is the coefficient of variation (the standard deviation divided by the mean). The values for the sectors (over the baseline period) shown in the figure are as follows: non-whiting trawl (including non-trawl IFQ in 2011-2012): 0.131; shoreside whiting trawl: 0.584; non nearshore fixed gear: 0.269; nearshore fixed gear 0.074; at-sea catcher-processors: 0.503; at-sea mothership catcher vessels: 0.551.

[13] The dahl_sector column in the PacFIN vdrfd table is used to categorize landings and revenue by groundfish fishery sectors.

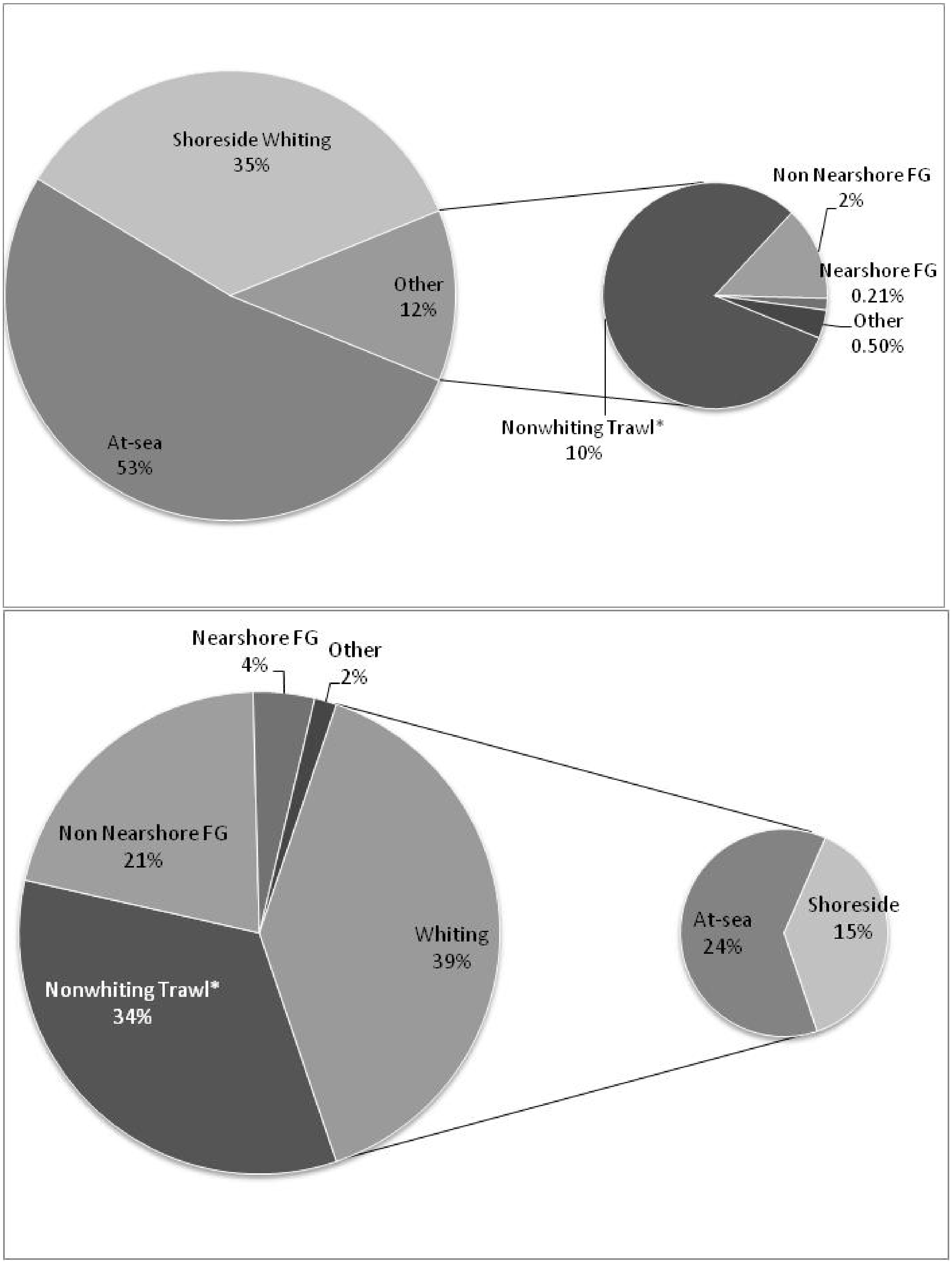


Figure 3-4. Share of groundfish landings (top) and inflation adjusted ex-vessel revenue (bottom) by fishery sector, 2003-2012. Source: *2011-2012 non-whiting trawl includes IFQ non-trawl landings. (PFMC 2014, Tables 12a-b and 14a-b).

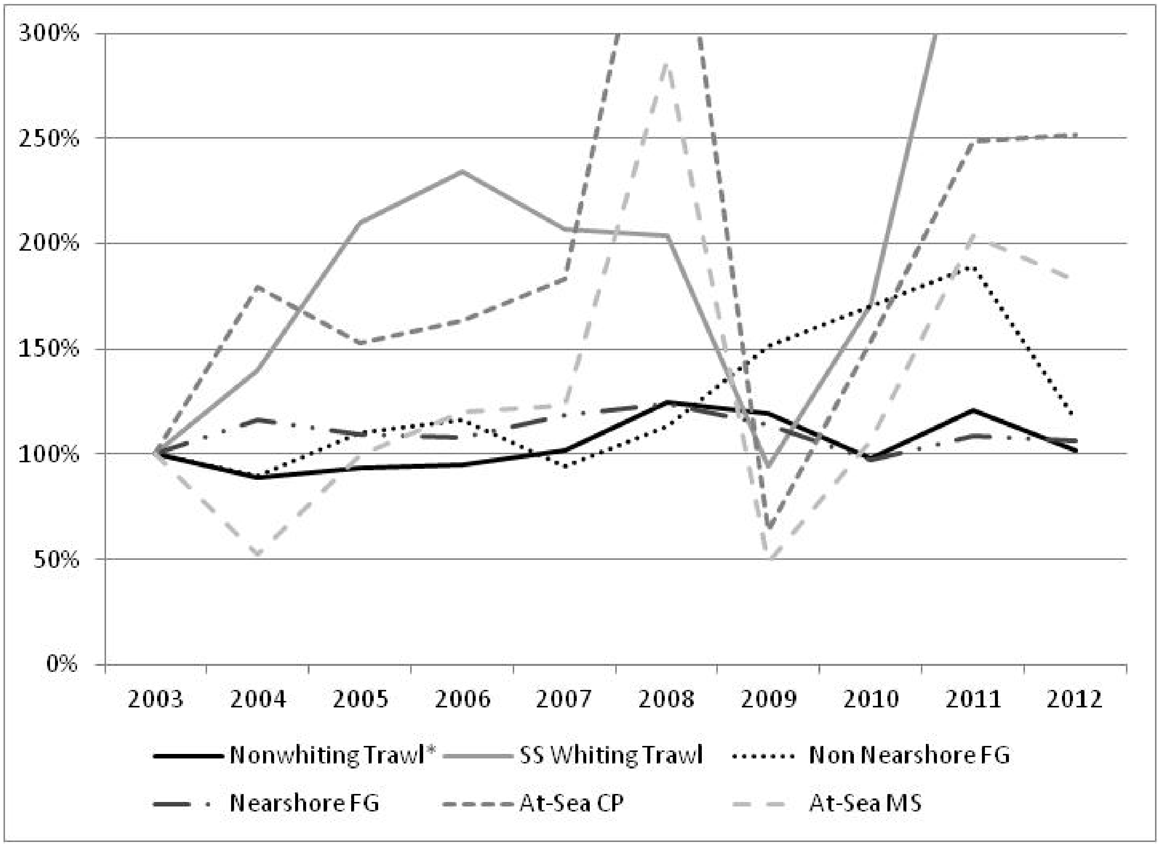


Figure 3-5. Ex-vessel revenue trends (inflation adjusted, 2012, from groundfish only) for groundfish fishery sectors, 2003-2013; 2003=100. *Non-whiting trawl includes non-trawl IFQ in 2011-2012. Value outside figure scale (>300%): 2008 at-sea CP whiting 408%, 2011 shoreside whiting 342%. (Source: PFMC 2014 Tables 12b and 14b).

3.2.2.1 Pacific Whiting Fisheries

As mentioned above, the Pacific whiting fishery is further subdivided into three sectors, two of which operate with at-sea processing operations and the other with trawl vessels delivering to shoreside processing plants.[14] The allocation of Pacific whiting among these sectors (after deductions from the ACL for tribal fisheries and other activities) is specified in the Groundfish FMP: 42% to shoreside catcher vessels, 34% to the catcher-processors, and 24% to mothership catcher vessels. Figure 3-6 shows the share of revenue among these sectors during the baseline period. There is a 4% difference between the allocation shares and revenue for catcher-processors and shoreside catcher vessels, indicating that catcher-processor vessels have on average commanded a higher price for whiting deliveries or else harvested relatively more of their allocation. However, catcher-processor whiting prices are imputed since there is no actual sale from catcher to processor in these integrated operations. Therefore, the revenue differences could be at least partly an artifact of this imputation.

[14] The at-sea sectors are distinguished by their operational characteristics. Because the shoreside segment of the Pacific whiting fishery includes vessels that participate in other trawl fisheries, a catch-based definition is used: trips where the landing is composed of at least 50% whiting are classified as part of the shoreside whiting fishery.

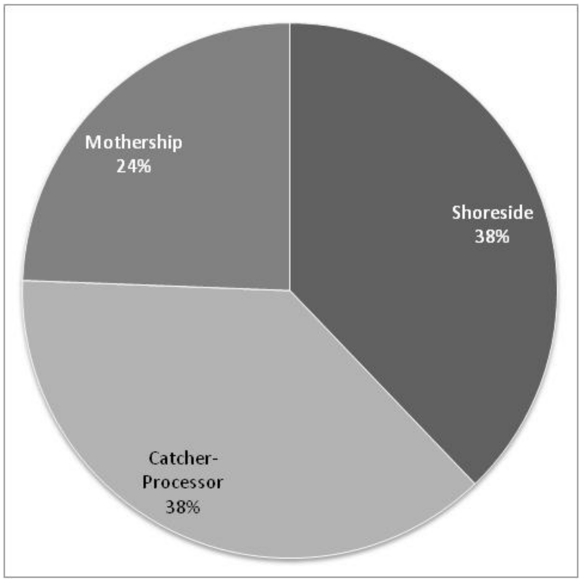


Figure 3-6. Share of inflation-adjusted (2012) ex-vessel revenue for unprocessed Pacific whiting by fishery sector, 2003-2012.

As noted above, whiting catch and revenue can be quite variable from year to year, mainly due to the underlying variation in stock productivity. The long-term trend is shown in Figure 3-3; Figure 3-7 shows revenue by whiting sector during the baseline period against the left vertical axis and annual catch limits (in metric tons) against the right vertical axis. This depiction shows that variation in catch limits has a major influence on revenue, which has been somewhat mitigated by increasing real prices for whiting. The average inflation-adjusted price per pound for shoreside deliveries was $0.06 in 2009 and $0.14 in 2012, which likely explains why the decline in revenues in 2012 was not as steep as in 2009 even though the catch limit in 2012 was below the average for the baseline period.

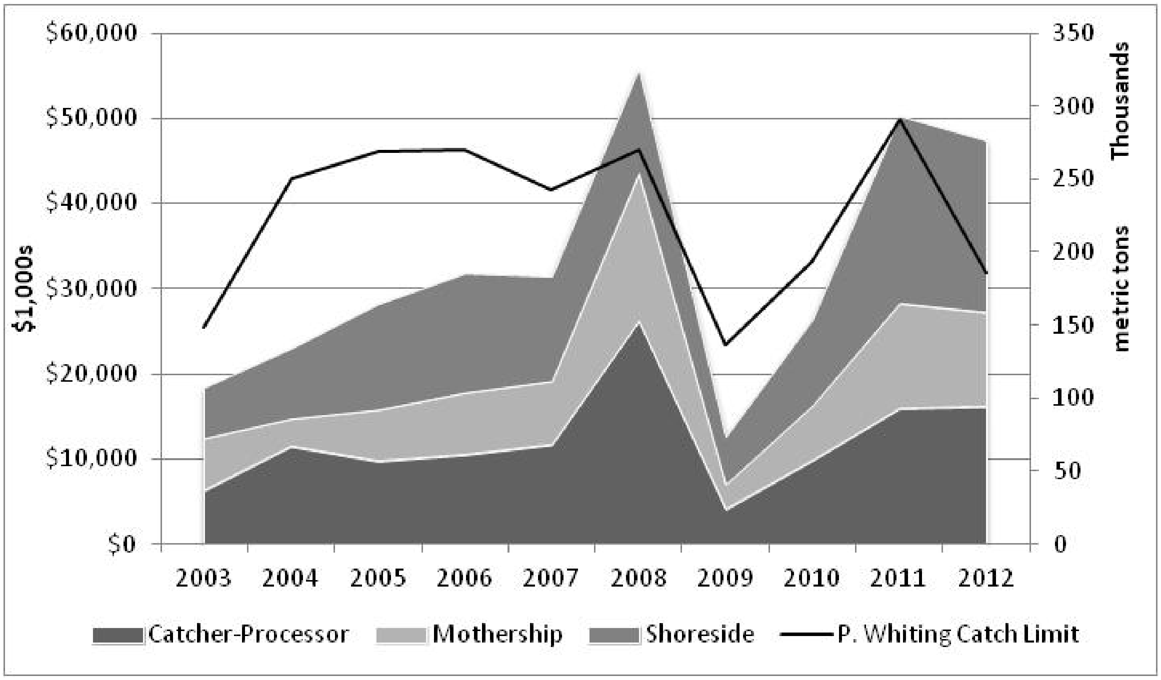


Figure 3-7. Inflation adjusted ex-vessel revenue by sectors ($1,000s, left vertical axis) and catch limits (metric tons 1,000s, right vertical axis) for Pacific whiting, 2003-2012. (Source: PFMC 2014, Table 14b) and various groundfish harvest specifications EISs.

3.2.2.2 Shoreside Non-whiting Trawl/IFQ Fishery

As discussed above, management of the shoreside non-whiting trawl fishery changed substantially in 2011 with the implementation of the IFQ program. Although quota share trading was delayed until 2014 (partly a program feature and later extended due to litigation), trading in quota pounds—the annual allocation of "fishing opportunity"—was permitted from the outset. This allows individual harvesters to adjust their "IFQ portfolios" to better match the actual fishing strategies they wish to pursue, at least in the short term.

Table 3-3 compares ex-vessel revenue by species for the shoreside non-whiting trawl fishery prior to 2011 and the two segments of the IFQ fishery (trawl and non-trawl) that trawl permit holders have pursued in 2011 and 2012. The trawl segment has retained a similar pattern of landings, with revenue for the fishery as a whole dominated by sablefish, Dover sole, petrale sole, and thornyheads. Use of these categories to some extent masks specialist strategies that harvesters may pursue such as winter fishing on the continental slope for Dover sole, thornyheads, and sablefish, and fishing in shallower depths for various flatfish and sablefish during summer months. The trawl segment pursues a more diverse set of strategies compared to the non-trawl segment, which targets sablefish almost exclusively.

Table 3-4 compares the two segments with respect to the top-earning species, sablefish, for the period 2009-2012, which brackets implementation of the shorebased IFQ program. As discussed above, 2011 was anomalous because of the historically high prices sablefish fetched. Perhaps partly due to this, in the latter two years the non-trawl segment has garnered 40% of the ex-vessel revenue from sablefish even though they represent only about a third of the vessels in the fishery (see Table 3-5). Another feature of the shorebased IFQ fishery highlighted by Table 3-5 is the specialization by gear type; only 4-5% of the participating vessels used both trawl and non-trawl in either 2011 or 2012.

Table 3-3. Average annual ex-vessel revenue (inflation adjusted $1,000s, 2012, and percent of total revenue from groundfish landings) for the shoreside non-whiting trawl fishery (2003-2010, 2011-2012) and IFQ non-trawl fishery (2011-2012). (For the non-trawl fishery Other Groundfish includes thornyheads.) (Source: PFMC 2014, Tables 4b and 5b).

	Trawl 2003-2010	Percent	Trawl IFQ 2011-2012	Percent	Non-trawl IFQ 2011-2012	Percent
Sablefish	$9,032	32.7%	$7,451	31.7%	$6,254	97.7%
Dover Sole	$7,269	26.3%	$6,666	28.4%		
Petrale Sole	$4,703	17.0%	$2,925	12.5%		
Thornyheads	$2,608	9.4%	$1,999	8.5%		
Rockfish	$843	3.0%	$1,397	5.9%		
Arrowtooth Flounder	$545	2.0%	$533	2.3%		
English Sole	$470	1.7%	$81	0.3%		
P. Cod	$444	1.6%	$421	1.8%		
Lingcod	$151	0.5%	$479	2.0%		
Other Groundfish	$1,567	5.7%	$1,540	6.6%	$150	2.3%

Table 3-4. Landings, nominal revenue, and price-per-pound for sablefish in the trawl and non-trawl segments of the shorebased IFQ fishery, 2011-2012. Source: PacFIN vdrfd 8/9/13

	2009	2010	2011	2012	Total
Landings (mt)					
Trawl	3,009	2,511	1,663	1,429	8,612
Non-trawl			1,116	923	2,039
Total Landings	**3,009**	**2,511**	**2,779**	**2,352**	**10,651**
Revenue ($1,000s)					
Trawl	$12,432	$10,727	$9,176	$5,569	$37,904
Non-trawl			$7,477	$4,898	$12,375
Total Revenue	**$12,432**	**$10,727**	**$16,653**	**$10,467**	**$50,279**
Price per Pound ($)					
Trawl	$1.87	$1.94	$2.50	$1.77	
Non-trawl			$3.04	$2.41	

Table 3-5. Number of vessels participating in the IFQ fishery by type of gear used, 2011-2012. Source: PacFIN vdrfd 8/9/13.

Gear	2011	2012
Both	5	4
Trawl only	67	63
Non-trawl only	26	23
Total	**98**	**90**

Fishery managers have noted an increase in vessels targeting widow and yellowtail rockfish with midwater trawl gear over the past few years. In the 1980s there was a large fishery employing this strategy, which effectively disappeared as the need to rebuild overfished stocks resulted in increased management restrictions. Both the rebuilding of the widow rockfish stock and implementation of IFQ management has facilitated the reemergence of this fishery on a limited scale. For perspective, Figure 3-8 shows the historical trend for landings of widow and yellowtail rockfish by trawl gear.

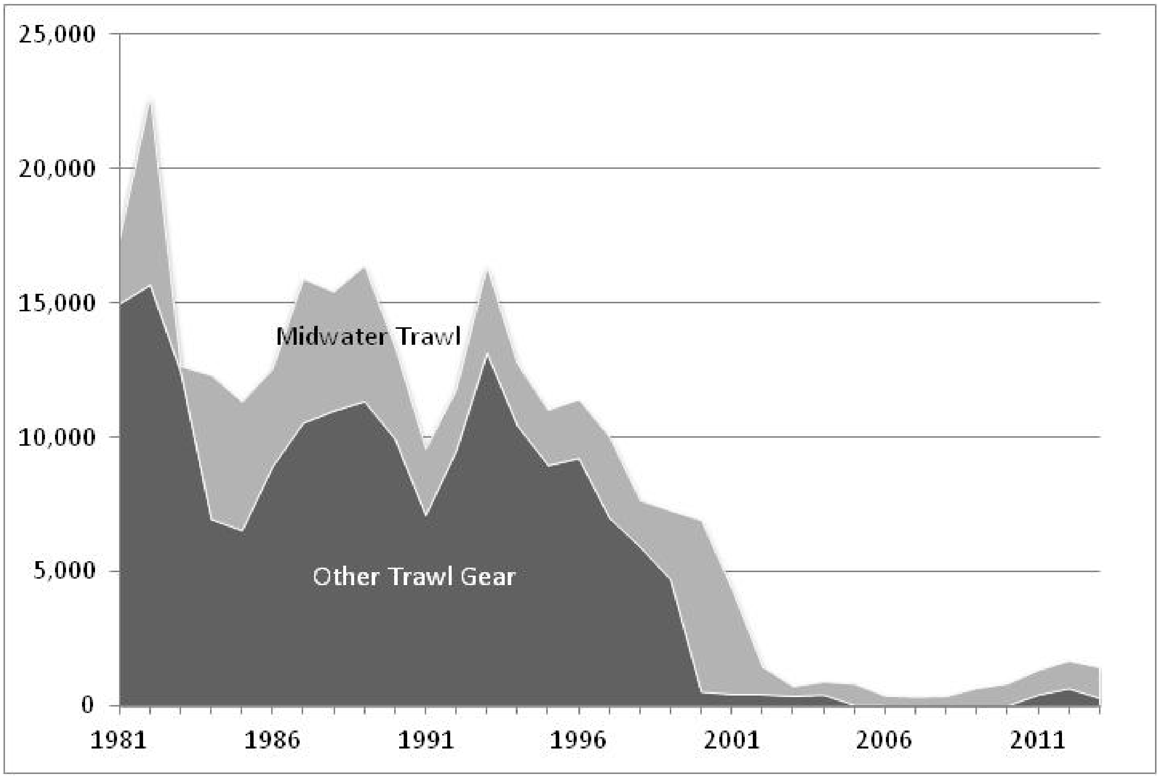


Figure 3-8. Landings of widow and yellowtail rockfish by trawl gear, 1981-2013

The figure indicates an uptick in landings of these species since 2009. Looking more closely at the midwater fishery, Table 3-6 shows landings and revenue from trips in the commercial fishery where widow and yellowtail rockfish made up at least 50% of the total landing by weight. This criterion is used as proxy for trips targeting these species. Surprisingly, the number of trips (estimated by counting fish ticket numbers) fell substantially after 2010; in 2010 there were 497 trips based on this estimate while there were 11, 67, and 74 trips in 2011-2013 respectively. However, overall landings and revenue from these two species in 2013 exceeded the summed amounts in previous years. Landings composition is used as a proxy for target strategy in compiling these data but it is impossible to determine whether the intended target and the landings composition correspond in all cases. In other words, some portion of these trips could represent instances where the intended target was Pacific whiting even though the majority of landing was made up of other species.

Table 3-6. Landings and inflation adjusted revenue for trips with midwater trawl gear targeting widow/yellowtail, 2010-2013. (Source: PacFIN vdrfd 3/18/2014)

	2010		2011		2012		2013	
Species	MT	Dollars	MT	Dollars	MT	Dollars	MT	Dollars
Widow	25	$22,103	12	$9,981	9	$9,547	214	$226,943
Yellowtail	166	$136,648	11	$13,421	239	$283,181	391	$415,777
P. Whiting	0	$0	11	$2,522	9	$1,291	11	$1
Other	24	$1,546	<1	$145	5	$2,606	5	$3,874

3.2.2.3 Non-nearshore Fixed Gear Fishery

The non-nearshore fixed gear fishery is composed of vessels with a gear-endorsed Federal limited access permit ("limited entry fixed gear") and vessels without such permits ("open access," although they may hold state limited entry permits). The limited entry portion of the fleet has more catch opportunity for the primary target species, sablefish, through vessel level catch limits (based on the associated permit “tier” status) and higher cumulative landing limits.[15] Vessels with Federal limited entry permits accounted for 77% of overall inflation-adjusted revenue from sablefish during the baseline period even though open-access vessels accounted for 68% of participating vessels during the baseline period.

Figure 3-9 shows the distribution of ex-vessel revenue by species during the baseline period for the non-nearshore fishery (including both the sablefish and non-sablefish portions). Sablefish accounts for the most revenue, both because of its share of landings and its high value, followed by thornyheads. A variety of other species, mainly rockfish, account for the remainder of groundfish landings and revenue.

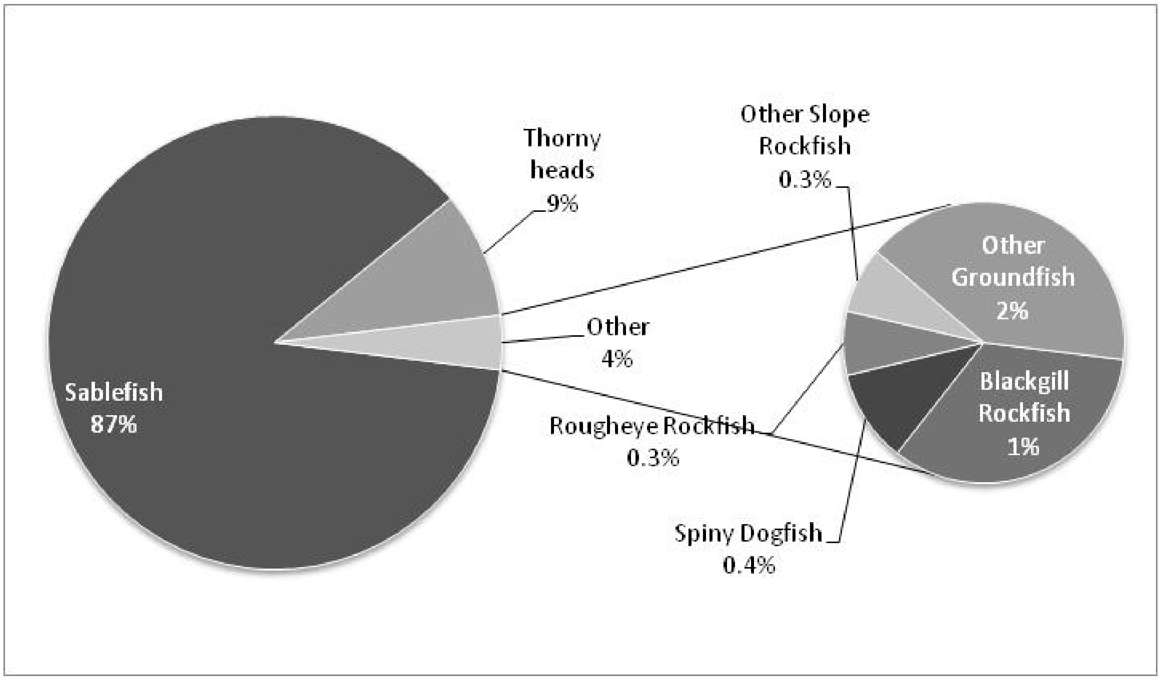


Figure 3-9. Non-nearshore fixed gear ex-vessel revenue by groundfish species or species group in inflation-adjusted (2012) dollars, $1,000s, 2003-2012. Source: PacFIN vdrfd 8/14/13.

Blackgill rockfish and spiny dogfish have been of particular interest to fishery managers over stock conservation concerns. Tables 8a and 8b in the 2014 Groundfish SAFE (PFMC 2014) provide landings and revenue data for species important in the non-nearshore fishery, including these two species. Figure 3-10 presents these data graphically. Blackgill rockfish landings and inflation-adjusted revenue averaged 56 mt and $566,000 annually during the 2003 to 2012 baseline period while for spiny dogfish these figures were 77 mt and $41,300 out of total annual average landings and revenue of 331 mt and $17.3 million. In 2013 trip limits for blackgill rockfish were reduced. Preliminary PacFIN data (vdrfd table, 3/19/2014) show that 16 mt valued at $50,000 was landed in 2013, a substantial decline from the peak in the 2011.

[15] Although for data and management a distinction is made between trips targeting sablefish and trips where sablefish are not landed (implying some other target), during the baseline period 97% of revenue was earned on sablefish-targeted trips.

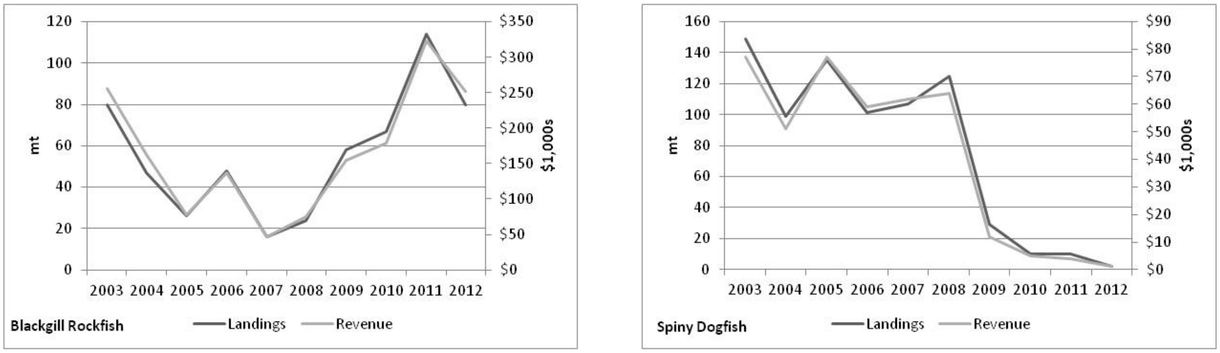


Figure 3-10. Landings and revenue (inflation adjusted, 2012) for blackgill rockfish (left) and spiny dogfish (right) in the nonnearshore fixed fishery.

3.2.2.4 Nearshore Fixed Gear Fishery

Although the nearshore fixed gear fishery accounted for less than 0.5% of coastwide groundfish landings during the baseline period, it garnered 5% of total revenue. Much of the fish from the fishery commands high ex-vessel and retail prices, with live fish markets catering to Asian communities in California as an important destination. Although a small portion of coastwide ex-vessel revenue, the nearshore fishery is regionally important, as discussed in section 3.2.8.

Figure 3-11 shows the distribution of revenue by species or species group during the baseline period. Although a relatively few species (cabezon, brown rockfish, gopher rockfish, blue rockfish, lingcod, and kelp greenling) account almost three-quarters of the revenue, a diverse array of other rockfish species are also caught and make up the balance of the landings. Table 3-7 shows the species included in "Other Nearshore Rockfish" category in SAFE Table 9b (PFMC 2014). Within this category, again just a few species account for a majority of landings but a wide range of rockfish species are landed as indicated by the long list of species names listed for the remaining 5%.[16]

[16] The names in this table are from the CNAME column associated with PacFIN species id codes (SPID), which include species and various market categories. Note that species composition adjustments are applied in generating the PacFIN vdrfd table.

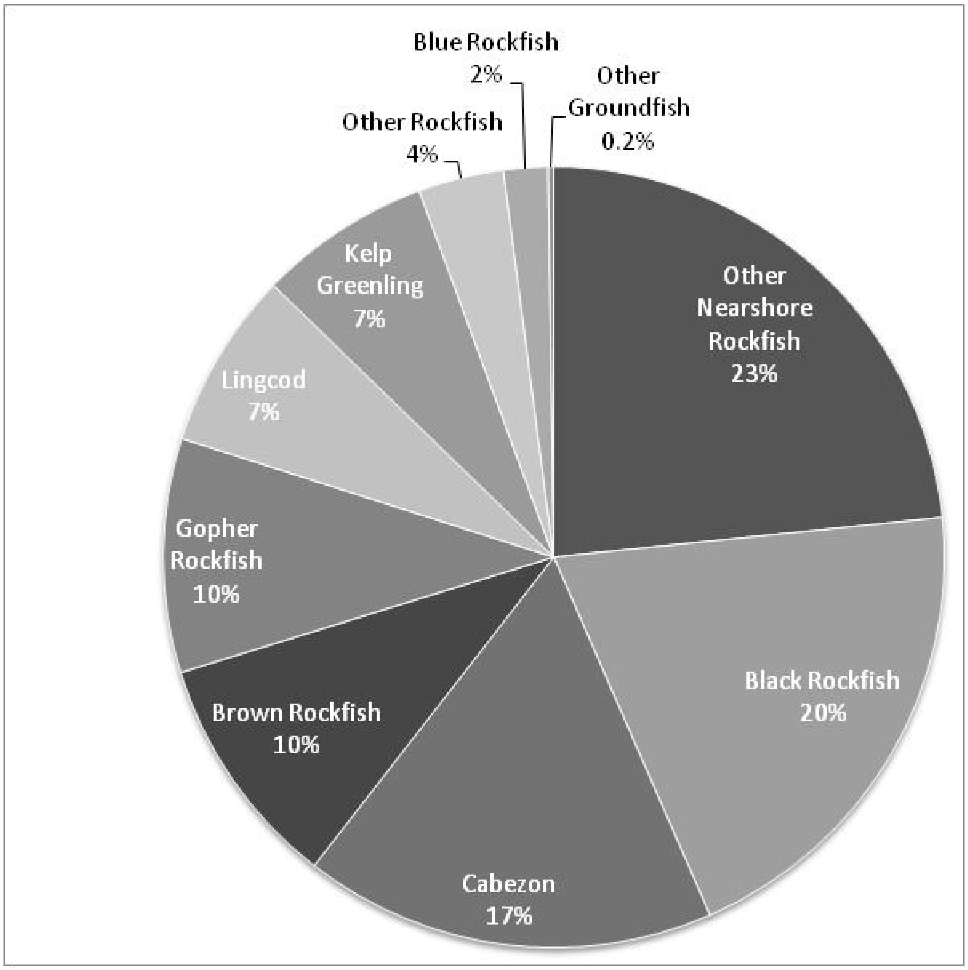


Figure 3-11. Nearshore fixed gear ex-vessel revenue by groundfish species or species group in inflation-adjusted (2012) dollars, $1,000s, 2003-2012. SAFE (Source: PFMC 2014, Table 9b).

Table 3-7. Rockfish species within Other Nearshore Rockfish category in SAFE Table 9b and proportion of landings in this category, 2003-2012. Source: vdrfd 8/15/13, based on procedure for SAFE Table 9b.

PacFIN Species	Pct. Of Landings
Vermilion Rockfish	59.66%
California Scorpionfish	10.22%
Yellowtail Rockfish	8.71%
Bocaccio	4.28%
Unsp. Reds Rckfsh	4.14%
Blackgill Rockfish	3.55%
Unsp. Shelf Rockfish	2.48%
Tiger Rockfish	1.07%
Unsp. Rockfish	0.97%
Starry Rockfish, Chilipepper, Widow Rockfish, Darkblotched Rockfish, Flag Rockfish, Rosy Rockfish, Greenspotted Rockfish, Bank Rockfish, Greenblotched Rockfish, Unsp.	4.91%

Small Reds Rckfsh, Speckled Rockfish, Mexican Rockfish, Unsp. Slope Rockfish, Nor. Unsp. Shelf Rockfish, Splitnose Rockfish, Unsp. Rosefish Rckfsh, Unsp. POP Group, Yelloweye Rockfish, Canary Rockfish, Greenstriped Rockfish, Rosethorn Rockfish, Redbanded Rockfish, Freckled Rockfish, Shortbelly Rockfish, Blackspotted Rockfish, Squarespot Rockfish, Honeycomb Rockfish, Cowcod Rockfish, Bronzespotted Rockfish, Nor. Unsp. Slope Rockfish, Rougheye Rockfish, Pink Rockfish, Silvergrey Rockfish, Pinkrose Rockfish, Yellowmouth Rockfish, POP, Squarespot, Aurora Rockfish	
Total	**100%**

3.2.2.5 Other Commercial Fisheries Catching Groundfish

Groundfish are caught in a variety of other circumstances including by vessels targeting groundfish with gear types other than trawl or fixed gear, fisheries for species other than groundfish and catching groundfish incidentally (referred to by managers as the "incidental open access sector" and the "exempted trawl sector"), vessels targeting groundfish pursuant to an EFP, and research catches. (Tribal fisheries are considered separately and discussed below). Catches in these sectors are negligible from a socioeconomic standpoint, accounting for 2% of inflation-adjusted groundfish ex-vessel revenue during the baseline period. But this catch can be very important to fishery managers in terms of accounting for overfished species catch, because ACLs for some of these stocks tend to be very low, imposing constraints on target fisheries. Figure 3-12 shows the breakdown of revenue from these sectors for the baseline period. Figure 3-13 shows the proportion of ex-vessel revenue derived from various species and species groups for these miscellaneous sectors. About three-quarters of revenue come from species other than groundfish, which is expected since most of the sectors discussed here are not targeting groundfish.

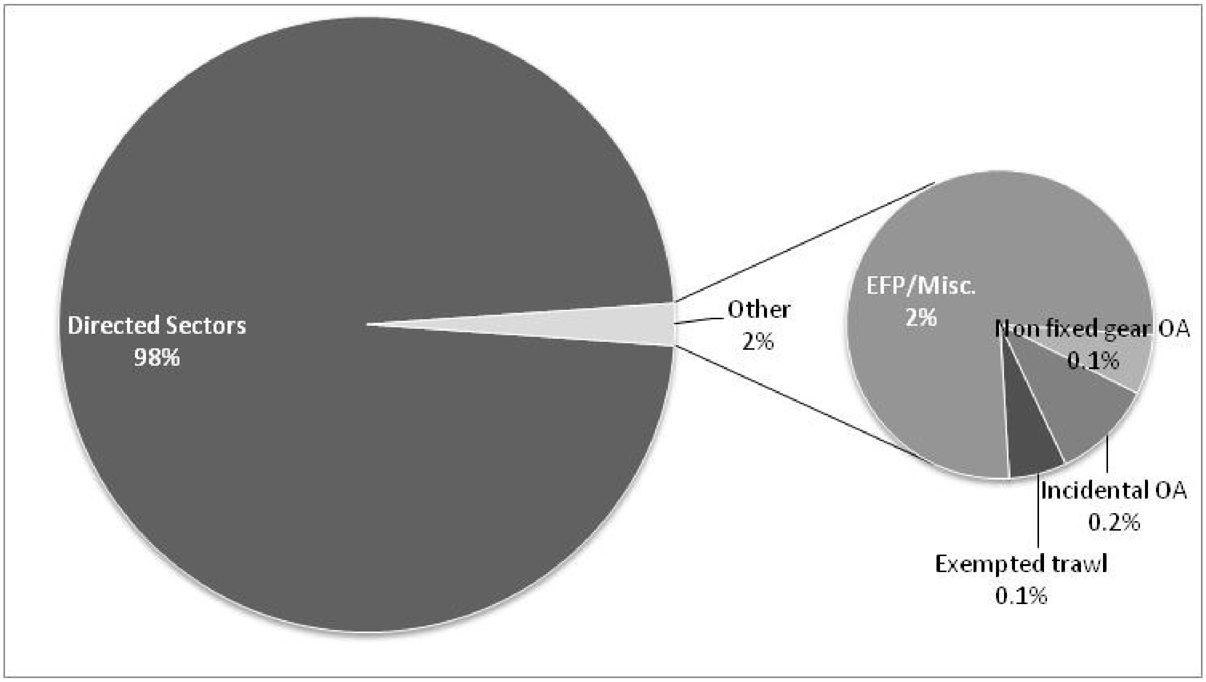


Figure 3-12. Share of inflation adjusted ex-vessel revenue (2012) from non-fixed gear open access incidental, and other minor sectors, 2003-2012. Source: vdrfd 8/15/13.

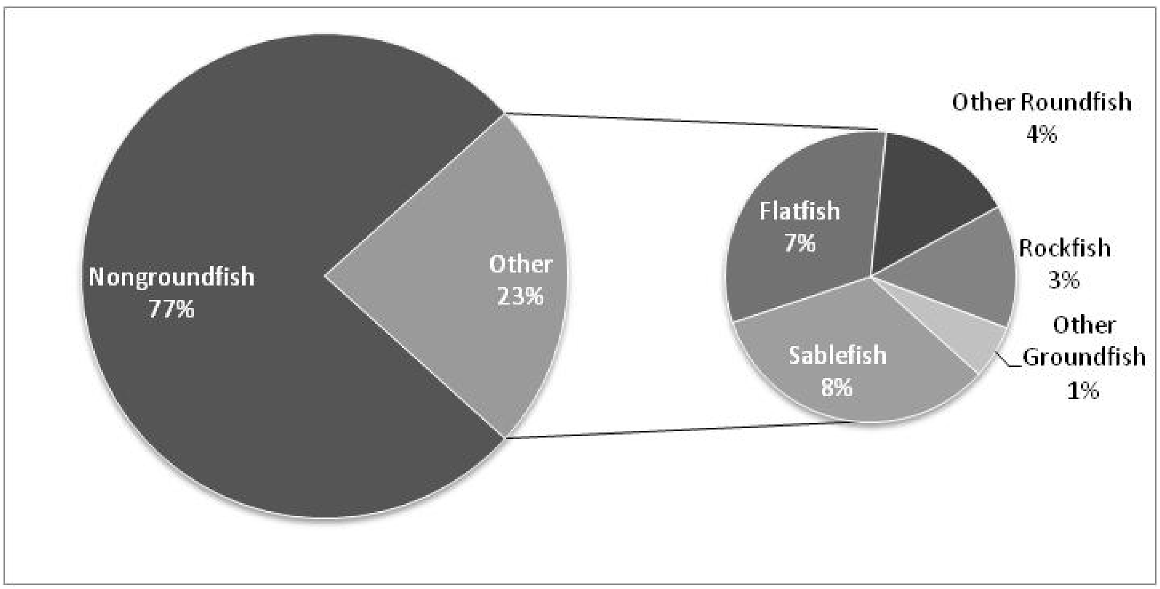


Figure 3-13. Inflation adjusted ex-vessel revenue by species composition from non-target and other miscellaneous groundfish sectors, 2003-2012. Source: vdrfd 8/23/13 based on procedure for Table 10a-b in the 2014 Groundfish SAFE (PFMC 2014).

3.2.3 Participation Trends in Commercial Groundfish Fisheries

Figure 3-14 shows annual counts of vessels (based on vessel ID) and landings (based on fish ticket ID) for the nearshore and non-nearshore fixed gear sectors and the non-whiting IFQ trawl sector during the baseline period. Participation in the nearshore fishery and trawl fisheries declined over the baseline period while non-nearshore participation remained relatively stable. In the nearshore fishery 453 vessels made landings in 2003, declining to 321 vessels in 2012. However, the annual number of landings in the nearshore fishery has remained fairly stable. The IFQ trawl fishery saw steep declines in 2004 (due to the vessel buyback program) and 2011 (likely a result of the implementation of IFQ management) in both vessel participation and the number of landings. The non-nearshore fixed fishery has remained fairly stable with respect to both metrics.

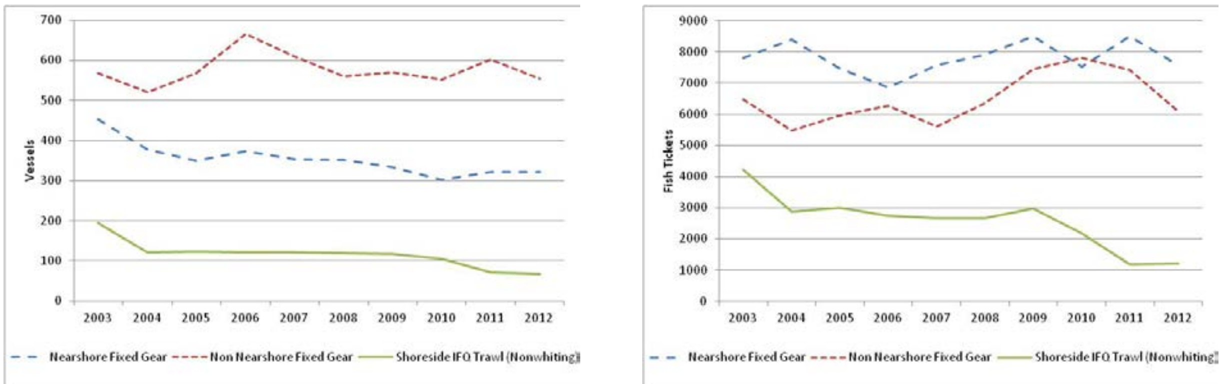


Figure 3-14. Number of vessels (left) and landings (right) by sector, 2003-2012. (PacFIN vdrfd 05/04/14)

3.2.4 Tribal Groundfish Fisheries

Past Groundfish Harvest Specifications EISs, including the 2013-2014 FEIS, describe tribal fisheries and Section 6.2.5 in the Groundfish FMP describes the special status of these fisheries. Several Pacific Northwest Indian tribes have treaty rights to fish for groundfish in their usual and accustomed fishing grounds. The Federal government has accommodated these fisheries through a regulatory process described at 50 CFR 660.50. Tribal fishery management is coordinated through the Council process so catches can be accounted for when developing management measures. West coast treaty tribes in Washington State have formal allocations for sablefish, black rockfish, and Pacific whiting. For other species without formal allocations, the tribes propose trip limits to the Council, which the Council tries to accommodate while ensuring that catch limits are not exceeded. Whether formally allocated or not, tribal catches are accounted through set-asides, which are deducted along with certain other sources of catch to determine the fishery harvest guideline, the overall limit commercial and recreational fisheries are managed to.

Because tribes have sovereign rights to manage their fisheries, the tribal sectors do not have an equivalent regulatory dimension like the commercial sectors discussed above. These sectors, described below, are identified more for data presentation purposes, although they do relate to target strategy.

The Makah tribe participates in whiting fisheries with both a mothership and shorebased component. On average, the treaty fisheries have accounted for 12 percent of total whiting landings and at-sea deliveries since 2005, generating an average of about $4 million (inflation-adjusted) per year.

The Tribal non-whiting sector is defined by groundfish landings other than whiting and thus includes a variety of gear types. Hook-and-line gear represents by far the largest portion of average annual revenue for the 2003-2012 period at 70 percent, followed by bottom trawl, accounting for 28 percent (see PFMC 2014, Table 13b). In the hook-and-line fishery 97% of baseline period inflation-adjusted revenue comes from sablefish. This is similar to the commercial fixed gear sectors where sablefish is the most important component of baseline revenues. Trawl fishery landings are more diverse; the largest proportion of baseline revenue comes from rockfish, at 36%, followed by Pacific cod, petrale sole, Dover sole, and sablefish. Together these species accounted for 84% of baseline period Tribal non-whiting sector revenue for trawl gear.

While all four coastal tribes have longline fleets, only Makah currently has a trawl fleet. The Makah Tribe's trawl fleet has reduced from 10 vessels to 5 active (8 eligible) vessels due in part to reduced markets. Buyers in Neah Bay have reduced the number of trucks taking fish to processors since the closure to limited entry trawl of the area shoreward of the RCA north of Cape Alava went into place. Makah trawl fisheries pursue two basic strategies – bottom trawl and midwater trawl. In an agreement with NMFS and the Council, the Tribe has had an observer program in place since 2003 to monitor maximum retention. Maximum retention is defined as retention of all marketable species and all overfished species. The program has a target observation rate of approximately 15% of all trawl trips in a given year, though recent staffing issues and fishing patterns have made that difficult to achieve across both midwater and bottom trawl strategies in all years. For example, there were insufficient observations to conduct an analysis on 2011 bottom trawl fisheries. Likewise, there was not enough effort in 2013 midwater trawl to conduct an analysis due to confidentiality requirements and the bottom trawl coverage was similar to 2011 levels. However, for 2011 and 2012 midwater and 2012 bottom trawl, coverage was above target levels (i.e. 45.7%, 24.4%, and 23%, respectively). As such the analysis here is conducted for midwater trawl in 2011 and both midwater and bottom trawl in 2012. Prior years' analyses can be found in past Specifications and Management Measures EISs.

Management of the Makah trawl fishery is focused on avoidance of canary rockfish (an overfished species) in both strategies and widow rockfish in midwater trawls. Makah Fisheries Management combines their maximum retention policy with an observer program to verify the accuracy of bycatch accounting (i.e., if observed bycatch rates are not substantially different than unobserved bycatch rates, managers are reasonably certain that landings reflect total mortality for overfished species).

For 2012 comparisons of bycatch rates in observed versus unobserved landings were conducted for bottom trawl to test for differences in retention of canary rockfish (Table 3-8and Table 3-9). Separate analyses (*t* tests) were performed for vessels that carried an observer and all vessels combined (i.e., including those vessels that had no observer coverage during the year. Bycatch rates were also compared for three separate target strategies in bottom trawl (these are labeled "flatfish", "deep", and "P. cod") in addition to examining all targets combined to examine whether bycatch was more prevalent in one strategy than the other. The flatfish strategy was defined as trips that focused on the most predominantly targeted flatfishes: Dover, English, and petrale soles. The deep strategy focused on landings composed mostly of Dover sole, shortspine thornyhead, and skates. The Pacific cod (P. cod) strategy was defined as trips where that was the predominant species landed. Two-tailed *t* tests found no significant difference between observed and unobserved trips for vessels that carried an observer during the year. Likewise, no significant difference was measured between all observed and unobserved trips. Bycatch was not predominantly associated with a particular target strategy for bottom trawl in 2012.

Midwater trawl fisheries were similarly analyzed for differences in retention of both canary and widow rockfish (either of which may be constraining), as a proportion of target species (i.e. yellowtail and redstriped rockfish). Two-tailed paired *t* tests were conducted for both 2011 and 2012 since all vessels carried an observer during each year (Table 3-10 and Table 3-11). No significant differences were found between observed versus unobserved landings for either canary or widow rockfish in either year.

Table 3-8. Comparisons of canary rockfish bycatch rates (measured as pounds of canary rockfish divided by pounds of target category) for bottom trawl vessels that carried an observer at least once during 2012.

Year	Target Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2012	Flatfish	0.005601	0.003717	4	0.791121	0.47314
	Deep	0.043549	0.009598	4	1.178613	0.303876
	P. cod	0.01196	0.005157	4	1.185394	0.301471
	All Targets	0.003403	0.001557	4	1.474319	0.21441

Table 3-9. Comparisons of canary rockfish bycatch rates (measured as pounds of canary rockfish divided by pounds of target category) for all observed and unobserved bottom trawl vessels in 2012.

Year	Target Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2012	Flatfish	0.003501	0.003239	9	0.134277	0.896138
	Deep	0.027218	0.014679	9	0.592772	0.567927
	P. cod	0.007475	0.004036	8	0.820329	0.435787
	All Targets	0.001575	0.001215	9	0.431581	0.6762

Table 3-10. Comparisons of canary and widow rockfish bycatch rates (measured as pounds of bycatch divided by pounds of yellowtail + redstriped) for midwater trawl vessels in 2011.

Year	Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2011	Canary	0.00336	0.003418	2	-0.04048	0.971386
	Widow	0.12773	0.10101	2	1.526941	0.26633

Table 3-11. Comparisons of canary and widow rockfish bycatch rates (measured as pounds of bycatch divided by pounds of yellowtail + redstriped) for midwater trawl vessels in 2012.

Year	Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2012	Canary	0.004668	0.001495	2	2.347229	0.143455
	Widow	0.130594	0.091766	2	0.710896	0.550872

3.2.5 Recreational Fisheries

Recreational fisheries are an important part of fishery-related economic activity. However, because recreational catch is not sold it is more difficult to impute the economic value of these fisheries. Past Groundfish Harvest Specifications EISs have characterized recreational fisheries in terms of fishing effort (angler trips) to quantify spatio-temporal differences in west coast recreational fisheries. Income impacts reported in Chapter 4 to evaluate short-term (2 year) effects of the proposed action do include estimated economic impacts from recreational fishing activities.

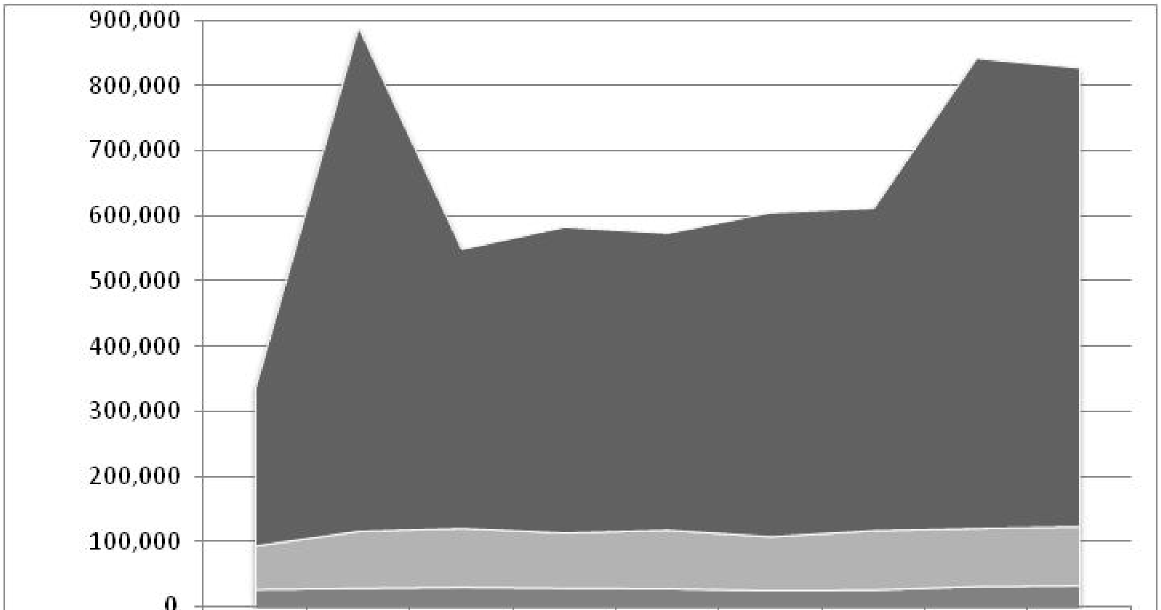
Recreational fisheries are broadly sub-divided between private anglers and commercial passenger fishing vessels (CPFVs), commonly referred to as charter vessels. Private anglers fish from shore or their own boats while charter vessels take paying passengers.

Table 3-12 shows bottomfish/halibut angler trips compared to trips targeting other species.[17] Overall, private and charter trips, which are subject to management measures described in this EIS, comprise 19% of all trips. Figure 3-15 shows bottomfish/halibut trips by state and year and Figure 3-16 shows the distribution of these trips by port area. Overall, the number of angler trips has shown a 77% increase over the 2004-2012 period. California, and especially Southern California, accounts for the vast majority of angler trips due to its large coastal population and milder year round weather.

Table 3-12. Total Angler trips by type and mode, 2004-2012. (Source: GMT state reps)

Mode	Bottomfish/Halibut	Other	Total
Charter	3,253,463 (10.4%)	1,764,526 (5.7%)	5,017,989 (16.1%)
Private	2,580,419 (8.3%)	4,259,283 (13.6%)	6,839,702 (21.9%)
Man-made	1,579,756 (5.1%)	10,592,088 (33.9%)	12,171,844 (39.0%)
Beach/Bank	30,985 (0.1%)	7,148,962 (22.9%)	7,179,947 (23.0%)
Grand Total	7,444,623 (23.9%)	23,764,858 (76.1%)	31,209,482 (100.0%)

[17] Because it is hard to distinguish between trips targeting bottomfish and those targeting Pacific halibut these trip types are combined. The tables and graphs presented in this section use data 2004-2012, because 2003 data is incomplete.



	2004	2005	2006	2007	2008	2009	2010	2011	2012
California	242,998	774,814	429,022	470,522	456,397	498,380	495,482	722,705	705,303
Oregon	66,690	87,403	90,321	84,645	89,817	82,687	90,867	89,202	90,581
Washington	27,838	29,452	31,133	29,718	28,904	26,047	27,072	32,306	33,576

Figure 3-15. Bottomfish + Pacific halibut marine angler boat trips by state, 2004-2012.

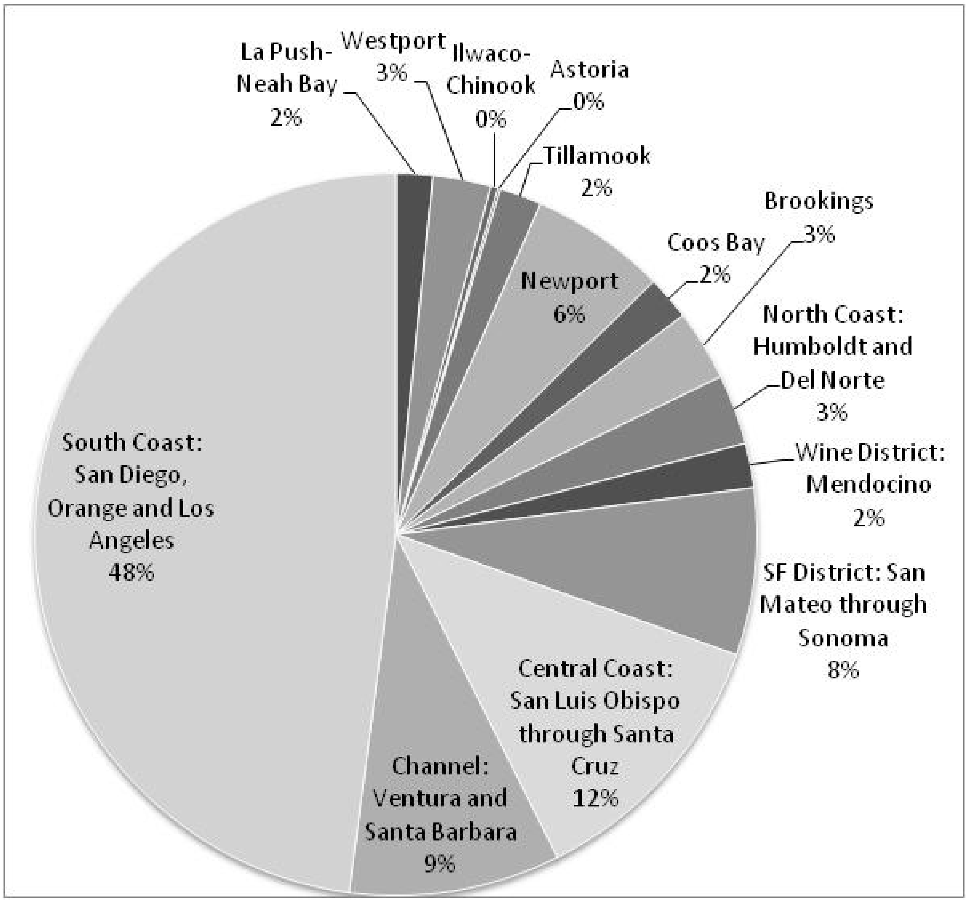


Figure 3-16. Bottomfish + Pacific halibut marine angler boat trips by reporting area, 2004-2012.

3.2.6 Costs in Commercial Groundfish Fisheries

Figure 3-17 presents estimates of the breakdown in costs for different segments of the groundfish trawl fishery provided by the Economic Data Collection (EDC) program, which was enacted to monitor the economic effects of the 2011 transition of the West Coast groundish trawl fishery to a catch share (IFQs, co-ops) program.

Figure 3-17. Estimated costs in different segments of the trawl fishery.

3.2.7 Buyers and Processors

Table 3-13 and Table 3-14 show the geographic and sector distribution of first receivers based on the processor ID field in the PacFIN database. (Note that a single firm may own several entities with different IDs so these numbers may overstate the number of independent firms engaged in processing groundfish. A comparison to counts based on processor names stored in the database showed a negligible difference.) A first receiver may be an entity that both buys and processes fish or a buyer or transportation company serving as a middleman between purchasing locations and processing facilities. The count of first receivers (based on ID) has declined by about 20% both for those accepting groundfish and those accepting any species. From a sector perspective the largest declines have been the counts of first receivers accepting trawl-caught groundfish from the shoreside sectors. This may represent consolidation within the buyer/processor sector.

Table 3-13. Count of first receivers (based on processor ID) that accepted groundfish and total number (accepting any species) by state and coastwide, 2003-2012. (Source: vdrfd 8/29/13.)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
California										
Groundfish	261	260	229	232	226	212	212	204	202	219
Total	663	638	572	548	517	492	481	442	447	493
Oregon										
Groundfish	81	83	78	71	75	68	81	79	71	74
All Species	254	211	202	210	226	183	243	221	194	203
Washington										
Groundfish	40	39	36	30	34	30	30	29	27	32
Total	137	124	119	129	129	117	123	123	127	121
Coastwide										
Groundfish	382	382	343	333	335	310	323	312	300	325
Total	1051	972	891	884	870	791	847	786	768	817

Table 3-14. Count of first receivers (based on processor ID) that accepted groundfish, by major groundfish fishery sector, 2003-2012. (Source: vdrfd 8/29/13.)

Groundfish Fishery Sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Shorebased IFQ Trawl (Whiting)	12	10	10	14	14	15	17	20	9	9
Non-whiting Trawl	65	57	52	49	49	47	45	36	26	25
Shorebased IFQ Non-trawl									20	19
Non Nearshore Fixed Gear	202	211	183	198	205	187	201	178	179	203
Nearshore Fixed Gear	133	153	142	140	131	132	145	124	120	121

Table 3-15 shows the distribution of first receivers of groundfish with respect to purchase amounts over the entire 2003-2012 baseline period. Note that the bin intervals are logarithmic, emphasizing the highly skewed distribution of purchases. While 91% of first receivers purchased $1,000 or less over the period, they accounted for less than 0.1% of total purchases during the baseline period. At the end of the scale, only 5% of first receivers recorded total purchase amounts of $1 million or more but accounted for 94% of total purchases.

Table 3-15. Distribution of groundfish first receivers (by ID) by total purchase amount (nominal dollars), 2003-2012. (Source: vdrfd 3/19/2014)

Interval	Count	Percent	Purchases	Percent
<=$1,000	964	91%	$110,061	<0.1%
$1,001-$99,999	28	3%	$965,567	0.2%
$10,000-$999,999	10	1%	$7,703,195	1.2%
$100,000-$999,999	4	0.4%	$32,941,423	5.2%
>=$1,000,000	55	5%	$596,283,531	93.5%

3.2.8 Fishing Communities

As in the 2013-14 Groundfish Harvest Specifications EIS, fishing communities are described below in terms of landings by IOPAC port group. (See Table 9 in NOAA Technical Memorandum NMFS-NWFSC-111 for ports included in these port groups. The IOPAC Input-Output Model for Pacific Coast Fisheries is used to evaluate personal income impacts of proposed management measures.)

The 18 port groups used in IOPAC are:

Washington State:

1. Puget Sound
2. North Washington Coast
3. South and Central Washington Coast

Oregon:

4. Astoria (and other Columbia River ports in Oregon)
5. Tillamook
6. Newport
7. Coos Bay
8. Brookings

California: [18]

9. Crescent City (North Coast)
10. Eureka (North Coast)
11. Fort Bragg (North Coast)
12. Bodega Bay (North-Central Coast)
13. San Francisco (North-Central Coast)
14. Monterey (South-Central Coast)
15. Morro Bay (South-Central Coast)
16. Santa Barbara (South Coast)
17. Los Angeles (South Coast)
18. San Diego (South Coast)

Fisher characteristics of these port groups are shown in Table 3-16 and Table 3-20. Port groups (and as applicable California recreational reporting regions) are also used to organize the evaluation of impacts to fishing communities in Chapter 4.

[18] The regions noted in parenthesis show the approximate correlation between port groups and California state reporting regions for recreational fisheries.

3.2.8.1 Dependence and Engagement in Groundfish Fisheries

Table 23 in the 2014 Groundfish SAFE document (PFMC 2014) presents values for community engagement and dependence on commercial groundfish fisheries. Engagement is defined as groundfish ex-vessel revenue in the port as a percent of coastwide groundfish ex-vessel revenue for the 2003-2012 baseline period. Similarly, dependence is defined as groundfish ex-vessel revenue in the port as percent of total ex-vessel revenue in port during the baseline period. (For these calculations revenues are inflation-adjusted to 2012 dollar values.)

Engagement and dependence values can be developed for recreational fisheries using a similar methodology. For recreational fisheries the metric is the number of angler trips. Engagement is measured by dividing the number of groundfish-directed angler trips in the port by the coastwide number of groundfish angler trips during the baseline period. Dependence is measured by dividing the number of groundfish-directed angler trips in the port by the total number of angler trips in the port during the baseline period.

Table 3-16 presents summary information on commercial fishery engagement and dependence by port group as well as indicating the primary and secondary groundfish fishery sectors. The fishery sectors are identified based on the share of inflation-adjusted ex-vessel revenue the sector accounts for out of total groundfish revenue within the port.

In terms of engagement in commercial fisheries (share of coastwide revenue) South and Central Washington, Astoria, and Newport top the list. In contrast, ports with high dependence values are much more geographically dispersed with Morro Bay at the top of the rankings followed by Puget Sound and the North Washington Coast. These ports tend to be mid-ranking in terms of engagement. Southern California ports (Santa Barbara, Los Angeles, and San Diego) are neither highly engaged nor dependent on commercial groundfish fisheries.

Trawl fisheries (counting both the whiting and non-whiting segments) dominate the coast from the South and Central Washington Coast port group to Fort Bragg, California. The non-nearshore fixed gear fishery is important in Central and Southern California and the Puget Sound region. (Note that the North Washington Coast port group includes ports in the Straits of Juan de Fuca at the entrance to Puget Sound.)

Table 3-16. Commercial fishery engagement and dependence scores and rank, primary and secondary fisheries, for the 2003-2012 baseline period for each Port Group. Based on 2012 inflation-adjusted ex-vessel revenue.

Port Group	Engagement	Engagement Rank	Dependence	Dependence Rank	Primary Fishery	Secondary Fishery
Puget Sound	4.8%	9	43.6%	3	Non Nearshore Fixed Gear	Shoreside Non-whiting Trawl*
North WA coast	6.6%	5	44.7%	2	Non Nearshore Fixed Gear	Shoreside Non-whiting Trawl*
South and central WA coast	14.0%	3	14.2%	11	Shoreside Whiting Trawl	Non Nearshore Fixed Gear
Astoria	18.0%	1	37.2%	4	Shoreside Non-whiting Trawl*	Shoreside Whiting Trawl
Tillamook	0.3%	18	5.3%	15	Nearshore Fixed Gear	Shoreside Non-whiting Trawl*
Newport	15.0%	2	30.1%	7	Shoreside Whiting Trawl	Shoreside Non-whiting Trawl*
Coos Bay	8.4%	4	21.8%	9	Shoreside Non-whiting Trawl*	Non Nearshore Fixed Gear
Brookings	5.3%	7	32.1%	6	Shoreside Non-whiting Trawl*	Non Nearshore Fixed Gear
Crescent City	2.4%	13	10.0%	13	Shoreside Non-whiting Trawl*	Nearshore Fixed Gear
Eureka	6.0%	6	26.2%	8	Shoreside Non-whiting Trawl*	Non Nearshore Fixed Gear
Fort Bragg	5.1%	8	36.4%	5	Shoreside Non-whiting Trawl*	Non Nearshore Fixed Gear
Bodega Bay	0.4%	17	3.7%	16	Non Nearshore Fixed Gear	Shoreside Non-whiting Trawl*
San Francisco	2.5%	12	9.2%	14	Shoreside Non-whiting Trawl*	Non Nearshore Fixed Gear
Monterey	2.7%	11	16.0%	10	Non Nearshore Fixed Gear	Shoreside Non-whiting Trawl*
Morro Bay	4.5%	10	64.7%	1	Non Nearshore Fixed Gear	Nearshore Fixed Gear
Santa Barbara	1.4%	15	2.7%	18	Non Nearshore Fixed Gear	Nearshore Fixed Gear
Los Angeles	1.5%	14	3.2%	17	Non Nearshore Fixed Gear	Nearshore Fixed Gear
San Diego	1.0%	16	10.1%	12	Non Nearshore Fixed Gear	Nearshore Fixed Gear

*Shoreside Non-whiting Trawl includes Non-trawl IFQ in 2011-2012.

Table 3-17. Recreational fishery engagement and dependence scores and rank for the 2003-2012 baseline period.

[Similar table for recreational fisheries / GMT data request]

Table 3-18. Top-ranked ports by groundfish fishery sector, based on inflation adjusted ex-vessel revenue 2003-2012. Percent share of coastwide sector revenue for the entire baseline period shown in parenthesis and total share accounted for by the three top-ranked ports in each category shown in the bottom row. Source: vdrfd 8/27/13 based on method used for data in the 2014 Groundfish SAFE Table 20.

	Whiting Trawl	Non-whiting Trawl*	Non Nearshore	Nearshore
1	Newport (33%)	Astoria (28%)	Newport (15%)	Morro Bay (31%)
2	So. & Cent. WA Coast (31%)	Coos Bay (13%)	So. & Cent. WA Coast (11%)	Brookings (27%)
3	Astoria (30%)	Newport (12%)	Puget Sound (9%)	Crescent City (12%)
Total share:	94%	53%	35%	70%

*Includes non-trawl IFQ sector in 2011-2012.

Table 3-18 shows the top-ranked ports for each major groundfish fishery sector in terms of inflation adjusted ex-vessel revenue during the baseline period. Newport, Astoria, and the South and Central Washington Coast are in the top-three of the rankings for the trawl (whiting and non-whiting) and non nearshore fishery sectors. The nearshore fishery figures more prominently on the Oregon-California border and in the Morro Bay port group. (Note that non nearshore fixed gear fisheries are also important in these three ports as evidenced by the primary and secondary fisheries identified in Table 3-16.) Table 3-18 also shows the share of coastwide sector revenue accounted for by each port and the sum for the top-ranked ports. Revenue from whiting trawl and the nearshore sector are relatively concentrated in the top-ranked ports at 94% and 70% respectively (but note that for nearshore the top two ports alone account for 58% of coastwide sector revenue).

The rankings and shares shown in Table 3-18 are also consistent with the use of the Gini coefficient in the 2013-14 Groundfish Harvest Specifications EIS to summarize the uniformity of the distribution of groundfish ex-vessel revenue across sectors and ports.[19] Using this statistic, the shoreside whiting trawl sector is the most concentrated with respect to distribution across ports. (In fact, relatively few ports have any shoreside whiting sector landings at all.) The nearshore sector ranks second. Table 3-19 repeats the across-port evaluation included in the 2013-14 EIS using inflation-adjusted ex-vessel revenue for the baseline period and the fishery sectors listed in Table 3-18 (except that non-whiting trawl and non-trawl IFQ are not combined). Generally speaking, ports with lower overall groundfish revenue have a less uniform distribution among sectors, because fewer sectors operate out of those ports. This is most clearly evidenced by Southern California ports, which rank near the bottom in terms of engagement (share of coastwide groundfish revenue) and also have the least uniform distribution among sectors. Notable exceptions to this inverse correlation include the North Washington Coast (engagement rank of 5, Gini coefficient rank of 4), Crescent City (13 and 17), Bodega Bay (17 and 14), and Morro Bay (10 and 18).

[19]The Gini coefficient is a measure of the statistical dispersion of a data distribution, ranging between 0 and 1. A value of 0 indicates that all data points in a distribution are identical while a value of 1 indicates the maximum degree of diversity in the data set. This statistic is often used to measure national-level income distribution where a value of 0 indicates that everyone receives the same income, and a value of 1 would indicate that virtually all income goes to one individual. Its use in the 2013-2014 Harvest Specifications EIS was not intended to imply any particular policy objective (e.g., a more uniform distribution of ex-vessel revenue) but merely to describe the uniformity of the distribution of groundfish ex-vessel revenue among west coast ports and between fisheries sectors within those ports.

Table 3-19. Distribution of ex-vessel revenue among commercial groundfish fishery sectors within port groups, 2003-2012, using Gini coefficient. Ranking is from least uniform (1) to most uniform (18) distribution.

Port Group	Gini Coefficient	Gini Coefficient Rank
Puget Sound	0.62175	8
North WA coast	0.70677	4
South and central WA coast	0.54597	12
Astoria	0.60903	11
Tillamook	0.63016	6
Newport	0.43195	16
Coos Bay	0.62709	7
Brookings	0.25685	15
Crescent City	0.42600	17
Eureka	0.67958	5
Fort Bragg	0.61146	9
Bodega Bay	0.50349	14
San Francisco	0.60921	10
Monterey	0.53330	13
Morro Bay	0.39445	18
Santa Barbara	0.71094	3
Los Angeles	0.78504	2
San Diego	0.79624	1

Figure 3-18 contains panels showing trends in top-ranked ports' share of revenue during the baseline period for each major fishery sector listed in Table 3-18. These figures are based on total revenue accounted for by the sector in the port as a share of coastwide revenue for that sector. These values are then shown in terms of percent change over the baseline period, starting in 2003. Values greater than 100% indicate the share is higher than in 2003 while values below 100% indicate the share is less than it was in 2003.

With the exception of the shoreside whiting trawl sector, the top-ranked port (represented by the solid line in each case) increased its share over the baseline period. For non-whiting trawl and non nearshore fixed gear the share of revenue for the second- and third-ranked ports is actually below what it was in 2003. For the nearshore sector the first- and second-ranked ports (Morro Bay and Brookings) are fairly stable in terms of changes in their revenue shares while the third-ranked port (Crescent City) shows a decline of more than 60% from its 2003 share of coastwide sector revenue. At 12% of coastwide nearshore sector revenue for the baseline period as a whole, Crescent City is a distant third compared to Morro Bay and Brookings.

The shoreside whiting fishery is concentrated in the top three port groups, which account for 94% of coastwide sector revenue. While Newport's share of revenue declined over the baseline period, Astoria and the South and Central Washington Coast (SCWC) (essentially, Westport and the port of Ilwaco) show an inverse correlation in revenue changes. For example, in 2009 Astoria's share increased while SCWC's share decreased, while in 2010 the reverse is true. These trends may be a function of processing capacity in these ports. When landings are lower, they may be more evenly distributed, because no ports meet their processing capacity limit. When landings are high, ports with surplus capacity could increase their share of landings. The top-ranked shoreside whiting ports are also unusual in that the second- and third-ranked ports, SCWC and Astoria, show increases in their revenue share from 2003 compared to first-ranked Newport; its share declined by about one fifth (from 40% of coastwide sector revenue in 2005 to 27% in 2007) and has stayed below its 2003 share since then.

There is a trend towards increasing concentration of ex-vessel revenue in major fishing ports. This may indicate a general trend toward agglomeration (the concentration of firms specializing in an activity, such as fish processors and shipyards, in a geographic area.) Figure 3-19 displays data used for Table 3-18 and Figure 3-18 to evaluate trends in concentration of revenue within ports over the baseline period. For all groundfish fisheries, the share of coastwide revenue flowing to the top-three ranked ports increased, especially after 2009. This trend appears to be driven primarily by landing patterns in the shoreside trawl/IFQ fishery. Conversely, the concentration of revenue from the nearshore fishery is fairly stable over time but highly concentrated, with the top-three ports accounting for about 70% of coastwide revenue.

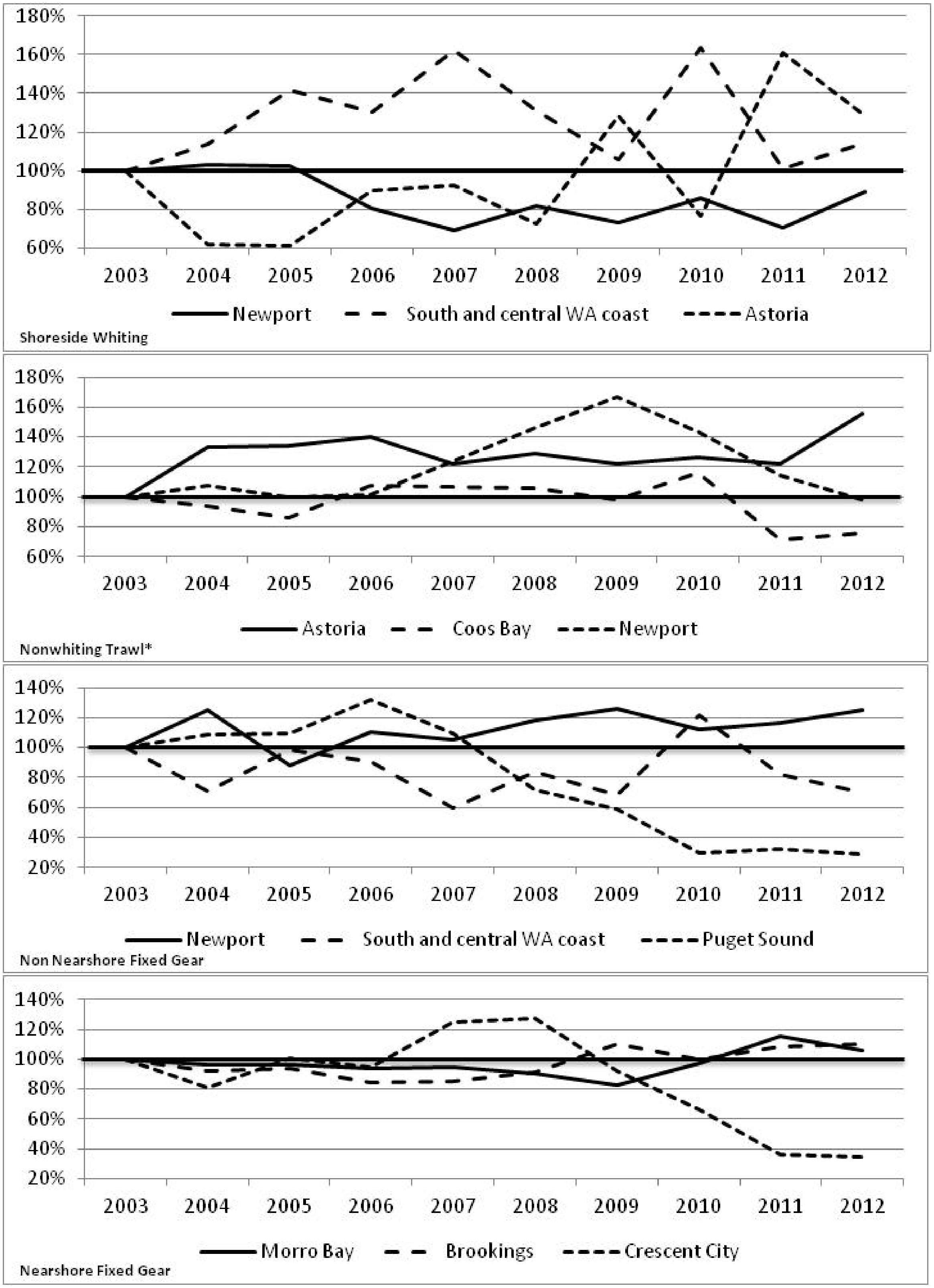


Figure 3-18. Trends in top-ranked ports' share of inflation-adjusted ex-vessel revenue by fishery sector. (2003=100%). *Non-whiting trawl includes non-trawl IFQ sector landings in 2011 and 2012.

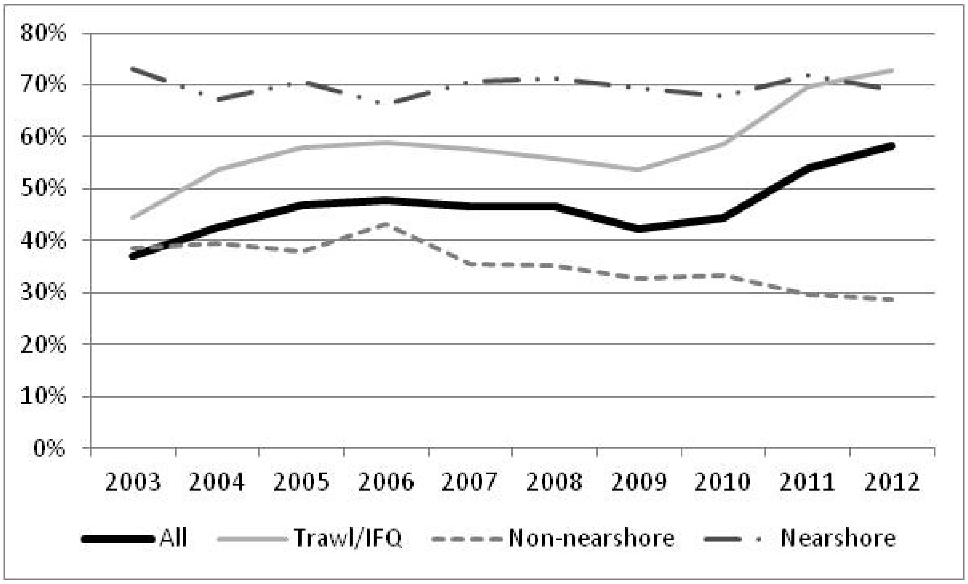


Figure 3-19. Share of inflation adjusted ex-vessel revenue for top three ranked ports for all sectors and selected fishery sectors, 2003-2012.

3.2.8.2 Community Vulnerability

Past Groundfish Harvest Specifications EISs have catalogued various demographic and fishery statistics to characterize west coast fishing communities with respect to their socioeconomic vulnerability to groundfish fishery management actions. These methods combine the concepts of engagement in and dependence on groundfish fisheries with resilience to assess community vulnerability. Communities that may be disproportionately affected by adverse impacts can thus be identified. Vulnerability assessment is also a tool for determining whether measures to rebuild overfished species stocks address the MSA mandate that the time period for rebuilding an overfished species "be as short as possible, taking into account the status and biology of any overfished stocks of fish, *the needs of fishing communities*, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem;…" (emphasis added).

Each vulnerability analysis conducted as part of the Groundfish Harvest Specifications impact evaluation (2007-2008, 2011-2012, 2013-2014, and this EIS for 2015-2016) has used different units of analysis and methods for scoring or rating a community's vulnerability. [20] While the 2007-2008 EIS used ports, the 2011-2012 and 2013-2014 EIS analyses used counties as the unit of analysis. Beginning with the 2013-2014 EIS a social vulnerability index prepared by the Hazards and Vulnerability Research Institute at the University of South Carolina was used in place of resiliency scores developed specifically for the EIS analysis. The use of this index is carried forward, using an updated version available from the Institute's

[20] The 2007-2008 Harvest Specifications FEIS (see Appendix A) included a community vulnerability analysis based on fishery and demographic data at the individual port level. A similar analysis was repeated in the 2011-2012 Harvest Specifications FEIS at the county level (see Appendix E). The 2011-2012 analyses, modeled after the original 2007-2008 analysis used the following metrics to score community resiliency: industry diversity, population density, unemployment rate, and percentage of the population living below the poverty line. Except for enumeration of basic population characteristics in the decennial census, U.S. Census Bureau demographic information is based on sample data. A statistical analysis conducted in conjunction with the 2011-2012 EIS exercise suggests that in many cases even at the county level there are not statistically meaningful differences in demographic characteristics (given the margin of error in sample data) between adjacent counties. Therefore, attempting a vulnerability analysis at a finer scale may be misleading.

website (the SoVI® 2006-10 Index).[21] The current analysis is also different in that it uses a weighted average (based on population) of the SoVI scores for counties within each of the 18 IOPAC port groups to derive a single vulnerability score for each port group.[22]

Each analysis has also differed somewhat in the methodology used to assign an overall vulnerability rating to the unit of analysis (port, county, port group). Generally speaking, these methods involved ranking communities by the various indicators and identifying communities as vulnerable if they rank near the top (top one-third, top quartile) for engagement or dependence and resilience/vulnerability. However, the 2013-2014 analysis only presented ratings for each component (engagement, dependence, vulnerability) in high, medium, and low categories without presenting an overall vulnerability assessment.

In the current analysis the engagement, dependence, and adjusted SoVI values for each IOPAC port group were scaled to values between 0 and 1. Commercial fishery engagement and dependence scores, shown in Table 3-20, are based on inflation-adjusted ex-vessel revenue during the 2003-2012 baseline period. Table 3-20 also shows the primary and secondary commercial groundfish fisheries in each port, defined as the fisheries accounting for the largest and second largest shares of groundfish ex-vessel revenue in the port. Table 3-21 shows the scores for recreational fisheries. Recreational data were only available for all port areas from 2004, so the data series is 1 year shorter than that used for commercial fisheries. A combined score was calculated by summing the charter and private recreational scores and rescaling the results between 0 and 1. Finally, these scores were summed and rescaled to derive an overall composite score, shown in Table 3-22 along with the scaled, population-adjusted SoVI scores.

[21] According to the website (http://webra.cas.sc.edu/hvri/products/sovi.aspx) "SoVI® 2006-10 marks a change in the formulation of the SoVI® metric from earlier versions. New directions in the theory and practice of vulnerability science emphasize the constraints of family structure, language barriers, vehicle availability, medical disabilities, and healthcare access in the preparation for and response to disasters, thus necessitating the inclusion of such factors in SoVI®. Extensive testing of earlier conceptualizations of SoVI®, in addition to the introduction of the U.S. Census Bureau's five-year American Community Survey (ACS) estimates, warrants changes to the SoVI® recipe, resulting in a more robust metric. These changes, pioneered with the ACS-based SoVI® 2005-09 carry over to SoVI® 2006-10, which combines the best data available from both the 2010 U.S. Decennial Census and five-year estimates from the 2006-2010 ACS."

[22] The IOCPAC port groups are constructed to coincide with county boundaries, because the IOPAC model uses input data at that scale. Each port group encompasses one or more counties. The SoVI Index contains both positive and negative values. To simplify calculation, the index values for each county were re-scaled to positive values (with the lowest value in the data set becoming zero). The index values were then multiplied by the fractional value of the county's population relative to the summed population value for the IOPAC port group. These values were then averaged to derive a score for port groups consisting of multiple counties.

Table 3-20. Scaled engagement and dependence scores for commercial fisheries, based on inflation adjusted ex-vessel revenue, 2003-2012.

	Normalized Engagement	Engagement Rank	Normalized Dependence	Dependence Rank	Primary Fishery	Secondary Fishery
Puget Sound	0.266	9	0.033	17	Non Nearshore Fixed Gear	Shoreside Nonwhiting IFQ*
North WA coast	0.365	5	0.369	9	Non Nearshore Fixed Gear	Shoreside Nonwhiting IFQ*
South and central WA coast	0.776	3	0.073	15	Shoreside IFQ Trawl (Whiting)	Non Nearshore Fixed Gear
Astoria	1.000	1	0.701	5	Shoreside Nonwhiting IFQ*	Shoreside IFQ Trawl (Whiting)
Tillamook	0.015	18	0.740	4	Nearshore Fixed Gear	Shoreside Nonwhiting IFQ*
Newport	0.834	2	0.757	3	Shoreside IFQ Trawl (Whiting)	Shoreside Nonwhiting IFQ*
Coos Bay	0.467	4	0.211	10	Shoreside Nonwhiting IFQ*	Non Nearshore Fixed Gear
Brookings	0.294	7	0.935	2	Shoreside Nonwhiting IFQ*	Non Nearshore Fixed Gear
Crescent City	0.135	13	1.000	1	Shoreside Nonwhiting IFQ*	Nearshore Fixed Gear
Eureka	0.335	6	0.626	7	Shoreside Nonwhiting IFQ*	Non Nearshore Fixed Gear
Fort Bragg	0.283	8	0.666	6	Shoreside Nonwhiting IFQ*	Non Nearshore Fixed Gear
Bodega Bay	0.023	17	0.173	12	Non Nearshore Fixed Gear	Shoreside Nonwhiting IFQ*
San Francisco	0.140	12	0.031	18	Shoreside Nonwhiting IFQ*	Non Nearshore Fixed Gear
Monterey	0.148	11	0.051	16	Non Nearshore Fixed Gear	Shoreside Nonwhiting IFQ*
Morro Bay	0.252	10	0.436	8	Non Nearshore Fixed Gear	Nearshore Fixed Gear
Santa Barbara	0.077	15	0.138	13	Non Nearshore Fixed Gear	Nearshore Fixed Gear
Los Angeles	0.083	14	0.136	14	Non Nearshore Fixed Gear	Nearshore Fixed Gear
San Diego	0.056	16	0.194	11	Non Nearshore Fixed Gear	Nearshore Fixed Gear

*2011-12 only.

Table 3-21. Scaled scores for charter and private recreational fisheries and the combined score based on angler trips, 2004-2012.

	Charter Recreational		Private Recreational		Combined Scores		Combined Rankings	
	Normalized Engagement	Normalized Dependence	Normalized Engagement	Normalized Dependence	Normalized Engagement	Normalized Dependence	Engagement	Dependence
Puget Sound	0.011	0.586	0.115	0.845	0.054	0.684	14	9
North WA coast	0.105	0.484	0.024	0.177	0.072	0.368	10	16
South and central WA coast	0.008	0.077	0.012	0.035	0.010	0.061	17	18
Astoria	0.002	0.119	0.006	0.094	0.004	0.110	18	17
Tillamook	0.037	0.880	0.088	0.488	0.058	0.731	13	6
Newport	0.169	0.847	0.197	0.814	0.180	0.835	6	5
Coos Bay	0.036	0.814	0.098	0.458	0.061	0.679	12	10
Brookings	0.028	1.000	0.209	1.000	0.103	1.000	8	1
Crescent City	0.004	0.614	0.039	0.747	0.018	0.664	16	11
Eureka	0.017	0.614	0.181	0.747	0.085	0.664	9	11
Fort Bragg	0.018	0.338	0.132	0.655	0.065	0.458	11	15
Bodega Bay	0.028	0.623	0.044	0.637	0.034	0.628	15	13
San Francisco	0.153	0.623	0.245	0.637	0.191	0.628	5	13
Monterey	0.168	0.872	0.415	0.909	0.270	0.886	4	4
Morro Bay	0.067	0.872	0.166	0.909	0.108	0.886	7	3
Santa Barbara	0.298	0.876	0.241	0.914	0.275	0.890	3	2
Los Angeles	1.000	0.693	1.000	0.678	1.000	0.687	1	7
San Diego	0.408	0.693	0.408	0.678	0.408	0.687	2	7

Table 3-22. Scaled adjusted SoVI scores and composite vulnerability scores.

	Normalized SoVI Score	SoVI Rank	Composite Score	Composite Rank
Puget Sound	0.033	17	1.071	15
North WA coast	0.369	9	1.544	11
South and central WA coast	0.073	15	0.993	18
Astoria	0.701	5	2.515	4
Tillamook	0.740	4	2.285	6
Newport	0.757	3	3.363	1
Coos Bay	0.211	10	1.630	10
Brookings	0.935	2	3.267	2
Crescent City	1.000	1	2.817	3
Eureka	0.626	7	2.337	5
Fort Bragg	0.666	6	2.138	7
Bodega Bay	0.173	12	1.031	16
San Francisco	0.031	18	1.020	17
Monterey	0.051	16	1.405	14
Morro Bay	0.436	8	2.117	8
Santa Barbara	0.138	13	1.518	13
Los Angeles	0.136	14	2.042	9
San Diego	0.194	11	1.539	12

Figure 3-20 shows the component scores for each port in a stacked bar chart to aid in assessing the relatively level of vulnerability. These results can be interpreted in any number of ways to classify ports as vulnerable and, as in past analyses, "most vulnerable." Table 3-23 presents the results in a simple ranking (1 = highest composite score) and compares that to the results from previous vulnerability analyses. The top third ranked ports (1-6) are highlighted as one potential definition of vulnerable. These six port areas (Astoria, Tillamook, Newport, Brookings, Crescent City, and Eureka) were rated vulnerable in at least one of the previous analysis. These ports are geographically concentrated, comprising the entire Oregon coast except for Coos Bay, and Northern California. On the other hand, several port groups that may have qualified as vulnerable in past analyses are not in the top one-third of ranked ports in the current analysis.[23] These include the Washington Coast port groups, Coos Bay, Fort Bragg, Monterey, and Los Angeles. All these ports have summed composite scores greater than 2, as shown in Figure 3-20, along with Morro Bay, and Los Angeles. (Recreational engagement accounts for a large component of the Los Angeles summed value as seen in Table 3-21, indicating that it holds a dominate position in terms of recreational groundfish effort.)

Rather than considering a port group as either vulnerable or not vulnerable, the rankings for all the ports can be used as a factor in evaluating actions that may have concentrated regional effects rather than coastwide effects. Any such disproportionate effects are likely to be a function of the mix of fisheries in a port (if management measures will have a greater effect on a particular fishery sector compared to others) or the species targeted or incidentally caught by the fisheries in a port (if management measures will have a greater effect on the catch of a particular species or species group).

[23] The unit of analysis in first two analyses were counties, so the status of IOPAC port groups, the current unit of analysis was inferred as described in the table footnotes.

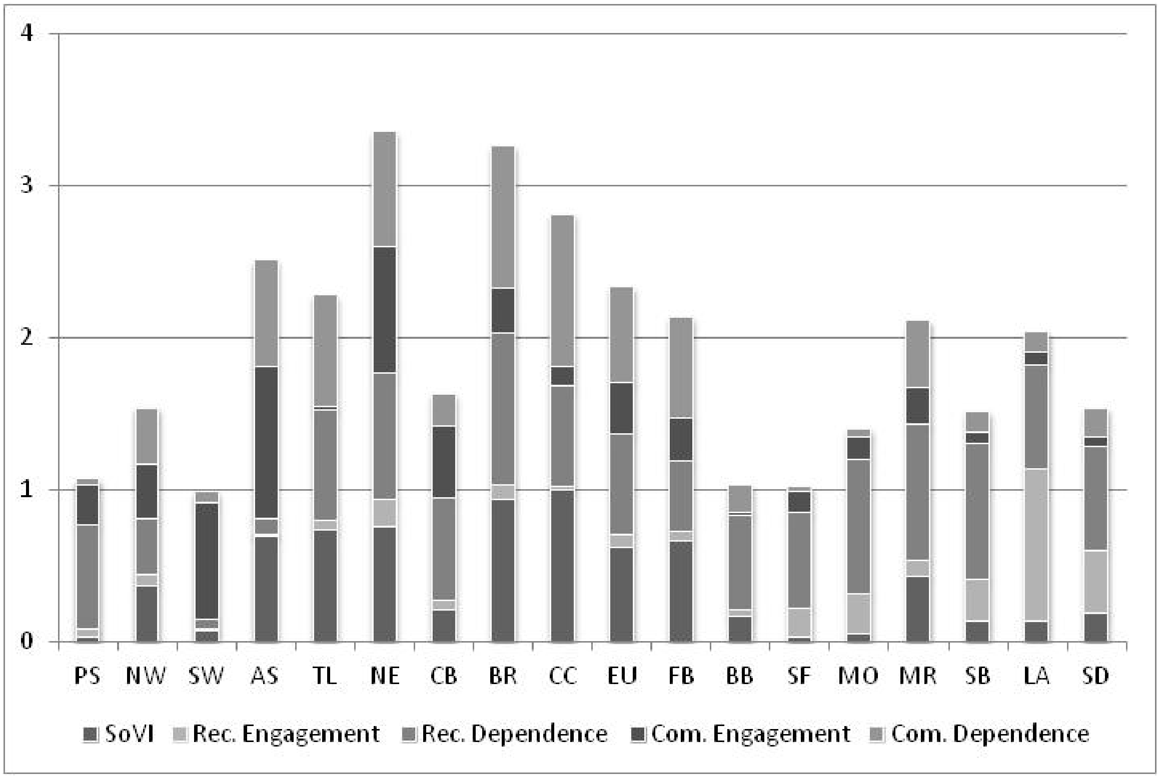


Figure 3-20. Visual representation of scaled scores. Key to port symbols: PS: Puget Sound / NW: North WA coast / SW: South and central WA coast / AS: Astoria / TL: Tillamook / NE: Newport / CB: Coos Bay / BR: Brookings / CC: Crescent City / EU: Eureka / FB: Fort Bragg / BB: Bodega Bay / SF: San Francisco / MO: Monterey / MR: Morro Bay / SB: Santa Barbara / LA: Los Angeles: SD: San Diego.

Table 3-23. Comparison of current vulnerability ratings inferred for IOPAC port groups to past analyses.

IOPAC Port Group	2007-08 EIS*	2011-12 EIS*	2013-14 EIS†	2015-16 Composite Rank‡
Puget Sound				15
North WA coast	Y		Y	11
South and central WA coast	Y	Y		18
Astoria	**Y**		**Y**	**4**
Tillamook		**Y**		**6**
Newport	**Y**	**Y**	**Y**	**1**
Coos Bay	Y	Y	Y	10
Brookings	**Y**	**Y**	**Y**	**2**
Crescent City	**Y**	**Y**		**3**
Eureka	**Y**	**Y**	**Y**	**5**
Fort Bragg	Y	Y		7
Bodega Bay				16
San Francisco				17
Monterey	Y			14
Morro Bay				8
Santa Barbara				13
Los Angeles	Y			9
San Diego				12

*One or more counties rated vulnerable/most vulnerable
†One or more counties rated high for engagement or dependence and vulnerability
‡Top one-third (1-6) bolded

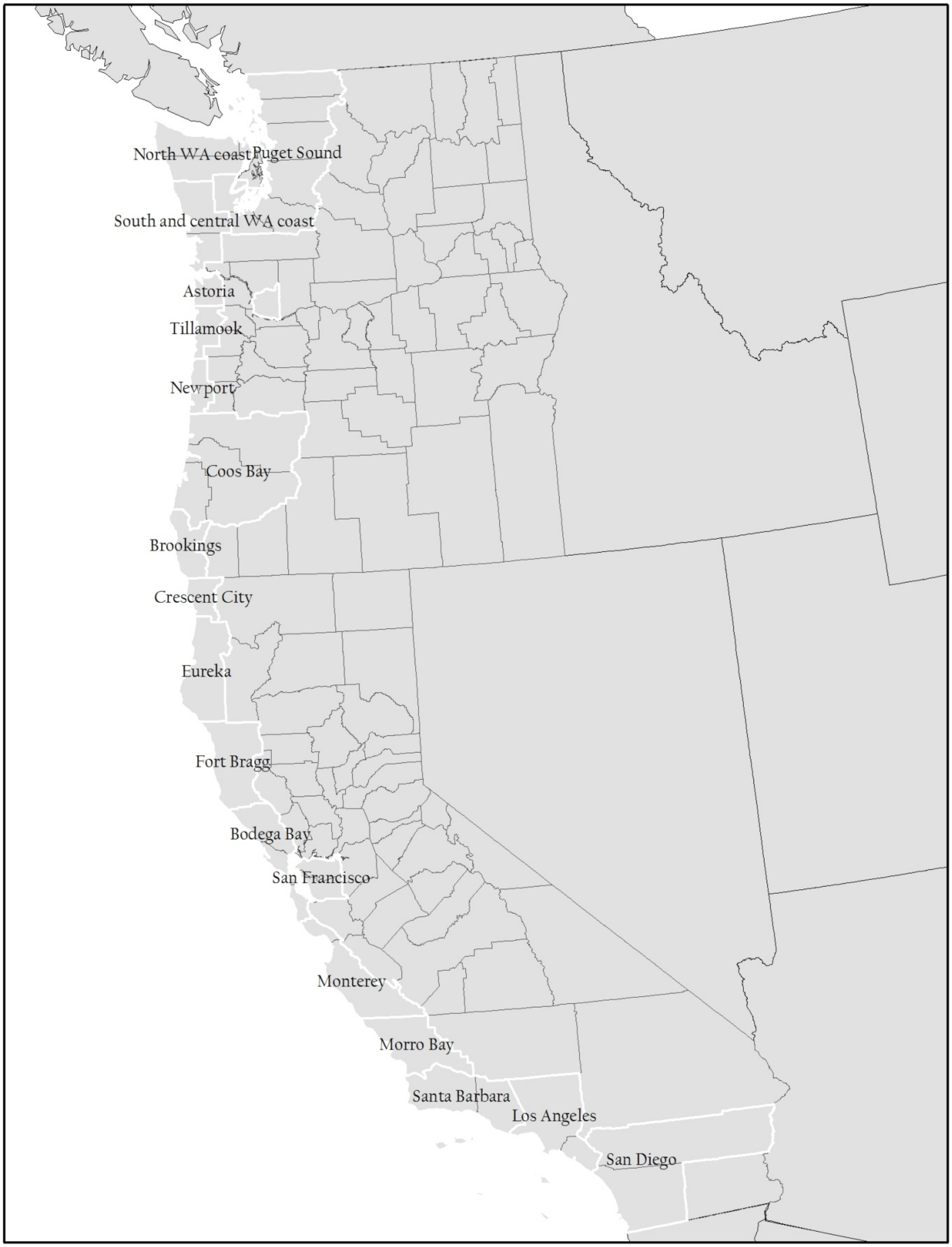


Figure 3-21. IOPac port group areas.

3.3 Essential Fish Habitat

The MSA (sec. 303(a)(7)) requires Councils to include in each FMP a description of essential fish habitat (EFH) for all managed species and measures to minimize to the extent practicable adverse effects on such habitat caused by fishing.[24] The Pacific Council has described EFH for all species managed under its four FMPs (Coastal Pelagic Species, Highly Migratory Species, Groundfish, and Salmon). EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (MSA sec. 3). Regulatory guidelines (50 CFR 600, Subpart J) elaborate that the words "essential" and "necessary" mean EFH should be sufficient to "support a population adequate to maintain a sustainable fishery and the managed species' contributions to a healthy ecosystem." Groundfish EFH is described in the FMP as:

- Depths less than or equal to 3,500 m (1,914 fm) to mean higher high water level (MHHW) or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 ppt during the period of average annual low flow.
- Seamounts in depths greater than 3,500 m as mapped in the EFH assessment geographic information system (GIS).
- Areas designated as Habitat Areas of Particular Concern (HAPC) not already identified by the above criteria.

The regulatory guidelines also establish authority for Councils to designate HAPC, based on the vulnerability and ecological value of specific habitat types. The Groundfish FMP identifies these HAPCs:

- Estuaries
- Canopy kelp
- Seagrass
- Rocky reefs
- Specified "areas of interest"

Chapter 7 in the Groundfish FMP describes groundfish EFH (Section 7.2) and HAPCs (Section 7.3). The current EFH and HAPC descriptions were incorporated into the FMP in 2006 through Amendment 19 to the FMP. The Council also established measures to mitigate the adverse impacts of fishing on groundfish EFH, which are described in FMP Chapter 6 (Management Measures). These mitigation measures include gear restrictions (Section 6.6), time/area closures (Section 6.8), and measures to control fishing capacity (Section 6.9). As acknowledged in Section 7.4 of the FMP, "Some of the management measures … have been implemented specifically to mitigate adverse impacts to EFH while others may have another primary purpose … but may have a corollary mitigating effect on adverse impacts to EFH."

The FEIS accompanying FMP Amendment 19 (NMFS 2005) included an evaluation of the adverse effects of fishing on groundfish EFH, and previous EISs for biennial harvest specifications and management measures (PFMC and NMFS 2011; PFMC and NMFS 2012) have assessed the effects on groundfish EFH of changes to catch limits and associated management measures. Changes to the Trawl RCA boundaries have come under increased scrutiny, because of their corollary mitigating effects; in 2014 NMFS prepared an environmental assessment (NMFS 2013d) for a Council-proposed change to the Trawl RCA that would open areas that had been closed to trawl fishing for several years. This action, like many other actions, has changed the baseline for considering impacts of the proposed action on EFH.

[24] A Federal agency authorizing, funding, or undertaking actions that may adversely affect EFH must consult with NMFS on measures to mitigate such impacts. Councils or Federal or state agencies may also advise NMFS on such actions.

Information from these documents may be incorporated into the baseline description in this section with citation.

In 2010 the Council developed a process and schedule for a 5-year review of "…the EFH description and identification, HAPC designations, and information on fishing impacts and nonfishing impacts…" as specified in Section 7.6 of the Groundfish FMP. This review began in 2011 under the auspices of the Council's Ad Hoc EFH Review Committee (EFHRC). During the first phase of the review the EFHRC and NMFS scientists updated and compiled available ecological, habitat, and fishing effort data, and used this information to develop a set of maps intended to support Council decision-making related to EFH (NMFS 2013b). A synthesis report based on these data was published in April 2013 (NMFS 2013b), completing the second phase.

In the third phase of the review, now underway, the Council is considering proposals for potential modifications to EFH conservation areas (discussed further below), which were implemented as part of Amendment 19 to the Groundfish FMP.

3.3.1 Effects of Fishing on Groundfish EFH

Fishing gear principally affects groundfish EFH when it comes into contact with benthic habitat. The gear type and configuration and the vulnerability of particular habitat types factor into assessments of the adverse impacts of fishing, as was done in the Amendment 19 FEIS (NMFS 2005). Section 3.5 in that document is a comprehensive and detailed description of fishing gear that is, or has been, used in the fishery management area and how they interact with benthic habitat. Section 3.2.4 in the FEIS summarizes the relative impacts of gear types by habitat type with those conclusions further consolidated in Table 3-24 showing the range of recovery times by habitat category and gear type.[25] Generally, for a given habitat type dredge and trawl gear are likely to have a greater effect than other bottom contacting gear types (e.g., demersal longline and pot gear, demersal, or Scottish, seine), because the contact is more extensive. With respect to biogenic and hard bottom habitats, Section 3.2.3.1 notes that corals, anemones, sponges, sea pens, and sea whips are highly sensitive habitat that may be substantially modified with relatively little fishing effort, and

> There have not been many studies of how these organisms recover from initial impact; however, growth rates of corals in particular suggest that recovery is in excess of seven years and likely to be much longer. The sensitivity and recovery indices prepared for the Risk Assessment should be interpreted with the caveat that very little science is available to understand the vulnerability of corals, anemones, sponges, sea pens, and sea whips to fishing impacts. It is plausible that the sensitivity and recovery times of corals, anemones, sponges, sea pens, and sea whips are underestimated and a precautionary approach may be warranted. (Page 3-15, internal citation omitted)

The full phase one report (Groundfish Essential Fish Habitat Review Committee 2012) cites more recent work that suggests recovery times on the order of 100 years for hard corals found off of Alaska. The longest recovery time shown in Table 3-24 is the upper range for recovery of offshore biogenic habitat

[25] See Appendix 10 to the Risk Assessment (MRAG Americas Inc., *et al.* 2004) for a full description of the methodology for the derivation of these recovery times. Note that Table 4-1 in NMFS (2014b) shows recovery times by gear type and habitat type as adapted from the EFH FEIS and Phase 2 Synthesis Report (NMFS 2005; NMFS 2013b). The categories and resulting values differs somewhat from what is displayed here. Bottom trawl, for example, ranges from 0.4 years for soft shelf habitat to 2.8 years for various hard and mixed habitats. Single values, rather than ranges are presented for habitat/fishing gear categories in Table 4-1, so the 0.4-2.8 range refers to all habitat categories.

from dredge gear (which was prohibited under Amendment 19). This likely represents an estimate for deepwater hard corals.

Table 3-24. Average recovery times, in years, for constituent habitat types by habitat category and fishing gear type, based on (a) Table 3-1 in Amendment 19 FEIS (NMFS 2005) and (b)Table a.3.2 in Appendix to Groundfish EFH Synthesis Report (NMFS 2013a)

(a)

Habitat Category	Bottom Trawl	Dredge Gear	Hook and Line	Nets	Pots and Traps
Nearshore Biogenic	1.5 - 9	2.6 - 11	0 - 1	0.5 - 4	0 - 1
Nearshore Hard Bottom	1 - 2	1.5 - 2.5	0 - 0.5	0.5 - 1	0 - 0.5
Nearshore Unconsolidated Bottom	0.1 - 0.3	0.2 - 0.6	0 - 0.5	0 - 0.5	0 - 0.5
Offshore Biogenic	2.3 - 55.7	2.7 - 63	0.1 - 17.6	1.2 - 41.5	0.2 - 17.2
Offshore Hard Bottom	1.8 - 10	1.8 - 12	0.3 - 3	0.8 - 7	0.3 - 2.6
Offshore Unconsolidated Bottom	0.5 - 5.7	0.7 - 6.5	0.1 - 1.9	0.4 - 4.6	0.1 - 2.8

(b)

Substrate Type	Bottom Trawl	Midwater Trawl	Fixed Gear Distance	Fixed Gear Point
Hard shelf	2.8	na	0.1	0.1
Hard upper slope	2.8	na	0.3	0.1
Hard lower slope	2.8	na	0.3	0.1
Mixed shelf	2.8	na	0.4	0.1
Mixed upper slope	2.8	na	0.4	0.1
Mixed lower slope	2.8	na	0.4	0.1
Soft shelf	0.4	na	0.4	0.1
Soft upper slope	1.0	na	0.4	0.1
Soft lower slope	1.0	na	0.4	0.1

Fixed Gear Distance: fixed gear represented by a distance metric (i.e., longline gear and pot gear)
Fixed Gear Point: fixed gear represented by a point metric (i.e., hook-and-line gear other than longline gear)

“Structure forming” benthic macroinvertebrates are of interest because of their potential role as groundfish habitat. Section 3.2.3.2 in the Amendment 19 FEIS notes the supporting role of corals in complex marine communities elsewhere in the world (e.g., reef forming hermatypic corals mostly occurring in the tropics) but based on available evidence reaches no conclusion about the importance of these macroinvertebrates as groundfish habitat. The synthesis report referenced above notes that kelp beds are known to be important habitat for many groundfish species, especially juveniles, but little new information about other biogenic areas has been collected since the Amendment 19 analysis (NMFS 2013b, p. 27).

Table 3-25 summarizes information from Table 4a.2 in the synthesis report on the distribution of fishing effort by habitat type.[26] For all gear types most fishing effort occurred on soft substrate on the upper slope, ranging from 77% for midwater trawl to 55% for fixed gear. Table 3-26 displays relative fishing effort. This metric was derived by dividing the amount of fishing effort in percent by area of each habitat type by percent and rescaling the values in percent (meaning the resulting values sum to 100% for each gear type). By this measure the biggest relative impact has been on mixed substrate on the upper slope.

[26] The synthesis report includes the Salish Sea (Puget Sound region) in its summary; this region is excluded here because it is outside the fishery management area. Reported depth zones refer to the continental shelf and slope. The break between the shelf and slope, measured by depth, is 140 meters (Gross 1972). Bottom and midwater trawl fishing effort is measured by trawl distance in meters; fixed gear effort is measured in number of fishing events.

However, mixed substrate comprises only 1% of the total area by substrate type while soft substrate accounts for 91%. The lower slope is essentially unaffected, because, aside from the difficulty of fishing at greater depth, Amendment 19 included a mitigation measure prohibiting bottom trawling in depths greater than 700 fathoms, which for the depth zones used in the synthesis report constitutes the shoreward boundary of the lower slope. Fixed gear effort is more evenly distributed across habitat types; measured relative to habitat area, a larger proportion of the fixed gear effort / habitat area ratio occurs on hard substrate.

Table 3-25. Distribution of fishing effort, 2002-2010, (percent) by gear type and habitat type (substrate x depth zone) summarized from Tables A3a.5, A3a.6, and A3.a7 in NMFS (2013b).

	Depth Zone			
Substrate	**Shelf**	**Upper slope**	**Lower slope**	**All Depths**
Bottom Trawl				
Hard	0.3%	1.5%	0.0%	1.8%
Mixed	0.2%	1.9%	0.0%	2.1%
Soft	37.0%	59.0%	0.1%	96.1%
All Substrates	**37.6%**	**62.4%**	**0.1%**	**100.0%**
Midwater Trawl				
Hard	0.2%	3.1%	0.0%	3.3%
Mixed	1.2%	5.5%	0.0%	6.8%
Soft	12.6%	76.7%	0.6%	89.9%
All Substrates	**14.1%**	**85.2%**	**0.7%**	**100.0%**
Fixed Gear				
Hard	9.3%	6.5%	0.5%	16.3%
Mixed	3.4%	5.7%	0.5%	9.6%
Soft	19.0%	55.0%	0.1%	74.1%
All Substrates	**31.7%**	**67.3%**	**1.1%**	**100.0%**

Table 3-26. Relative fishing impact metric by gear type and habitat type derived from Table 2.1 (distribution of habitat types) and Tables A3a.5, A3a.6, and A3.a7 in NMFS (2013b).

	Depth Zone		
Substrate	**Shelf**	**Upper slope**	**Lower slope**
Bottom Trawl			
Hard	2.9%	7.3%	<0.1%
Mixed	6.0%	43.5%	0%
Soft	21.2%	18.9%	<0.1%
Midwater Trawl			
Hard	0.9%	7.1%	<0.1%
Mixed	15.3%	61.5%	0%
Soft	3.4%	11.6%	<0.1%
Fixed Gear			
Hard	23.0%	8.7%	0.4%
Mixed	24.0%	36.2%	*
Soft	3.0%	4.8%	<0.1%

*Fixed gear fishing events are reported for lower slope mixed substrate while the area of this habitat type is reported as zero. Therefore, fixed gear fishing effort in that habitat type is excluded from the calculation.

As noted above, landings data sugests that groundfish trawl vessels are using midwater trawl gear to target species other than whiting, principally widow and yellowtail rockfish. This fishery would likely have impacts similar to the midwater trawl fishery for Pacific whiting except that it may occur in different times and areas. A final rule is expected in 2014 to reduce chafing gear restrictions on the codends of midwater trawl nets. (The codend is a baglike apparatus at the terminus of the net where the fish collect. It has a “zipper” mechanism to allow it to be detached or opened to retrieve the fish once the net has been brought aboard the vessel.) Chafing gear protects the codend; in the case of midwater gear this is more relevant to when the codend is pulled up the stern ramp of the vessel rather than contact with the seafloor. The EA associated with this rulemaking (PFMC and NMFS 2013) describes potential impacts of the gear modification including habitat impacts of the gear. In summary, because of the way midwater trawl nets are designed, harvesters try to avoid bottom contact.

3.3.2 Non-Fishing Impacts

Adverse effects from activities other than fishing are not part of the proposed action but contribute to cumulative effects (see Section 4.15). Appendix D to the Groundfish FMP incorporates a 2003 report prepared by NMFS cataloging the types of activities affecting groundfish EFH. Activities identified in the appendix include those onshore, such as non-point and point source discharge of pollutants and coastal construction, and those in the marine environment including dredging, dredge spoil disposal, and marine mining. Section 4.4 in the synthesis report (NMFS 2013b) updates information on non-fishing impacts based on spatially explicit data compiled by Halpern, et al. (2008). The main findings of the analysis are that these impacts are more intense in nearshore areas. Offshore impacts are more intense in the northern portion of the fishery management area compared to the southern area.

3.3.3 EFH Mitigation Measures

3.3.3.1 Gear Restrictions

Amendment 19 made permanent an existing prohibition on the use of bottom trawl gear with footropes larger than eight inches in diameter shoreward of a line approximating the 100 fathom depth contour, as described in Section 6.6.1.1 of the Groundfish FMP. These footrope restrictions were originally implemented to discourage trawling in areas where bycatch of overfished rockfish species are more abundant. Because these are generally areas of rocky habitat the prohibition also had an important mitigation effect for EFH. Amendment 19 also implemented prohibitions on dredge and beam trawl gear, because of their adverse impact on groundfish EFH.

Amendment 20 ("trawl rationalization") established the individual fishing quota (IFQ) program for trawl-endorsed groundfish limited access permit holders. The program allows these permit holders to use any legal groundfish gear. As a consequence, since implementation in 2011, a portion of landings have been made with fixed gear.[27] (See section 3.7.2.2 for more information.) In 2011-2012 fixed gear landings in the IFQ fishery accounted for about 40% of total landings by weight and 21% of trips measured by counting fish tickets, excluding trips targeting whiting. Although these measures do not correlate directly with fishing effort, they do suggest that some trawl effort has been substituted by fixed gear effort, and fixed gear has less adverse impacts on groundfish EFH (for example as measured by recovery time, shown in Table 3-24). Estimated recovery times for fixed gear interactions with hard substrate are shorter than for bottom trawl, even comparing recovery from trawl on soft substrate to fixed gear on hard substrate. Thus, even though rocky habitat is more accessible by fixed gear compared to trawl, the net effect of such gear switching is likely beneficial.

3.3.3.2 Time/Area Fishing Restrictions

As part of Amendment 19, 34 areas were closed to bottom trawl gear and 16 areas were closed to bottom contact commercial fishing gear other than demersal seine gear. (Section 6.8.5 in the Groundfish FMP enumerates these areas.) A bottom trawl footprint closure, covering all areas deeper than 700 fathoms, was also instituted (described in FMP section 6.8.6). These closures are designed specifically to mitigate the adverse impacts of fishing on EFH.

Marine protected areas (MPAs) may mitigate adverse impacts of fishing, although these areas may be established with a broader set of objectives. As noted in Groundfish FMP section 6.8.7, the closed areas implemented by Amendment 19 meet the definition for MPAs established by EO 13158. The Amendment 19 EIS (NMFS 2005) catalogued extant MPAs at that time. Although most MPAs have been established by states in state waters, there are also five Federal National Marine Sanctuaries on the west coast that meet the MPA definition. Table 3-27 summarizes data from the National MPA Center's MPA Inventory on the areas under MPA management off the west coast by government level and type of restriction. NMFS is shown separately from other Federal agencies, because the EFH closures account for a large proportion of the total area. Excluding closed areas implemented by NMFS, commercial fishing is prohibited in 3% of the remaining areas and fishing is restricted in 36%. Recreational fishing gear, which is predominantly hook-and-line, has negligible adverse impacts on EFH.

[27] Note that vessels using fixed gear in the shorebased IFQ program are subject to the non-trawl RCAs.

Table 3-27. West coast MPA area (sq. km.) summarized by fishing restrictions. Source: National MPA Center, March 2013 MPA Inventory, http: //marineprotectedareas.noaa.gov/dataanalysis/mpainventory/.

	NMFS	Other Federal	State	Local	Partnership	Total
Commercial and Recreational Fishing Prohibited		23.2	1,149.5		0.2	1,173.0
Commercial and Recreational Fishing Restricted	14,166.4	8,846.1	1,761.6		26.2	24,800.4
Commercial Fishing Prohibited		1.8	15.8			17.7
Commercial Fishing Prohibited and Recreational Fishing Restricted		44.7	77.8			122.5
Commercial Fishing Restricted	372,170.1	3,828.4	8.9		3.9	376,011.2
Commercial Fishing Restricted and Recreational Fishing Prohibited			27.8			27.8
No Site Restrictions		20,858.7	3,515.7	0.1	49.4	24,423.9
Recreational Fishing Prohibited			1.6			1.6
Recreational Fishing Restricted	655.4		10.9			666.3
Restrictions Unknown		37.0	93.5			130.5
Total	386,991.9	33,640.0	6,663.0	0.1	79.8	427,374.8

The Council and NMFS have also implemented Groundfish Conservation Areas (GCAs) to prevent commercial and, in some cases, recreational vessels from targeting groundfish in areas where catch of overfished groundfish species is likely to be high. These areas do not have EFH mitigation as an objective, nor are they considered MPAs (and are not included in the MPA Inventory described above). However, as an ancillary effect they do mitigate the adverse effects on EFH by prohibiting fishing within their boundaries. The GCAs include two Cowcod Conservation Areas (CCAs) off Southern California and Rockfish Conservation Areas (RCAs) designated for specified gear types. The CCAs have had the same boundaries since they were implemented in 2001. Trawl RCA boundaries change periodically during the year and annually since first implemented in September 2003 (see Table 3-28). Changes in RCA configurations and the recovery times for constituent habitat types are a consideration in defining the environmental baseline. See Section 4.2 for a description of this management measure as implemented during the 2015-2016 biennial period.

Table 3-28. Limited entry trawl RCA depth boundaries by year and month, 2002-2012, including inseason changes.

Year	Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013[a]	North of 48°10'	0 - [m]200		0 - 200		0 - 150				0 - 200		0 - [m]200	
	48°10' - 45°46'	75 - [m]200		75 - 150		100 - 150						75 - 150	
	45°46' - 40°10'			75 - 200		100 - 200						75 - [m]200	
	40°10' - 34°27'	100 - 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 - 150											
2012[a]	North of 48°10'	0 - [m]200		0 - 200		0 - 150				0 - 200		0 - [m]200	
	48°10' - 45°46'	75 - [m]200		75 - 150		100 - 150						75 - 150	
	45°46' - 40°10'			75 - 200		100 - 200						75 - [m]200	
	40°10' - 34°27'	100 - 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 - 150											
2011[a]	North of 48°10'	0 - [m]200		0 - 200		0 - 150				0 - 200		0 - [m]200	
	48°10' - 45°46'	75 - [m]200		75 - 200		75 - 150		100 - 150		75 - 150			
	45°46' - 40°10'					75 - 200		100 - 200		75 - 200		75 - [m]200	
	40°10' - 34°27'	100 - 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 - 150											
2010[a]	North of 48°10'	0 - [m]200		0 - 200		0 - 150				0 - 200		0 - [m]200	0 - 250
	48°10' - 45°46'	75 - [m]200		75 - 200		75 - 150		100 - 150		75 - 200		75 - [m]200	75 - 250
	45°46' - 40°10'					75 - 200		100 - 200					
	40°10' - 34°27'	100 - 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 - 150											
2009[a]	North of 48°10'	0 - [m]200			0 - 200	0 - 150				0 - 200		0 - [m]200	
	48°10' - 45°46'	75 - [m]200			75 - 200	75 - 150		100 - 150		75 - 200		75 - [m]200	
	45°46' - 40°10'					75 - 200		100 - 200					
	40°10' - 34°27'	100 - 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 - 150											
2008[a]	North of 48°10'	0 - [m]200		0 - 200		0 - 150						0 - [m]200	
	48 10 - 46 38.17	75 - [m]200		60 - 200		60 - 150					75 - 150	75 - [m]200	
	46 38.17 - 46 16			60 - 200				60 - 150					
	46 16 - 45 46			75 - 200		75 - 150				75 - 200			
	45 46 - 43 20.83			75 - 200									
	43 20.83 - 42 40.50	0 - [m]200		0 - 200								0 - [m]200	
	42 40.5 - 40 10	75 - [m]200		75 - 200		60 - 200					75 - 200	75 - [m]200	
	40 10 - 34 27	100 - 150											
	South 34 27 (mainland)												
	South 34 27 (islands)	0 - 150											
2007[a]	North of 48°10'	75 - [m]250		75 - 250	0 - 150					0 - 200	75 - 200	75 - [m]200	
	48°10' - 46°38'				75 - 150					75 - 200			
	46°38' - 46°16'				60 -150					60 -200			
	46°16' - 45°03'				75 - 150				75 - 200				
	45°03' - 43°20'				75 - 200								
	43°20' - 42°40'				0 - 200						75 - 200		
	42°40' -40°10'				75 - 200								
	40°10' - 38'	100 - [m]200		100 - 150								100 - [m]200	
	38° - 34°27'	100 - 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 - 150											
2006[a]	North 40 10	75 - [m]200		75 - 200				100 - 250		75 - 250		75 - [m]250	
	40 10 - 38	75 - 150		100 - 150				100 - 200		100 - 250			
	38 - 34 27							100 - 150				75 - 150	
	South 34 27 (mainland)												
	South 34 27 (islands)	0 - 150											
2005[a]	North 40 10	75 - [m]200		100 - 200							0 - 250		
	40 10 - 38	75 - 150		100 - 200		100 - 150							
	38 - 36			100 - 150							0 - 200		
	36 - 34 27										50 - 200		
	South 34 27 (mainland)												
	South 34 27 (islands)	0 - 150									0 - 200		
2004	North 40 10	75 - [m]200		60 - 200		60 - 150		75 - 150			0 - 250		
	40 10 - 38	75 - 150[z]				100 - 150[z]				75 - 150[z]			
	38 - 36										0 - 200[z]		
	36 - 34 27										0 - 150		
	South 34 27 (mainland)												
	South 34 27 (islands)	0 - 150											
2003	North 40 10	100 - [m]250		100 - 250		50 - 200		75 - 200		50 - 200		0 - [m]200	
	40 10 - 38	50 - [m]250		60 - 250		60 - 200							
	38 - 34 27	50 - 150		60 - 150									
	South 34 27 (mainland)	100 - 150				100 - 200							
	South 34 27 (islands)	0 - 150				0 - 200							
2002	North 40 10	Within DBCA - CLOSED TO TRAWLING, September - December, special footrope requirements outside DBCA											

[m]The "modified" depth" line is modified to exclude certain petrale sole areas from the RCA.
[a]Selective flatfish trawl required shoreward of the RCA north of 40 10
[z]Additional closure 0-10fm around Farallon Islands

In April 2013 the Council recommended changing the trawl RCA boundaries north of 40°10'. N. lat. (near Cape Mendocino, California) to 100 and 150 fathoms from the current configuration, which varies somewhat during the year by has a maximum extent of 75 to 200 fathoms. Although such changes are usually considered an "inseason action" that allows an abbreviated rulemaking process, in this case NMFS determined that more detailed analysis and a full (notice and comment) rulemaking was required. A major factor in making this determination was the that the Council's recommendation that would open fishing grounds that had been off limits for a long enough time so that they may have recovered from impacts caused by bottom trawl gear (based on the estimates shown in Table 3-24). NMFS provided a draft EA to the Council at its September 2013 meeting (see Agenda Item G.6.b) at which time the Council reaffirmed their previous recommendation.

NMFS published a final rule on April 17, 2014 (79 FR 21639) implementing a modification of the Council proposal and made the final EA available (NMFS 2014b). The EA evaluated the Council recommendation and the NMFS modification. The change implemented by NMFS retains a seaward boundary of 200 fathoms between 40°10'. N. lat. and 45°46'. N. lat. (Cape Falcon, Oregon) but otherwise implements the Council's recommendation.[28] The rationale for this modification is that "this area has been largely closed to groundfish bottom trawling since 2004" (79 FR 21641) allowing EFH in this area to recover from the adverse impacts of fishing. Furthermore, opening this area could impair the Council's ongoing review of EFH, discussed above, because "some of the groundfish EFH proposals that may be considered by the Council during its review include proposals for new EFH conservation areas within the portion of the RCA that has essentially been closed to groundfish bottom trawling year-round since 2004" (79 FR 21641). Any change to this portion of the RCA should therefore not occur until the review process is complete and any new conservation areas implemented. Finally, NMFS notes that "this area may currently have greater conservation value than portions of the actual 'core' RCA" between 100 and 150 fathoms. Although this core area has been continuously closed to bottom trawl since September 2002, pink shrimp trawl gear has been allowed in this area (along with a few other activities, such as NMFS trawl surveys, which also occur in other depth zones). Pink shrimp trawling occurs shallower than 150 fathoms and thus not in the 150-200 fathom area proposed to be opened.

NMFS states that the Council did not "sufficiently acknowledge or contribute additional analysis to minimize the potential for adverse impacts on the identified area as compared to other recommended areas, and did not provide sufficient rationale when they made their initial recommendation…" (April 17, 2014 letter from William W. Stelle, Jr., Regional Administrator, to Dorothy Lowman, Pacific Council Chair). NMFS explains that the Council needs to consider the MSA's requirement to "minimize to the extent practicable adverse effects" to EFH as part of a fishery management plan (MSA Sec. 303(a)(7)). To do so, the Council needs to demonstrate that the economic impact is "substantial enough" to outweigh potential adverse impacts to EFH. This evaluation standard is based on the description of practicability in Federal regulations at 50 CFR 600.815(a)(2)(iii): "…Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with National Standard 7" ("Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication").[29]

[28] From November through February a modified 200 fathom line is implemented, which has "cutouts" to allow access to areas productive for Petrale sole catch.
[29] "Practicable" has a narrower definition the "practical." Something is practical if it is useful or convenient while practicable means doable or feasible. A time machine would be very practical but not practicable.

These findings by NMFS have implications for evaluating Council recommendations for changes to RCA boundaries in the context of considering "routine" management measures. Even though the trawl RCA boundaries have been changed frequently in the past (see Table 4-6 in NMFS 2014b) in cases where this management measure has allowed areas of EFH to recover from the adverse effects of fishing, sufficient rationale is expected to demonstrate that the benefits of an RCA change outweigh the adverse effects of potentially subjecting a recovered area to renewed adverse effects. As discussed in the NMFS EA (NMFS 2014b), fishing activity is by no means spatially uniform. By the same token, both past adverse effects and future effects resulting from a proposal will vary within a large area such as the 150-200 fathom zone that NMFS concluded should not be opened. Depending on available data, analyses should take this into account. Past efforts have not generally taken into account the mitigation effects of RCAs at such a discrete level. For example, maps of fishing effort in the EFH Phase 2 report do not display RCA boundaries (see, for example, http://efh-catalog.coas.oregonstate.edu/platesK/).

3.3.3.3 Fishing Effort

Section 7.4 in the Groundfish FMP identifies reductions in fishing effort as another way to reduce adverse impacts. The assumption is that reduced fishing effort correlates with a decline in the frequency and extent of gear contact with benthic habitat constituting groundfish EFH. Section 7.4 cites various extant measures to limit capacity, "loosely defined as the number, size, and configuration of vessels participating in a fishery." These include state and Federal license limitation programs ("limited entry"), an industry/government permit and vessel buyback program for Federal trawl-endorsed permits implemented in 2003, and the trawl rationalization program, which implemented IFQ management in the shoreside trawl fishery and co-op management in the at-sea whiting fishery. Past Groundfish Harvest Specification EISs and the Amendment 20 EIS describe these programs in detail.

Table 3-29 shows annual counts of vessels landing at least one pound of groundfish by gear type. Coastwide, fixed gear vessel counts have varied between 889 and 744 with a slight downward trend; trawl vessel counts show a clear downward trend from a high of 206 in 2003 to a low of 85 in 2012. A big drop can be seen between 2003 and 2004 when the vessel buyback occurred and after 2010 when the IFQ program was implemented.

Table 3-29. Counts by year, state and coastwide, and gear type of vessels landing at least 1 lb of groundfish (PacFIN vdrfd 1/29/14 using dahl_sector field for groundfish trawl and fixed gear sectors not including at-sea whiting).

State	Gear Type	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Washington	Fixed Gear	108	89	112	124	91	68	74	70	84	63
	Trawl	28	19	23	27	25	19	16	19	14	12
Oregon	Fixed Gear	252	226	278	295	267	263	270	240	242	232
	Trawl	103	75	75	81	84	82	85	80	59	60
California	Fixed Gear	541	479	424	479	488	454	458	440	507	487
	Trawl	90	51	52	51	51	45	40	39	24	25
Coastwide	Fixed Gear	883	779	796	889	837	780	793	744	821	775
	Trawl	206	130	132	132	133	129	125	117	87	85

Figure 3-22 shows measures of fishing effort based on trawl tow set and retrieval times and locations recorded in trawl logbooks and available from the logbook subsystem on PacFIN.[30] Tow time (panel a)

[30] No filters were applied on the records aside from the dates; thus, the totals cover a range of trawl strategies. Using the PacFIN_target field in the lbk_tow table, the most common targets (based on number of tows) are Dover sole, thornyheads, and sablefish individually or combined ("DTS") accounting for 43% of tows in the time period. The second most common strategy, at 15%, is "nearshore mixed," which covers vessels fishing shoreward of the RCA mainly for flatfish. Pacific whiting accounts for 8% of tows and 8% of tows had no target identified. California halibut and ridgeback prawn, nongroundfish targets, accounted for 4% of tows.

declined substantially over the time period while tow distance (panel b) shows more fluctuation with a decline in 2011 and 2012. However, CPUE, measured by dividing landings by tow distance, increased after implementation of IFQ management in 2011. It should be noted that some of the inter-annual variations could be based on incomplete reporting in logbooks.[31]

a. b. c.

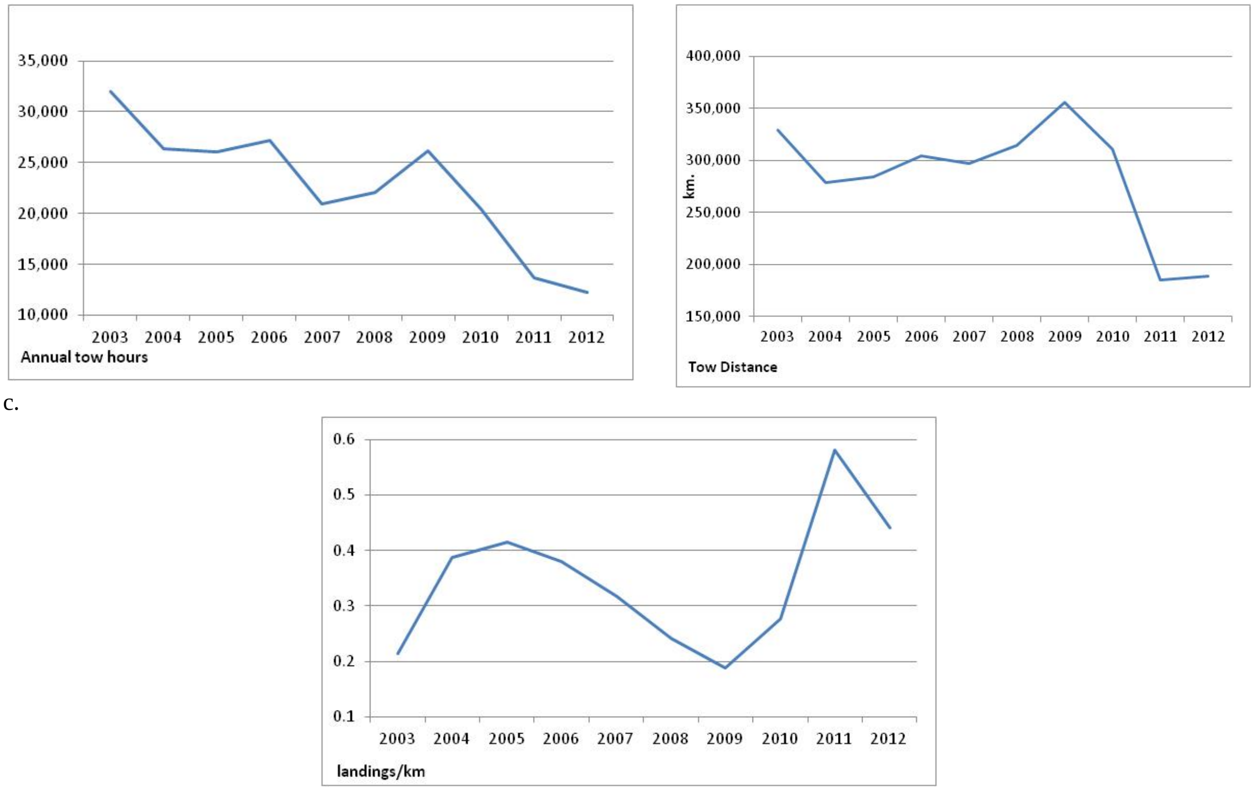


Figure 3-22. a. Total annual tow hours based on set and retrieval times in trawl logbooks. b. Total annual tow distance based on set and retrieval positions (longitude and latitude) in trawl logbooks. c. Annual catch-per-unit-effort in the shoreside groundfish trawl fishery based on tow distance and landings from 2014 Groundfish SAFE Table 4.a. (PacFIN, lbk_tow, 1/29/14)

3.4 California Current Ecosystem

In April 2013 the Council adopted the Pacific Coast Fishery Ecosystem Plan for the U.S. Portion of the California Current Large Marine Ecosystem (PFMC 2013, Pacific Coast FEP). This document contains a wealth of information on characteristics of the California Current large marine ecosystem (CCE) where the groundfish fishery occurs and the types of impacts fisheries and other anthropogenic activities have on ecosystem dynamics and marine habitat. Information from this document is incorporated by reference. Previous EISs prepared for biennial harvest specifications also contain information about this ecosystem and fishery effects. The information in sections 3.4.1 and 3.4.2 is based on sections 3.1 and 3.2 in the Pacific Coast FEP.

[31] An analysis of the tow location fields found that about 2% of the 205,328 tows made in the 2003-2012 period had a zero or null value in one or more of the location fields. An additional 2% or 3,683 records had the same values in the set and retrieval position fields resulting in a zero distance. Non reporting (zero or null values) declined steadily over the period from 4.6% in 2003 to 0.04% in 2012.

Chapter 4 in the Pacific Coast FEP (PFMC 2013) describes the effects of human activities and climate on the CCE. Information from the FEP and other sources is summarized here to characterize impacts of groundfish and other fisheries (section 3.4.3), other human activities (section 3.4.4), and climate (section 3.4.5).

Coincident with the development of the Pacific Coast FEP, NMFS has been developing the Integrated Ecosystem Assessment (IEA) of the CCE. This is "a formal synthesis and quantitative analysis of all relevant scientific information—biological, geological, physical, economic, and social—in relation to ecosystem management objectives" (Levin and Schwing 2011b). The IEA includes the development of a suite of indicators used to periodically report on the status of the CCE. Section 3.4.7 summarizes recent IEA reports on CCE status using these indicators.

For the purpose of impact analysis, ecosystem is characterized as the web of trophic relationships within the system and how system structure (relative abundance of constituent organisms) may change in response to human activities, specifically fisheries targeting groundfish.[32]

3.4.1 Overview of California Current Large Marine Ecosystem

The California Current Ecosystem (CCE) is composed of a major eastern boundary current, the California Current, which is dominated by strong coastal upwelling, and is characterized by fluctuations in physical conditions and productivity over multiple time scales (Mann and Lazier 1996; Parrish, *et al.* 1981). Food webs in these types of ecosystems tend to be structured around coastal pelagic species that exhibit boom-bust cycles over decadal time scales (Bakun 1996; Checkley and Barth 2009; Fréon, *et al.* 2009). By contrast, the top trophic levels of such ecosystems are often dominated by highly migratory species such as salmon, tuna, billfish and marine mammals, whose dynamics may be partially or wholly driven by processes in entirely different ecosystems, even different hemispheres. Ecosystems analogous to the CCE include other shelf and coastal systems, such as the currents off the western coasts of South America and Spain.

The CCE contains a diverse array of species, most of which make a relatively modest contribution to the energy flow within the ecosystem (Field and Francis 2006). Because the flow of energy is more of a "food web" than a "food chain," the species of the CCE do not neatly divide into clearly delineated trophic levels (for example, an organism may eat a prey item and also eat items that its prey eats), except at the highest and lowest levels. Most CCE species do not occupy a single trophic level and may occupy multiple trophic levels, particularly when considering changes that occur over the course of their life as they change both their size and feeding preferences.

3.4.2 Role of Groundfish in the California Current Ecosystem

3.4.2.1 Groundfish Trophic Role

Groundfish occupy a range of trophic niches and habitats, but most species are considered to be at either middle or higher trophic levels. The following characterization is based on diet analysis contained in Dufault, et al. (2009):

- High trophic level carnivorous fish feeding largely on juvenile and adult stages of other groundfish, as well as forage fishes, mesopelagic fishes, and squid. These include large flatfish (arrowtooth flounder, Pacific halibut, petrale sole); deep, large rockfish (shortspine thornyhead,

[32] The *trophic level* of an organism is the position it occupies in a food chain or food web. Trophic relationships express the pattern of consumption and by extension the flow of energy through the system.

darkblotched rockfish, rougheye rockfish); sablefish; skates and rays (longnose, Bering, and big skates); soupfin shark; deep, small rockfish (longspine thornyhead, sharpchin and splitnose rockfish); Pacific grenadier; and lingcod (Dufault, *et al.* 2009, feeding guild H).

- Mid to high trophic level fish that feed on zooplankton. These include Pacific hake (whiting); canary rockfish; shallow large rockfish (redstripe, yelloweye, black and blue rockfish); mid-water rockfish (widow rockfish, Pacific Ocean perch, yellowtail rockfish); spiny dogfish; and spotted ratfish (Dufault, *et al.* 2009, feeding guilds B and G).
- Mid to high trophic level fish that feed on benthic invertebrates. These include shallow, small rockfish (rosethorn, greenstriped, and pygmy rockfish); English sole; and small flatfish (Dover sole, rex sole, Pacific sanddab, and deepsea sole) (Dufault, *et al.* 2009, feeding guild E).

Many species may have more varied diets than indicated by the above. For example, many species, including most rockfish, are omnivorous mid-trophic level predators that may be piscivorous at times but also feed on krill, gelatinous zooplankton, benthic invertebrates, and other prey. Pacific hake (whiting), the most abundant groundfish in the CCE, have different food habits at different life stages. Younger, smaller hake feed primarily on euphausiids and shrimps, switching to an increasing proportion of herring, anchovies and other fishes (as well as other hake) as they reach 45-55 cm length, and are almost exclusively piscivorous by 70-80 cm.

3.4.2.2 Trophic Role of Non-Groundfish Species that are the Prey of or that Prey upon Groundfish Species

This group of species is necessarily more broad and diverse than the groundfish species discussed above. Species discussed in this section include the higher trophic level piscivores that prey upon groundfish at varying life stages and sizes. Species discussed in this section also include the lower trophic level species that are eaten by groundfish. Some of these species are protected under the MMPA or ESA, some are themselves target species for other fisheries, and some are neither targeted nor protected. Most of these species are only directly affected by the fisheries when they are taken as bycatch with groundfish gear. Otherwise, these species are primarily indirectly affected by how each of the alternatives either increases or decreases their prey availability or the abundance of their predators.

Using the Dufault, et al. (2009) characterizations in combination with the large species group distinctions discussed in section 3.2 of the Pacific Coast FEP, non-groundfish species directly or indirectly affected by this action may be described by their trophic levels and prey groups. Dufault and colleagues did not have adequate data to include all CCE species in their diet analysis, particularly at the lower trophic levels. These broad species groups are intended to generally characterize the trophic roles of non-groundfish species that prey upon or that are the prey of groundfish:

- Piscivorous Marine Mammals and Seabirds: Includes all CCE pinnipeds, small cetaceans, and all toothed whales except Transient Killer Whales, which feed on other mammals. Includes all CCE seabirds, which are primarily or exclusively piscivorous (Dufault et al. 2009, feeding guilds C and I).
- High trophic level carnivorous fish: Chinook salmon, albacore, giant grenadier, and large demersal sharks (sixgill and sleeper sharks) (Dufault, et al. 2009, feeding guilds C, H, and I).
- Lower trophic level fish and invertebrates that are preyed upon by groundfish: northern anchovy; Pacific sardine; Pacific herring; shrimps (crangon and mysid); large zooplankton (euphausiids, chaetognaths, pelagic shrimp, pelagic polychaetes, pasiphaeids); deposit feeders (amphipods, isopods, small crustacean, snails, ghost shrimp, sea cucumbers, worms, sea slugs, barnacles, solenogaster, hermit crabs); megazoobenthos (Dungeness crab, tanner crab, spiny lobster, pinchbug crabs, red rock crab, graceful rock crab, spider crabs, grooved tanner crab, bairdi,

scarlet king crab, and California king crab); deep vertical migrators (myctophids, blue lanternfish, California headlightfish, Pacific viperfish, northern lampfish, garnet lanternfish); miscellaneous nearshore fish (white croaker, sculpin, midshipman); and other benthic filter feeders (geoduck, barnacles, clams, scallops, and other bivalves, urchins).

3.4.3 Effects of Managing to B_{MSY}

Fishery removals affect the relative abundance of different species. Broadly speaking, stock-specific management seeks to maximize yield based on compensatory growth resulting from reducing the population size (see Rose, *et al.* 2001, for an overview of compensatory processes). Notionally, yield is maximized (MSY) when stock size is about half its unfished size (although for individual stocks B_{MSY} may be somewhat larger or smaller relative to unfished size). Since fisheries catch a relatively small range of the different organisms within the CCE, this activity is likely to change the relative abundance of species. This results in a direct effect on the fished population (evaluated in other sections of this EIS mainly based on single species stock assessments).

The Pacific Coast FEP section 3.3.2 describes species interactions, which may be altered by changes in relative population size due to fishing. For example, reduction in a predator population may allow a prey population to increase. Density dependent interactions such as competition for habitat or parasitism may decrease as the population of one or both interacting species declines. These effects are proximate to the change in abundance but indirectly related to the action (fishing). Thus, while from an ecosystem perspective they may be considered direct effects, relative to the action evaluated in this EIS they are indirect. From this perspective the effects of fishing on the ecosystem are principally indirect and cumulative.

A specific example of an indirect effect is described in the Pacific Coast FEP. On unfished rocky reefs the abundance of larger, piscivorous rockfish species is higher relative to more abundant, smaller, fast-growing, and early-maturing rockfish species (Jagielo, *et al.* 2003; Yoklavich, *et al.* 2002; Yoklavich, *et al.* 2000). In contrast, the larger piscivorous rockfish are relatively less abundant on heavily fished rocky reefs. This may be due to a "depensatory" effect resulting from the smaller fish eating the larvae of the larger fish (MacCall 2002; Walters and Kitchell 2001). When the local population of the larger predatory fish is reduced the population of smaller fish increases and they in turn consume a greater share of the large fishes' spawning output, limiting recruitment to the adult population. This demonstrates the structuring role of higher trophic level organisms that can be disrupted by fishing. Empirical and theoretical research suggests such effects could be more widespread in terms of species and habitats (Baskett, *et al.* 2006; Levin, *et al.* 2006).

Kaplan, et al. (2012) used the Atlantis ecosystem simulation model to assess the cumulative effects of fisheries on the CCE.[33] This work provides the most specific assessment of the effects of fishing by different fleets on various ecosystem components and indicators of ecosystem health. Their simulation starts with initial conditions approximating 2005-2008 and then projects forward 50 years. The authors compared the effects of 20 individual fishing fleets operating in the CCE and the combined effects of these fleets, using the unfished ecosystem (as determined by the model) as a comparative benchmark and "status quo" defined as all fisheries operating at constant fishing mortality rates derived from recent catches.

Four major fleets were identified based on total catch and economic importance. In the simulations these fleets have large negative impacts on target and bycatch species (measured in terms of the change from status quo) along with indirect effects on other species:

[33] See Horne, et al. (2010) for a description of the structure and parameterization of the CCE implementation.

- Bottom trawl indirectly affected small shallow rockfish and zooplankton (krill), with their populations increasing due to the reduction in predation. [34]
- Fixed gear indirectly affected mesozooplankton (copepods), which increased.
- Hake (whiting) trawl indirectly resulted in increases of small planktivores, large piscivorous flatfish, Dover sole, shortbelly rockfish, and shrimp.
- In contrast to the other three fleets, CPS purse seine had indirect effects throughout the food web. Reduction in squid (cephalopods) abundance resulted in a large increase in krill and microzooplankton. This in turn led to increases in planktivores such as salmon and myctophids (vertical migrators). Although CPS purse seine also targets small and large planktivores (sardine and mackerel), small planktivores showed almost no response to fishing while large planktivore biomass increased 2.65 times from the status quo level (all fisheries operating), because of increases in large zooplankton.

The authors also evaluate impacts in terms of nine ecosystem attributes based on those used for the CCE Integrated Ecosystem Assessment project (Levin and Schwing 2011a) and the IndiSeas project (Shin, *et al.* 2010). Fleets with the strongest negative impact on these attributes (based on the average value of the attribute scores for each fleet) were those described above plus pink shrimp trawl (with hake trawl considered separately in its at-sea and shoreside components because of differences in total removals). Figure 3-23, adapted from Kaplan, et al. (2012) Figure 3, shows the effect of these fleets on selected ecosystem attributes (chosen because they varied by ≥5% from status quo). As noted above, all fleets show negative impacts as measured by the targeted biomass/catch indicator. This attribute received the largest negative score among the nine attributes for all the major fleets shown in Figure 3-23 except for bottom trawl and non-nearshore fixed gear. For those two fleets the piscivore indicator received the largest negative score. Bottom trawl and CPS purse seine had notable (>5%) positive effects on the krill attribute and bottom trawl was the only fleet to have a negative effect on the healthy assessed stocks attribute.

[34] The model uses 60 functional groups, some containing single species and others species aggregations.

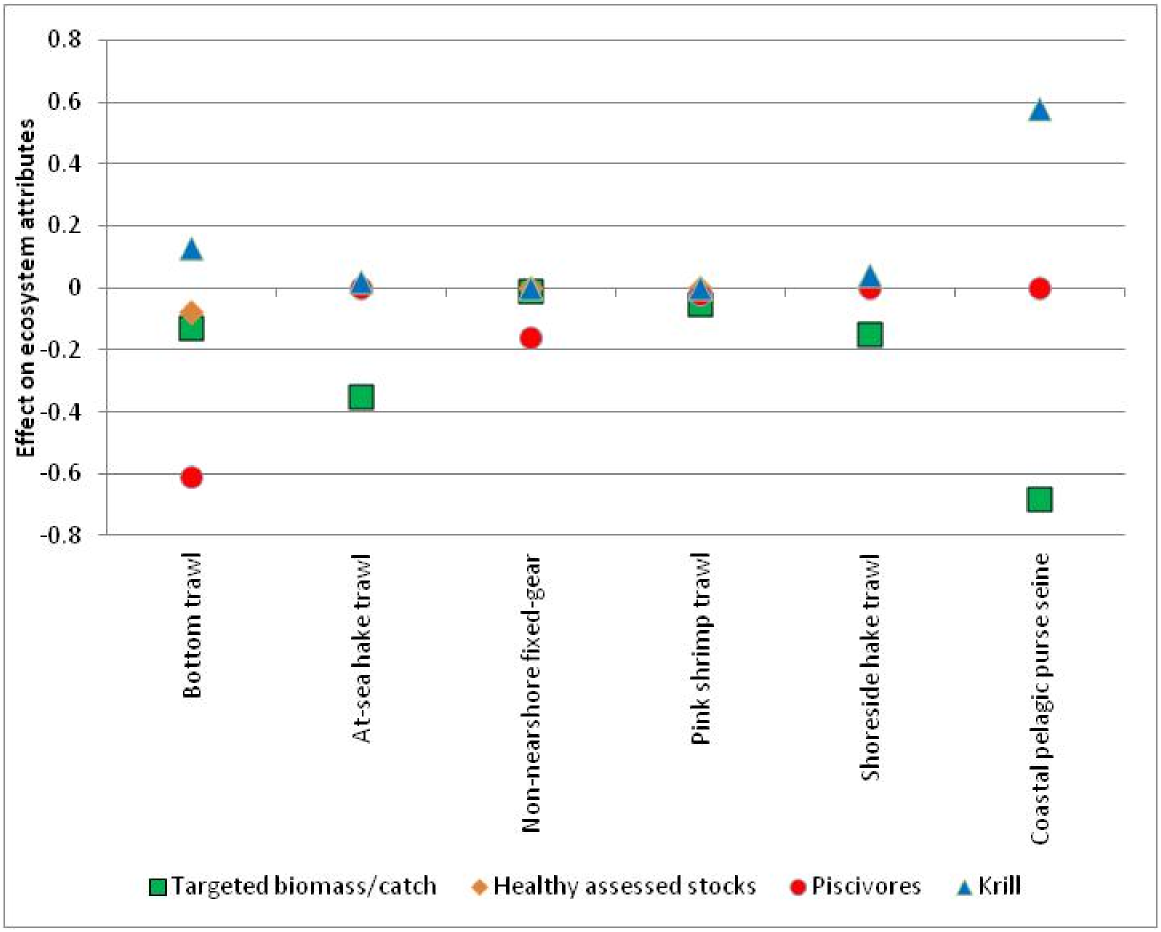


Figure 3-23. Effect of six individual fleets on four ecosystem attributes. Adapted from Kaplan et al. (2012), Figure 3. Values represent the proportional difference between a simulation at status quo (all fleets operating) and one in which the specified fleet was omitted. Zero represents no change from status quo.

Figure 3-24 represents the effect on ecosystem attributes of successively adding fleets, with fleets ordered by their negative impacts from most to least. (This figure appears in the supplement to Kaplan et al. with attribute scores rescaled between 1, the value in the unfished state, and 0, the lowest recorded value for the attribute. It is based on the data presented in Figure 4 in the paper.) The major fleets discussed above account for most of the impacts. Targeted biomass, mean trophic level of the catch, healthy assessed stocks, and piscivores show increasing negative impacts with the addition of fleets (with the exception of a slight increase in mean trophic level as additional fleets are added after the major fleets). Forage fish increases with each fleet addition and krill increases once CPS purse seine is added, which results in a corresponding increase in total biomass.

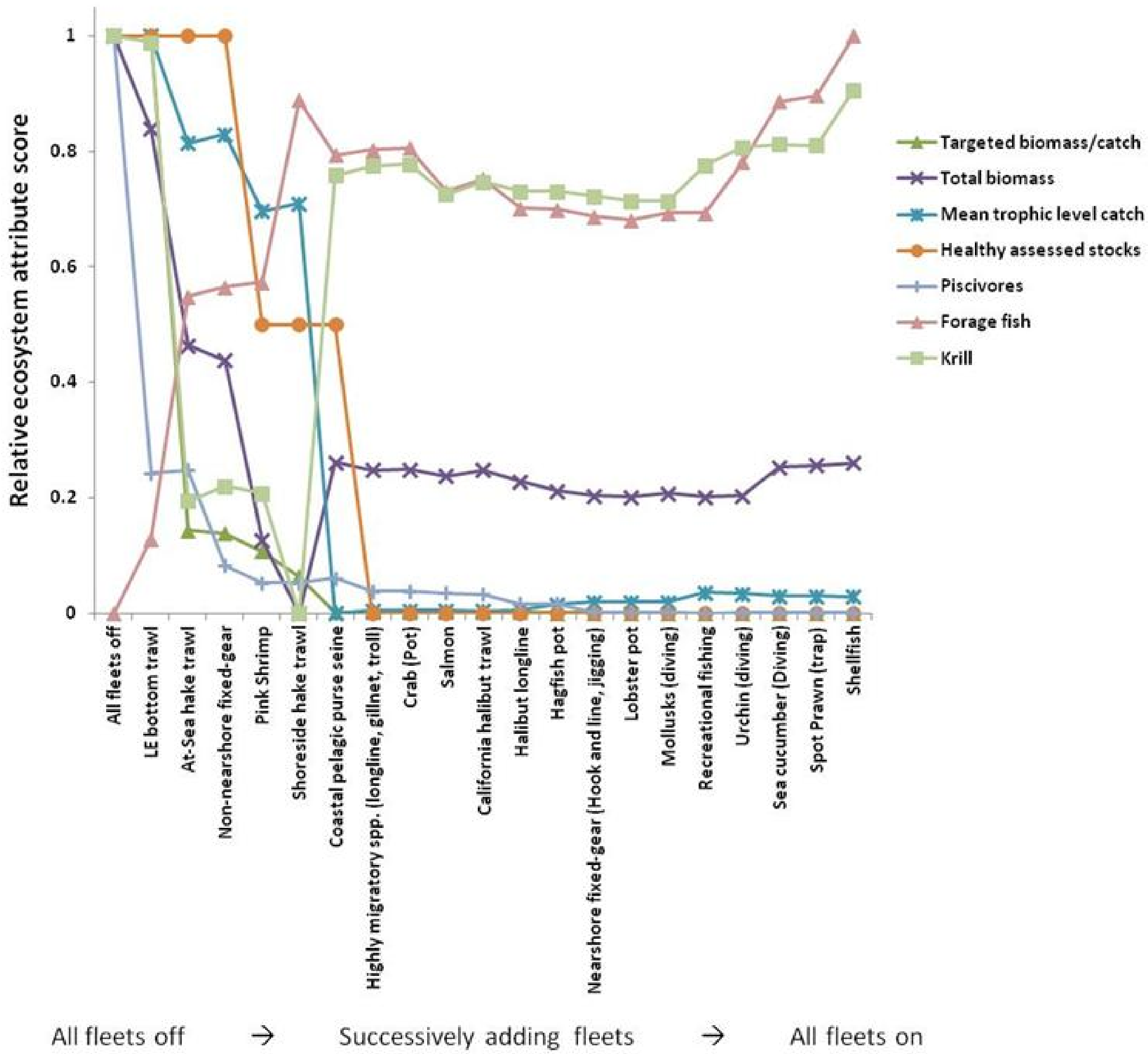


Figure 3-24. Ecosystem attributes, as affected by the successive addition of each fleet, ordered from the fleet with the strongest to the weakest negative impacts. Symbols indicate the value of each individual attribute. Ecosystem attribute scores (y-axis) are rescaled to be between 0 and 1. Values of 1 represent the highest or unfished value of the attribute, and 0 represents the lowest value of the attribute calculated for any combination of fleets. Source: Figure S1 in the Supplement to Kaplan, et al. (2012).

Finally, the authors evaluated the effects of fleet interactions. First, the effect of combinations of four major fleets (bottom trawl, fixed gear, hake fleets, and CPS purse seine) on change in the biomass of 60 functional species groups defined in the Atlantis CCE model was evaluated. Second, the effect of these fleet combinations on the ecosystem attributes discussed above was evaluated. These collective effects could be additive, the combined effect on an ecosystem attribute equals the sum of the effects measured by the attribute values for each of the individual fleets; positive, the combined effect results in an attribute value greater than the sum of individual effects; or negative, the combined effect results in an attribute value less than the sum of the individual effects.

Combined effects were by and large additive (equal to the sum of the individual fleet effects); 93% of interactions in the case of changes in the biomass of functional groups. Only 2% of the interactions were negative (biomass lower than the sum of biomasses resulting from modeling the individual fleets). For the ecosystem attributes there were no negative interactions and only two attributes involved in positive interactions.

In addition to the effects of changes in the relative abundance due to fishing, the age and size structure of fish populations may be altered (see pp. 138-139 in PFMC 2013). If sufficient information is available, size/age truncation (because fishing subjects larger/older fish to relatively higher mortality) can be accounted for in stock assessments. But indirect effects may remain unquantified. Larger/older females are not only relatively more fecund but produce more robust eggs, contributing to greater larval survival and potentially increased recruitment to the adult (or fished) population. Population behaviors, such as migration, may be affected by changes in population structure. Size/age truncation along with reduced population size may also reduce overall resiliency of the population to environmental shocks.

3.4.4 Activities other than Fishing

Other human activities, aside from fishing, that affect the CCE mostly occur in estuarine and freshwater habitats (the latter affecting the productivity of salmon and other species that enter streams and rivers to reproduce).[35]

The Annual State of the California Current Ecosystem Report presented to the Council in November 2012 (Agenda Item K.3.a, Supplemental Attachment 1, November 2012) identified several indicators to track non-fishing ecosystem impacts:

- Benthic structures, such as oil rigs, wells and associated anchorings, modifies or destroys marine habitat. But these structures also provide colonization sites for marine organisms and attract structure-associated fishes and invertebrates. Related activities can disturb epifaunal communities, which may provide feeding or shelter habitat for species of interest. Benthic organisms, especially prey species, may recolonize disturbed areas, but this may not occur if the composition of the substrate is drastically changed or if facilities are left in place after production ends.
- Commercial shipping vessels transit through the CCE, concentrating in approaches to major ports (e.g., Seattle, Los Angeles). Increased trade volume may lead to more ship strikes of protected species and underwater noise, which can affect fish spawning, migration, communication, and recruitment.
- Terrestrial runoff (nonpoint source pollution) increases nutrients in freshwater and estuarine areas. Excessive nutrients accelerate eutrophication, which produces a wide range of other impacts on aquatic ecosystems and fisheries, including: algae blooms; declines in aquatic vegetation; mass mortality of fish and invertebrates through poor water quality (e.g., via oxygen depletion and elevated ammonia levels); and alterations in long-term natural community dynamics.

The 2014 Annual State of the California Ecosystem Report (NMFS 2014a) reports that

> Non-fisheries human activities in the CCE that may negatively impact the ecosystem are generally low with stable or declining trends. Nutrient input is an exception: it is elevated, although it shows a declining trend at the coast-wide scale. (page 1)

[35] Human-induced climate change is discussed in the following section.

3.4.5 System Forcing and Climate Change

Climate encompasses a variety of physical forces affecting the input of energy into the CCE and the distribution of energy and material through the system through water movement. Climate change is a long-term trend over a time scale that makes it essentially unidirectional in relation to human activities.

The CCE is characterized by fluctuations in physical conditions over multiple time scales. This physical forcing in the CCE is correlated with changes in species' biomass and population productivity. Particular system states favor some species over others. Many of these fluctuations have been shown to be a consequence of larger scale changes in ocean conditions throughout the Pacific, including changes observed in the tropics (the El Niño/Southern Oscillation, ENSO) and changes in the north Pacific and subarctic (indexed by the Pacific Decadal Oscillation, PDO, and the North Pacific Gyre Oscillation, NGPO). ENSO is a higher-frequency inter-annual phenomenon while the PDO/NGPO fluctuate at lower frequency (years or decades). At a gross level there are two system states—a warm water regime and a cold water regime—precipitated by cyclical climate events and characterized by these and other indices and signals.

During the ENSO warm water phase (El Niño conditions):

> primary and secondary productivity (e.g., phytoplankton and zooplankton) [is lower], often leading to reduced recruitment of many groundfish species, lower survival of salmon smolts, and distributional shifts (to the north, as well as onshore from offshore waters) of most migratory species (such as coastal pelagics, HMS, and Pacific hake). For example market squid abundance (and catches) often decline to very low levels during El Niño events, and rebound strongly during strong La Niña [cold water] events. Highly migratory species such as tunas and billfish are also more frequently available to fishermen during El Niño events, and recreational fishing effort often shifts to those and other warm water targets, and away from rockfish and other cooler water species, particularly in the waters of the Southern California Bight. (Agenda Item K.3.a, Supplemental Attachment 1, November 2012)

The PDO is characterized by longer warm and cold regimes. Productivity is higher during cold regimes and lower during warm regimes. However, the PDO does not predict sea surface temperatures in the CCE as reliably as in more northerly regions. Thus while the cold regime is associated with higher productivity, the PDO does not explain all of the observed variability in the productivity of a population. The NGPO is linked to changes in salinity and chlorophyll-a (a remotely sensed indicator of primary production).

The introduction to section 4.5 in the Pacific Coast FEP provides the following concise assessment of the effects of climate change in the CCE:

> Climate change is expected to lead to substantial changes in physical characteristics and dynamics within the marine environment, with complex and interacting impacts to marine populations, fisheries and other ecosystem services (Doney, *et al.* 2012; Harley, *et al.* 2006; Scavia, *et al.* 2002). Three major aspects of future climate change that will have direct effects on the CCE are: ocean temperature, pH (acidity versus alkalinity) of ocean surface waters, and deep-water oxygen. Globally by 2050, ocean temperatures on average are expected to rise at least 1°C (by the most conservative estimates in IPCC 2007), while at the same time, ocean pH in the upper 500m has steadily been decreasing (becoming more acidic, aka "ocean acidification") at a rate of approximately -0.0017 pH per year (Byrne, *et al.* 2010). On a more regional basis within the CCE, deep-water oxygen levels have shown a steady and relatively rapid decrease since the mid 1980's (Bograd, *et al.* 2008; McClatchie, *et al.* 2010). These three factors are linked: ocean

> temperature affects ocean pH, ocean temperature and deep water oxygen levels both can be controlled by large scale circulation patterns, and primary production can affect both oxygen and pH (Gilly, *et al.* 2013). All three factors show long-term trends and decadal-scale variance similar to changes in the PDO (Mantua, *et al.* 1997) and North Pacific Gyre Oscillation (Di Lorenzo, *et al.* 2008) climate signals. In addition to these three large-scale aspects of climate change, some more immediate and localized aspects of climate change observed in coastal marine ecosystem include: intensification of upwelling (Bakun 1990; Schwing and Mendelssohn 1997), changes in phenology (phenology refers to the relationship between a periodic biological phenomenon and climatic conditions) (Bograd, *et al.* 2009), and changes in the frequency and intensity of existing interannual and interdecadal climate patterns (Yeh, *et al.* 2009, CCIEA 2012, and references therein). Substantial changes in weather and precipitation patterns will also affect snowpack, stream flow, river temperatures and other aspects of freshwater habitat, with tremendous real and potential consequences to the future productivity and sustainability of anadromous resources such as salmon (Crozier, *et al.* 2008; Mantua and Francis 2004). (page 165)

The following summarizes the effects of these changes as described in the Pacific Coast FEP (pages 165-169):

- Increasing water temperature is likely to cause northward shifts in the distribution of marine species in the CCE. This may result in the disappearance of some species from localities. Overall primary productivity decline due to thermal stratification of ocean waters is also likely. Seasonal upwelling of deep ocean waters, an important contributor to local productivity, could be disrupted.
- The ocean has absorbed about a quarter of the atmospheric carbon dioxide resulting from human activity; because of basic chemical processes this is making ocean waters more acidic (lowering the pH). Acidification is expected to affect shell-producing organisms, making it more difficult to form them, because shell material is composed of calcium carbonate, which degrades more quickly as water becomes more acidic. Although ongoing impacts resulting from acidification are highly uncertain (partly because the capacity for organisms to adapt to changes in pH is not fully understood), a major concern is that pH change could reduce plankton production, which, as the base of the food chain, would have far-reaching effects.
- Through various processes, dissolved oxygen levels in CCE waters could decline due to warming. This could increase the extent and duration of so-called “dead zones”: areas where upwelling of deeper low-dissolved-oxygen water moves into the continental shelf benthic zone. A decline in dissolved oxygen in deep ocean waters could result in more extensive effects. This has a direct effect, killing organisms trapped in the dead zone; over the long term particular species’ available habitat could be reduced.
- Intensified upwelling is a documented result of warming (Bakun 1990; Schwing and Mendelssohn 1997) due to stronger alongshore winds. Since upwelled water is more nutrient rich, this could lead to greater productivity.
- Changes in the frequency and duration of major climate patterns discussed above (ENSO, PDO, NGPO) may be linked to warming.
- The timing of seasonal upwelling seems to be changing with an earlier start in the south and later start in north as observed in the past 5 years (Bjorkstedt, *et al.* 2012). Along with changes in climate patterns, this could prompt changes in the phenology of physical and biological events (phenology refers to the relationship between a periodic biological phenomenon and climatic conditions).

3.4.6 Implications of Climate Change for Groundfish Fisheries

Water temperature, current patterns, water chemistry, and other features contributing to system dynamics, such as coastal upwelling, are likely to be affected by climate change. These physical factors in turn will affect biological components, such as physiology, productivity, and species distribution. On a global scale Cheung, et al. (2013) demonstrate that the mean temperature of the catch (MTC) has increased across 52 large marine ecosystems. MTC reflects species' temperature preferences, changing distribution, and resulting changes in catch composition. At a local scale Pinskey and Fogarty (2012) examined the interaction between the northward shift in target species distribution and fishery response in the Northeast U.S. In most cases MTC increased while the mean latitude of catch was slower to shift compared to the mean latitude of species (based on fishery independent data for four target species). Both operational factors (e.g., home port preference) and the regulatory environment contributed to slowing the geographic shift in fishing compared to target species distribution.

Focusing on the Northeast Pacific, Ainsworth, et al. (2011) used five Ecopath with Ecosim (EwE) foodweb models representing regions from Southeast Alaska to the Northern California Current to model climate change in terms of primary production, zooplankton community structure, range shifts, ocean acidification, and deoxygenation. Landings and biomass for composite species groups and ecosystem-scale biodiversity were used as response variables. Cumulatively, landings fell by 77% to 85% depending on the strength of climate effect scenario used.

According to Ainsworth, et al. (2011) range shifts as a single factor account for a 54% reduction in fisheries landings and is the dominant aspect of climate change in the analysis. Examined as a single factor it contributed to an increase in biomass but effects varied by functional group. The distribution of pelagic species was most affected while range shift resulted in declines in large piscivorus fish biomass. Range shifts also strongly influence mean trophic level of both catch and the ecosystem. Range shifts is also the only factor that had an appreciable effect on biodiversity.

3.4.7 Baseline Status of the California Current Ecosystem

Andrews, et al. (2011) identified a suite of indicators as part of the development of the CCE IEA. For groundfish, salmon, and green sturgeon indicators focus on population size and structure; for ecosystem health indicators focus on community composition and material and energy flows. Hazen, et al. (2011) summarize five indices or signals used to measure low frequency climate forcing in the CCE. The Council's Ecosystem Plan Development Team provided a summary report on the status of the CCE in 2012 (Agenda Item K.3.a, Supplemental Attachment 1, November 2012) that uses selected indicators identified as part of the IEA (NOAA NMFS 2012). The IEA team provides a report to the Council on the current status of the CCE annually. These reports and indictors are used to briefly characterize the baseline status of the CCE here.

The Council received the most recent Annual State of the California Current Ecosystem Report (NMFS 2014a) at their March 2014 meeting. The Report describes trends in various indices to characterize current CCE conditions, which are briefly summarized below for climate forcing and ecological integrity.

Figure 3-25 (excerpted from the Report) shows trends in the Multivariate ENSO Index (MEI), PDO, and NGPO. The symbols to the right of each graph indicate that there is no recent trend in these indices and the most recent 5-year mean is within one standard deviation of the full mean time series. Between 2010 and 2012 the tropical Pacific moved from La Niña conditions to ENSO-neutral conditions and strong upwelling in 2012 (off Central and Southern California) and 2013 (coastwide) promoted higher productivity. These years recorded some of the highest upwelling anomalies (deviation from the mean for relevant indices) ever recorded.

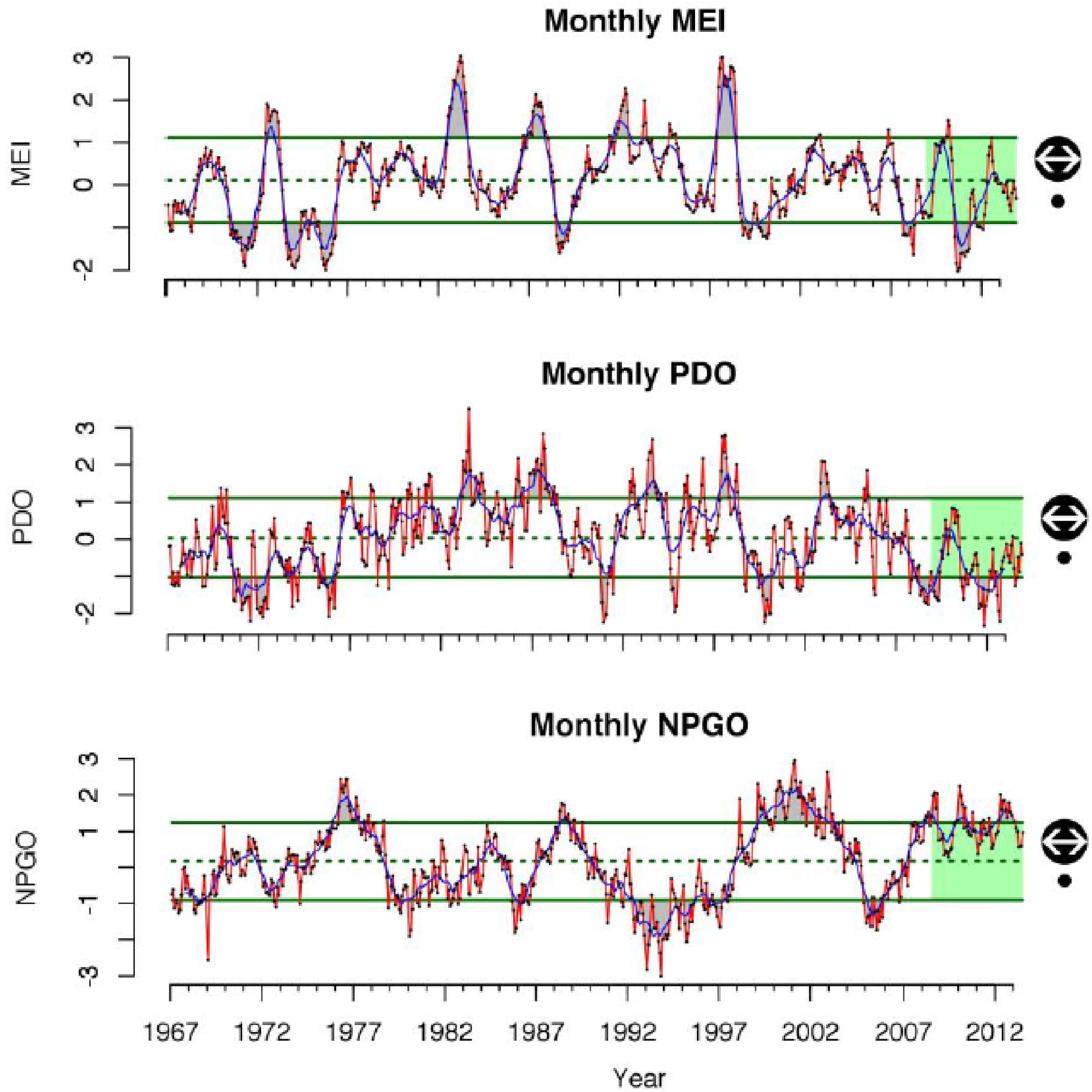


Figure 3-25. Monthly values of basin-scale climate indicators used to assess environmental variability impacts in the California Current ecosystem. The three time series are Multivariate ENSO Index (MEI), Pacific Decadal Oscillation (PDO), and North Pacific Gyre Oscillation (NPGO). The blue line shows the 12-month running average. (Excerpted from NMFS 2014a)

Low dissolved oxygen (DO), a function of upwelling bringing oxygen poor water into coastal waters, is of concern because it can result in the die-off of less mobile organisms (e.g., benthic invertebrates) and habitat compression for pelagic species. Because DO is associated with upwelling low-oxygen (hypoxic) conditions are more common in summer months. While DO levels at monitoring stations showed no trend and were within on standard deviation of the time series mean, the location of these stations may not adequately cataloghypoxic conditions in nearshore waters.

Ocean acidification results from increasing amounts of carbon dioxide absorbed in oceanic waters and can affect marine organisms with calcium carbonate structures. Acidification is measured indirectly by the aragonite saturation with values near or less than 1 indicating acidic conditions for at least two key animals: the larvae of oysters and the pelagic snail *Limacina helicina*. *L. helicina* is an important food source for pink salmon and herring and to a lesser degree for other salmonids. There is no clear temporal trend in aragonite saturation; however, seasonal pulses of acidified water occur off Oregon, which are believed to be of natural origin, caused by the decomposition of organic matter and carbon dioxide release as it sinks toward the seafloor.

The Report presents these indices to characterize ecological integrity:

- Northern copepod biomass anomaly
- Copepod species richness off Washington and Oregon
- Anchovy, sardine, and forage diversity
- Chinook salmon abundance
- Groundfish stock status
- Mean trophic level of west coast groundfishes
- California sea lion pup production

This range of metrics is intended to characterize the relative condition of ecologically important, managed, or protected species assemblages.

Northern copepod species are a valuable source of nutrition for pelagic species and have been relatively more abundant (but without clear trend) in recent years. Copepod species richness negatively correlates with southward transport of sub-Arctic waters, high abundance of lipid-rich northern copepods, and increased growth and survival of some species. As one might expect, this index substantiates conditions indicated by the northern copepod anomaly index. Northern anchovy and sardine along with other larval fish are important components of the forage base. Survey data collected in 2013 off Central CCE show a marked increase in forage, especially young-of-the-year (YOY) rockfish while in the Northern CCE region there has been a decline in forage abundance.

Chinook salmon, aside from their cultural and economic importance, migrate over great distances and are part of both marine and freshwater ecosystems. An index of escapement (adult salmon reaching spawning grounds) for various runs is used to assess condition. Generally, escapement has been near the time series average.

Harvest specifications are, of course, intended to control fishing mortality with respect to stock status so that indicator from the Report is partially a function of the proposed action. Figure 3-26 (excerpted from the 2014 Report) shows a phase or “Kobe” plot to summarize groundfish stock status. The vertical axis shows fishing mortality relative to the ABC (representing a precautionary reduction from the overfishing threshold) while the horizontal axis shows current biomass in proportion to B_{MSY}, the management target. The Report concludes “In general, results suggest that most groundfish populations that have been formally assessed in the CCE are at or above their target biomass levels, and most are at or below half of the total allowable catch or mortality level.” The Report presents an Ecosystem mean trophic level (MTL) index, the weighted average of the trophic levels in a sample, based on the West Coast Bottom Trawl Survey. Ecosystem MTL declined in the aughts but has remained a low but fairly stable level over the past 5 years. Changes in MTL are strongly driven by the abundance of Pacific hake (whiting), spiny dogfish, and sablefish, which are higher trophic level groundfish species. These conditions may be beneficial for other predators such as squid, salmon, tuna, and seabirds.

California sea lion pup production is used as an indicator of the status of upper trophic level species, because sea lions are common throughout the CCE and sensitive to changing conditions. In 2012, pups at the San Miguel Island rookery (a monitoring site) were in poor condition and emaciated animals were stranding on mainland beaches, leading NMFS to declare an Unusual Mortality Event for sea lion pups in

March 2013. Thus, despite robust growth in the California sea lion population overall, the cause of this event is being investigated with an eye towards forage dynamics.

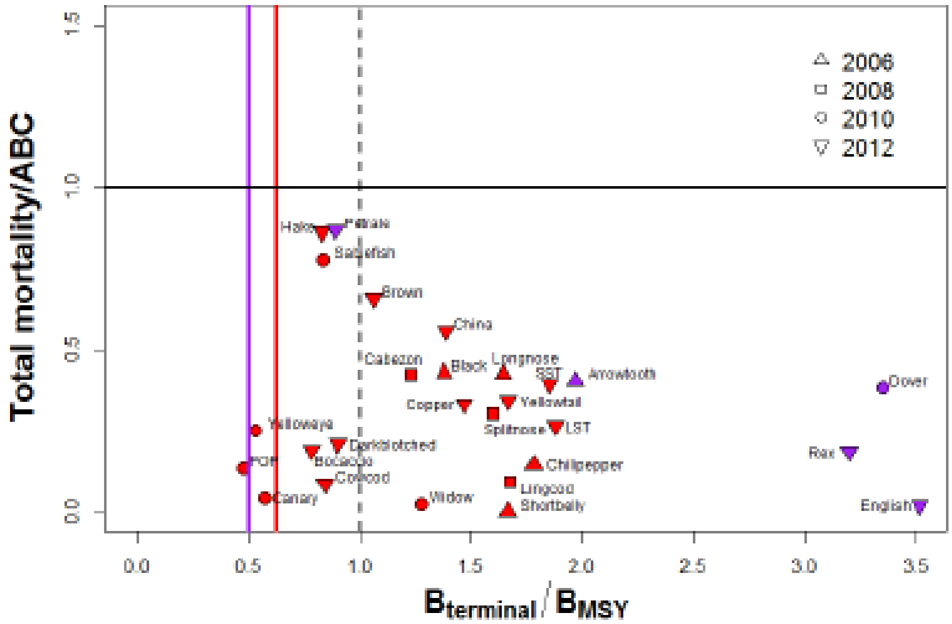


Figure 3-26. Stock status of all California Current groundfish assessed since 2007.
The vertical broken line indicates the target biomass reference point. The vertical solid lines indicate the limit reference point showing an overfished status (red for elasmobranchs, rockfishes, and roundfishes; purple for flatfishes). The horizontal line indicates overfishing threshold wherein total mortality exceeds the allowable biological catch (ABC). Symbols indicate the terminal year of the assessment in which the reference points are determined. (Excerpted from NMFS 2014a)

3.5 Protected Species

The term protected species refers to organisms for which killing, capture, or harm is prohibited under several Federal laws unless authorized. Incidental *take* of these species in the course of their operations may be allowed under provisions of applicable law.[36] The laws, listed below, include procedures to determine whether these impacts are of sufficient magnitude to require regulatory action to reduce the impact. This section describes protected species that may be encountered in groundfish fisheries in the context of actions and standards pursuant to these laws.

3.5.1 Applicable Law

Protected species are species listed under the ESA, the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA), and EO 13186. See Chapter 6 for further discussion of these laws.

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[36] Under the Endangered Species Act take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Take is defined under the Marine Mammal Protection Act as “to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal” (50 CFR 216.4).

- The ESA protects species in danger of extinction "throughout all or a significant part of their range," and mandates the conservation of critical habitat. The ESA defines "species" as a "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." A species is listed as "endangered" if it is in danger of extinction throughout a significant portion of its range and "threatened" if it is likely to become an endangered species within the foreseeable future throughout all, or a significant part, of its range.
- The MMPA guides marine mammal protection and conservation. Stock assessments are conducted annually for strategic stocks and every three years for non-strategic stocks. "Strategic stocks" are those with a human-caused mortality and injury level that exceeds the potential biological removal level (defined as "the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population…") Marine mammal populations with an abundance that falls below its optimum sustainable level are listed as "depleted." All marine mammal species are protected under the MMPA, regardless of species or stock listings under the ESA.
- The MBTA implements treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, it is unlawful to take, kill, or possess migratory birds. In addition, Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, directs Federal agencies to negotiate Memoranda of Understanding with the United States Fish and Wildlife Service (USFWS) that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. NMFS has entered in such an MOU. All migratory seabird species are protected under the MBTA and EO 13186, regardless of species or stock listings under the ESA.

3.5.2 Species Listed Under the Endangered Species Act

Past groundfish harvest specifications EISs (PFMC and NMFS 2011; PFMC and NMFS 2012) have described ESA-listed species that may be encountered in the Pacific Coast groundfish fishery. ESA-listed species are described in the sections below based on the consultation history for the groundfish fishery.

On December 7, 2012, NMFS released a biological opinion on the effects of the continued operation of the fishery (NMFS 2012a) on certain marine species. On November 21, 2012, the U.S. Fish and Wildlife Service released a biological opinion covering the effects of the continued operation of the fishery on short-tailed albatross, marbled murrelet, California least tern, southern sea otter, and bull trout (USFWS 2012). The most recent consultation on the effects of the fishery on ESA-listed salmonids was completed in 2006 and remains current (NMFS 2006).[37] The information in these documents is incorporated by reference.

3.5.2.1 Salmonids Covered by the 2006 Biological Opinion

Table 3-10 in the 2013-2014 groundfish harvest specifications FEIS (PFMC and NMFS 2011; PFMC and NMFS 2012) lists species and evolutionarily significant units occurring in the action area and is reproduced below (Table 3-30). The FEIS also describes the evolutionary significant units (ESUs) potentially affected by the proposed action.

[37] On January 22, 2013, NMFS requested the reinitiation of the biological opinion for listed salmonids to address changes in the fishery, including the trawl rationalization program and the emerging midwater trawl fishery. This consultation is expected to be completed in late 2014 and include the effects of the biennial management process in its scope. At this time the biological opinion for this consultation is not available and its conclusions cannot be described in this EIS.

Table 3-30 Endangered Species Act Status of West Coast salmon and steelhead (highlighted ESUs are those subject to the 2006 consultation).

Species/	ESU	Status
Salmon		
Sockeye	Snake rive	Endangered
	Ozette Lake	Threatened
Chinook	**Sacramento River Winter-run**	Endangered
	Upper Columbia River Spring-run	Endangered
	Snake River Spring/Summer -run	Threatened
	Snake River Fall-run	Threatened
	Puget Sound	Threatened
	Lower Columbia River	Threatened
	Upper Willamette River	Threatened
	Central Valley Spring-run	Threatened
	California Coastal	Threatened
	Central Valley Fall and Late Fall-run	Species of Concern
Coho	Central California Coast	Endangered
	Southern Oregon/Northern California	Threatened
	Lower Columbia River	Threatened
	Oregon Coast	Threatened
	Puget Sound/Strait of Georgia	Species of Concern
Chum	Hood Canal Summer-run	Threatened
	Columbia River	Threatened
Steelhead	Southern California	Endangered
	Upper Columbia River	Threatened
	Central California Coast	Threatened
	South Central California Coast	Threatened
	Snake River Basin	Threatened
	Lower Columbia River	Threatened
	California Central Valley	Threatened
	Upper Willamette River	Threatened
	Middle Columbia River	Threatened
	Northern California	Threatened
	Puget Sound	Threatened
	Oregon Coast	Species of Concern

NMFS first consulted under the ESA on the effects of the fishery on listed salmonids in 1990 and reinitiated consultation several times thereafter. The 2006 biological opinion covers certain Chinook salmon ESUs most likely to be affected by the fishery, as listed in Table 3-30.[38] Although other salmon and steelhead species are taken in the fishery, consultations before 2006 determined that the amounts were limited such that further consultation was unnecessary.

The incidental take statement in a 1999 biological opinion identified an expected level of take of 11,000 Chinook salmon per year for the Pacific whiting fishery and 9,000 Chinook salmon for the bottom trawl fishery. Bycatch of other salmonid species is modest so no specified threshold was established for any other salmonid. Consultation under Section 7 of the ESA was reinitiated in 2006, because take exceeded

[38] "An ESU, or evolutionarily significant unit, is a Pacific salmon population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species. The ESU policy (56 FR 58612) for Pacific salmon defines the criteria for identifying a Pacific salmon population as a distinct population segment (DPS), which can be listed under the ESA." Source: http://www.nmfs.noaa.gov/pr/glossary.htm#esu

these estimates in 2005 for the whiting fishery and two out of three years between 2002 and 2004 for the bottom trawl fishery. This resulted in the 2006 supplemental biological opinion evaluating whether additional mitigation measures were needed to prevent the activity from jeopardizing the continued existence of the species (NMFS 2006).

Section 5.1 in the 2007-2008 groundfish harvest specifications FEIS includes a detailed summary of the information in the 2006 biological opinion. Since 2009 the West Coast Groundfish Observer Program has released reports estimating salmonid bycatch in groundfish fisheries. Table 3-31 and Table 3-32 provide summary information from the most recent report available (Al-Humadh, *et al.* 2012). Chinook salmon accounted for 91% of all salmonids caught in groundfish fisheries, 2002-2010. And the Pacific whiting (hake) fishery sectors caught two-thirds of the total. Table 3-33 shows annual catches by fishery sector of Chinook salmon and all other salmonids grouped. (As indicated in Table 3-33 pink salmon comprise almost two-thirds of the non-Chinook salmonids caught in the groundfish fishery.) Since 2005 when Chinook salmon bycatch in the whiting fisheries exceeded the 11,000 fish threshold to reinitiate the ESA Section 7 consultation neither of the incidental take statement levels in the 2006 biological opinion have been exceeded. The 2006 biological opinion expressed NMFS's intent to establish regulatory authority to close nearshore areas to fishing by the shoreside whiting sector as part of the 2007-2008 groundfish biennial harvest specifications. The at-sea whiting fishery employs voluntary measures to minimize Chinook salmon bycatch. Chinook salmon bycatch has fallen substantially over the 2002-2010 period as shown in Figure 3-27 and was 23% of the 2002 value in 2010.

As noted in the 2006 biological opinion, the Pacific whiting fishery sectors are fully observed, either through onboard observers in the at-sea sectors or dockside monitoring in shoreside sectors, where full retention of catch is required.[39] Other groundfish fishery sectors have not had full observer coverage and bycatch must be estimated. However, the groundfish bottom trawl fishery (or shorebased IFQ fishery) has been fully observed beginning in 2010. As noted in the WCGOP report (Al-Humadh, *et al.* 2012), "Point estimates of bycatch fluctuate due to a number of non-biological factors, including annual variation in observer coverage rates, fishing behavior, and various physical characteristics. Currently, it is not possible to fully quantify uncertainty for bycatch estimates presented in this report, as measures of the variability associated with all data sources are not available." And, as noted in the 2006 biological opinion, the distribution of salmon bycatch in the groundfish trawl fishery is highly skewed; a few tows account for a large fraction of total bycatch. With full observer coverage in the bottom trawl / shorebased IFQ fishery since 2011, uncertainty in bycatch estimates has been reduced. (Almost all bycatch occurs in trawl fisheries.)

Figure 3-28 shows Chinook salmon bycatch in the groundfish bottom trawl fishery by geographic area, season, and depth range for the years 2006-2010 based on data in Table 1 in Al-Humadh et al. (Al-Humadh, *et al.*). (That report presents bycatch estimates by strata that combine these dimensions.) Table 3-33 presents the average bycatch rates for these dimensions for the same period. The highest bycatch rates are for North of Cape Falcon, the winter season, and inside 125 fathoms. Looking at total estimated Chinook salmon bycatch for 2006-2010 by the strata presented in Al-Humadh et al. (2012), the following strata ranked in the top quartile and are listed in ascending order of bycatch here:

- Cape Falcon to Cape Blanco, winter, 125-250 fathoms
- North of Cape Falcon, winter, 125-250 fathoms
- Cape Blanco to Cape Mendocino, winter, 125-250 fathoms
- North of Cape Falcon, winter, 0-125 fathoms
- South of Cape Mendocino, summer, 0-125 fathoms

[39] See Section 3.2.2 for descriptions of the fishery sectors discussed here.

- North of Cape Falcon, summer, 0-125 fathoms

Table 3-31. Summary from Table 5 in Al-Humadh et al. (Al-Humadh, *et al.*) of bycatch by species and fishery sector. (Table 5 caption: Estimated bycatch of salmon (no. of fish) in all U.S. west coast fisheries observed by the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP) from 2002-2010, as well as salmon bycatch in shoreside Pacific hake sectors.)

	Non-whiting	Whiting sectors	Total	Percent
Chinook	37,466	51,620	89,086	91%
Chum	51	735	786	1%
Coho	338	1,688	2,026	2%
Pink	2	4,982	4,984	5%
Sockeye	0	4	4	0%
Unspecified	178	351	529	1%
Total	38,037	59,380	97,417	100%
Percent	39%	61%	100%	

Table 3-32. Summary from Table 5 in Al-Humadh et al. (Al-Humadh, *et al.*) of annual bycatch of Chinook salmon and other salmonid species by fishery sector and percent of total bycatch for sector and species. (Table 5 caption: Estimated bycatch of salmon (no. of fish) in all U.S. west coast fisheries observed by the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP) from 2002-2010, as well as salmon bycatch in shoreside Pacific hake sectors.)

Species		Sector	Year 2002	2003	2004	2005	2006	2007	2008	2009	2010	Percent Total
Chinook	Non-hake sectors	Limited Entry Trawl	15,626	16,435	1,746	824	61	193	338	305	55	39.9%
		Limited Entry California Halibut	314	120	492	423	107	125	79	0	11	1.9%
		Limited Entry Sablefish Primary	0	0	0	0	0	0	0	0	0	0.0%
		Nearshore	--	62	21	81	20	0	0	24	6	0.2%
	Hake sectors	Non-Tribal Mothership *	713	2,060	388	2,207	1,095	585	226	297	457	9.0%
		Tribal Mothership *	1,010	3,436	3,701	3,909	669	714	158	826	650	16.9%
		Catcher Processor *	959	576	369	1,756	114	736	496	22	257	5.9%
		Shoreside - Tribal **	--	9	50	76	1,271	1,690	539	1,321	28	5.6%
		Shoreside - EFP **	1,062	425	4,206	4,018	839	2,462	1,962	279	2,997	20.5%
Salmonids other than Chinook	Non-hake sectors	Limited Entry Trawl	65	74	107	5	0	13	0	2	27	3.5%
		Limited Entry California Halibut	96	0	0	0	48	0	0	0	0	1.7%
		Limited Entry Sablefish Primary	0	3	0	2	0	4	0	0	0	0.1%
		Nearshore	0	0	29	0	0	4	13	23	54	1.5%
	Hake sectors	Non-Tribal Mothership *	90	198	28	94	106	251	35	55	8	10.4%
		Tribal Mothership *	75	3,968	227	738	27	9	0	19	6	60.8%
		Catcher Processor *	83	21	25	60	10	180	66	0	6	5.4%
		Shoreside - Tribal **	0	0	0	0	0	619	41	178	0	10.1%
		Shoreside - EFP **	0	0	0	0	0	301	38	172	26	6.4%

* = A-SHOP

** = numbers from annual NWR reports

Dashes (--) signify years when the fishery/sector was not observed, or data were not available. (Note that because the panel for salmonids other than Chinook sums original values for several species, instances of non-observation are not represented.)

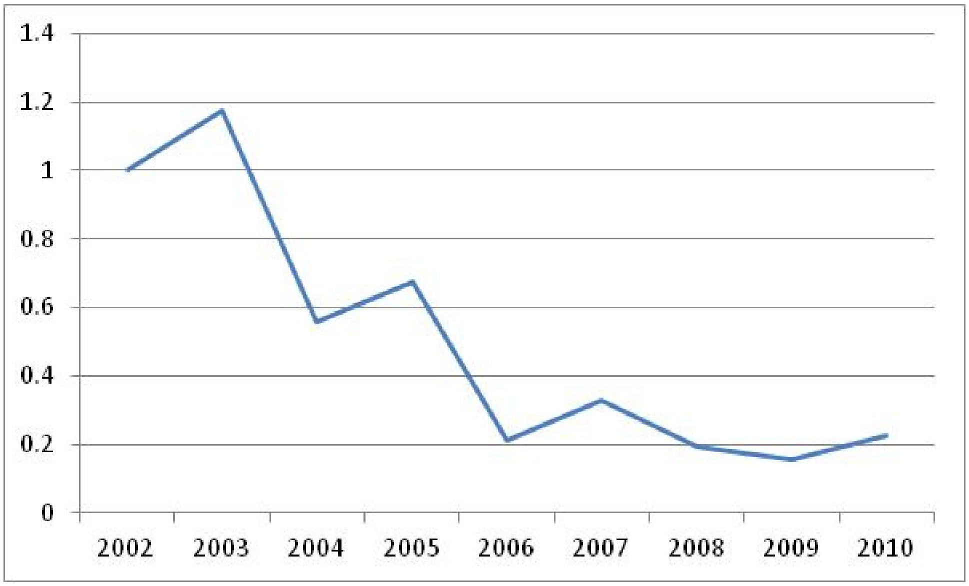

Figure 3-27. Relative change in Chinook salmon bycatch in groundfish fisheries, 2002-2010. 2002 = 1. (Source: Al-Humadh, *et al.*, Table 5)

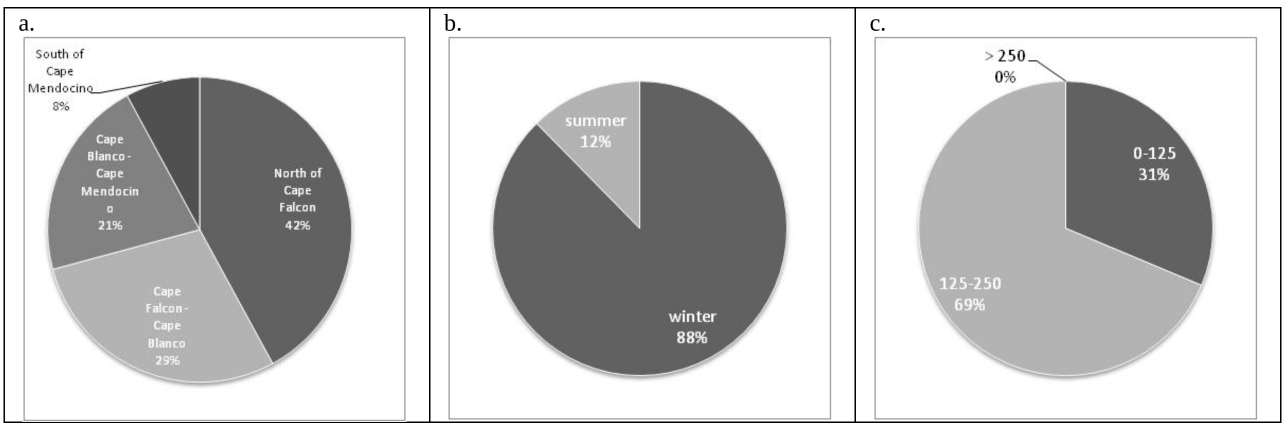

Figure 3-28. Chinook salmon bycatch in the groundfish bottom trawl fishery, 2006-2010, by a. geographic area, b. season, and c. depth (fathoms). (Source: Al-Humadh, *et al.*, Table 1)

Table 3-33. Average bycatch rate (no. fish / mt of observed groundfish) of Chinook salmon in the groundfish bottom trawl fishery by area, season, and depth (fathoms), 2006-2010. (Source: Al-Humadh, *et al.*, Table 1)

Area		Season		Depth	
North of Cape Falcon	0.037	winter	0.028	0-125	0.0361
Cape Falcon - Cape Blanco	0.007	summer	0.005	125-250	0.0130
Cape Blanco - Cape Mendocino	0.007			> 250	0
South of Cape Mendocino	0.015				

3.5.2.2 Species Covered by the 2012 NMFS Biological Opinion

Section 1.2 in the most recent biological opinion (NMFS 2012a) describes the past ESA Section 7 consultations on the continued operation of the Pacific Coast groundfish fishery.[40] Among other sources, this biological opinion used a biological assessment completed in mid-2012 by NMFS NWR SFD (NMFS 2012b) and a risk assessment drafted by the NMFS NWFSC in early 2012 (NWFSC 2012). Based on this information, and previous interactions observed in the Pacific Coast groundfish fishery, NMFS PRD determined that the fishery is likely to likely to adversely affect the following listed species and critical habitat:

- Eulachon (*Thaleichthys pacificus*)
- Green sturgeon (*Acipenser medirostris*) and their critical habitat
- Humpback whales (*Megaptera novaeangliae*)
- Steller sea lions (*Eumetopias jubatus*)[41]
- Leatherback sea turtles (*Dermochelys coriacea*) and their critical habitat

The following ESA-listed species occur in the fishery management area but NMFS SFD determined that the fishery is not likely to adversely affect them or their critical habitat:

- Green sea turtles (*Chelonia mydas*)
- Olive ridley sea turtles (*Lepidochelys olivacea*)
- Loggerhead sea turtles (*Caretta caretta*)
- Sei whales (*Balaenoptera borealis*)
- North Pacific right whales (*Eubalaena japonica*)
- Blue whales (*Balaenoptera musculus*)
- Fin whales (*Balaenoptera physalus*)
- Sperm whales (*Physter macrocephalus*)
- Southern Resident killer whales (*Orcinus orca*)
- Guadalupe fur seals (*Arctocephalus townsendi*)
- Critical habitat of Steller sea lions.

Section 2.2 in the current biological opinion describes the status of species and critical habitat subject to the consultation. Section 2.11 describes the rationale for reaching a “not likely to adversely affect” determination for the species listed above.

Section 2.1 in the current biological opinion describes the methods used to determine the effects of the Pacific Coast groundfish fishery with respect to two standards found in the ESA: whether the fishery is likely to “jeopardize the continued existence of a listed species” or result in “destruction or adverse modification” of critical habitat. “To jeopardize…” is defined in regulations as “to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Destruction or adverse modification of critical habitat was evaluated based on

[40] NMFS PRD also consulted on the operation of the fishery for 2012 only (PFMC and NMFS 2011). That biological opinion found effects consistent with those described in the current biological opinion.
[41] The eastern DPS of Stellar sea lions (the population segment occurring in the action area) was removed from the list of threatened species under the ESA on November 4, 2013 (78 FR 66140). Therefore, Federal agencies will no longer need to consult with NMFS under Section 7 of the ESA regarding actions that may affect the eastern DPS of Stellar sea lions. Protections under the MMPA would continue, however.

provisions in the ESA as interpreted by the agency.[42] These methods were applied to eulachon, green sturgeon (and critical habitat), humpback whales, Stellar sea lions, and leatherback sea turtles (and critical habitat), the species and critical habitat where preliminary findings suggested that the proposed action is likely to have an adverse effect.

Based on the analysis, NMFS PRD documented the effects of continued operation of the Pacific Coast groundfish fishery on species and habitat. These finding are summarized below.

Eulachon – Southern DPS (Threatened)

Eulachon are found in the eastern north Pacific Ocean from northern California to southwest Alaska and into the southeastern Bering Sea. The eulachon southern DPS is defined from the Mad River in northern California, north to the Skeena River in British Columbia. Eulachon are an anadromous fish. Adults migrate from the ocean to freshwater creeks and rivers where they spawn from late winter through early summer. The offspring hatch and migrate back to the ocean to forage until maturity. Once juvenile eulachon enter the ocean, they move from shallow nearshore areas to deeper areas over the continental shelf. There is little information available about eulachon movements in nearshore marine areas and the open ocean.

Because catches are not concentrated in a particular area or population components, the fishery is not expected to "have a measureable effect on the species' structure or diversity." The action affects species abundance and potentially population productivity. Productivity is a concern, because of the substantial decline in spawner abundance over the last 20 years. The cumulative effect, as characterized in the biological opinion, of climate change and modification of freshwater habitat contribute to this decline. Based on conservative assumptions about species abundance, the fishery is expected to "take 0.0052 percent of the estimated eulachon population and overall [account for] less than 0.1 percent of the total bycatch from U.S. fisheries." In conclusion "The level of take expected for the proposed action is therefore so small that we do not anticipate it would have any notably deleterious effect on the species, nor would it add materially to the ongoing effects already occurring in the action area."

NMFS recently considered whether the 2012 opinion should be reconsidered for eulachon in light of new information from the 2011 fishery and the proposed chafing gear modifications and determined that information about the eulachon bycatch in 2011 and chafing gear regulations does not change the extent of effects of the action, or any other basis to require reinitiation of the December 7, 2012 biological opinion. Therefore, the December 7, 2012 biological opinion meets the requirements of section 7(a)(2) of the ESA and implementing regulations at 50 CFR 402 and no further consultation was required.

Green Sturgeon – Southern DPS (Threatened)

The North American green sturgeon southern DPS is defined as coastal and Central Valley populations, south of the Eel River in California. Green sturgeon critical habitat is designated from 0 to 60 fm (74 FR 52300)

The biological opinion's assessment focuses on the Southern DPS of green sturgeon. The Pacific Coast groundfish fishery is not likely to further restrict the geographic distribution of green sturgeon along the coast or extent of spawning habitat in freshwater rivers. Southern DPS green sturgeon are at moderate to high risk of extinction because of the low estimated abundance of adults, and historically fisheries have

[42] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

been the primary source of mortality. Based on available data, fisheries other than the federally-managed groundfish fishery are estimated to incidentally capture 1,219 to 1,512 Southern DPS green sturgeon (adults and subadults) per year. This represents 20 to 69 percent of the total subadult and adult population, depending on the estimate of abundance used (2,188-6,250 subadults and adults, combined). It is estimated that fisheries for which no data are available account for the annual removal of an additional 1 to 4 percent of the population. Based on population models, these fisheries (excluding the Federal groundfish fishery) may be affecting the continued survival and recovery of Southern DPS green sturgeon. Green sturgeon take in the Pacific Coast groundfish fishery, when considered within the context of these sources of mortality and other cumulative effects, results in a comparatively small increase in the mortality imposed on the subadult and adult population. The majority of the green sturgeon incidentally caught in the fishery are expected to be released alive and to survive. In most years mortality due to the groundfish fishery would be low (0.03 to 0.09 percent of the total subadult and adult population). In the worst case (not expected to occur more than 2 years within a period of 9 years), mortalities would account for 0.1 to 0.3 percent of the total subadult and adult population. In summary, the lack of substantial impacts on the Southern DPS green sturgeon based on the low expected sublethal and lethal impacts of the fishery supports the conclusion that the proposed fishing will not appreciably reduce the likelihood of survival and recovery of the species.

With respect to critical habitat for green sturgeon, prey resources within the action area may be affected by non-point source and point source discharges, oil spills, dredged material disposal activities, renewable ocean energy installations, low oxygen “dead zones,” bottom-trawl fishing activities, and climate change. These activities and factors may also affect water quality and migratory corridors for green sturgeon. Although use of bottom-trawl gear may disturb benthic habitats and remove prey resources, existing gear restrictions provide a measure of protection for green sturgeon critical habitat. In addition, the expected effects of the proposed fishing on the prey resources are likely to be low given the opportunistic feeding behavior of green sturgeon and the likely dynamic nature of benthic prey. The low expected impacts to green sturgeon prey resources supports the conclusion that the Pacific Coast groundfish fishery is not likely to reduce the value of designated critical habitat for the conservation of Southern DPS green sturgeon.

Humpback Whale (Endangered)

Humpback whales are found in all oceans of the world. For management under the MMPA, stocks of humpback whales are defined based on feeding areas, with the whales feeding off California, Oregon, and Washington currently considered one stock. The most recent population estimate of humpback whales in the North Pacific Ocean is 21,808 (CV=0.04). The most recent estimated abundance of the CA/OR/WA feeding stock is 2,043 whales (CV=0.10), with a minimum population estimate of 1,878 whales. The maximum expected rate of annual increase for the species as a whole ranges from an estimated 7.3 to 8.6 percent, with a maximum plausible rate of 11.8 percent annually. North Pacific populations as a whole grew by an estimated 6.8 percent annually over the period from 1966 to 2006. The annual growth rate for the CA/OR/WA feeding stock is estimated at 7.5 percent. The Pacific Coast groundfish fishery affects the CA/OR/WA feeding stock, within the context of effects to the globally-listed species. Occurrence of the CA/OR/WA feeding stock overlaps the most with the spatial extent of the groundfish fixed gear fishery. There is uncertainty about the number of past entanglements attributed to fixed gear fishing, but based on precautionary assumptions NMFS PRD estimated that an average of 0.89 humpback whales may be injured or killed by the Pacific Coast groundfish fishery, annually.

The MMPA identifies the concept of potential biological removal (PBR) in assessing the effects of mortality on marine mammal stocks (see further discussion below). Based on the portion of the stock occurring in the west coast EEZ at any given time, PBR within the action area is estimated at 11.3 whales. On average, NMFS PRD estimated that 7.19 human-caused serious injuries or mortalities of CA/OR/WA humpback whales are likely to occur annually. This annual average is below the current PBR. Based on past annual variability, the average estimate likely will be exceeded in some years, up to a maximum of 16.25 injuries or mortalities in a single year. However, on average human-caused humpback injuries and mortalities will be below PBR allowing the stock to grow toward its optimum sustainable population level.

NMFS PRD also evaluated effects with respect to the potential change in the rate of population increase. It concluded that the population growth rate will decrease by approximately 0.04 percent due to groundfish fishing and by approximately 0.37 percent from all human sources, including groundfish fishing. Based on food-web modeling, trophic effects of the Pacific Coast groundfish fishery will likely be minor and in fact may positively affect the abundance of krill (prey of humpback whales) through removal of predators.

Because of uncertainty in the estimates of fishery-caused serious injury/mortality two other methods for estimating the maximum mortality rate potentially imposed by all west coast fisheries were examined (NWFSC 2012). These methods result in estimates of 61 and 88 whales killed annually. The biological opinion discusses reasons to conclude these estimates are implausibly high.

NMFS PRD concluded that impacts of the Pacific Coast groundfish fishery, when combined with other human sources of serious injury/mortality, are not likely to substantially reduce the population abundance or the growth trend of the stock. The lack of substantial impacts on the CA/OR/WA humpback whale stock combined with the increasing population trend for this listed entity supports the conclusion that the proposed fishing will not reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution.

The incidental take statement (ITS) for humpback whales in the current biological opinion was conditional on the issuance of a permit to authorize the incidental, but not intentional, taking of individuals pursuant to MMPA section 101(a)(5)(E). This permit was issued on September 4, 2013 (78 FR 54553) based on a Negligible Impact Determination (NID) as required by the MMPA. Therefore, the ITS for CA/OR/WA humpback whale stock is now valid.

Pursuant to the MMPA the WA/OR/CA sablefish pot fishery is listed as a Category II fishery, because of interaction with humpback whales. (See Section 3.5.3 for an explanation of these MMPA fishery categorizations.)

Steller Sea Lions (Delisted)

The eastern DPS of Steller sea lions is a single population that ranges from southeast Alaska to southern California, including inland waters of Washington State and British Columbia. The total population estimate is a range between 58,334 and 72,223 sea lions, with a minimum population estimate of 52,847 sea lions. The population has increased at a rate of approximately 3.1 percent in recent decades. Methods, as described above for humpback whales, were used to assess the effects of the Pacific Coast groundfish fishery on the eastern DPS of Steller sea lions.

NMFS PRD estimated that on average 13.88 Steller sea lions would be seriously injured or killed incidental to groundfish fishing, annually. When added together, NMFS PRD estimated a total of 60.55 sea lions seriously injured or killed annually from fisheries bycatch, including fishing in the Pacific Coast groundfish fishery. When combined with the estimate from Allen and Angliss (Allen and Angliss 2012) for other sources of injury or mortality of 15.2, the total is 75.75 sea lions per year. The PBR for this DPS is 2,378 sea lions. The estimated number of all human-caused serious injuries and mortalities anticipated to occur in future years from all sources, including the proposed fishing, is approximately 3.19

percent of the PBR. Based on food-web modeling, NFMS PRD also concluded that trophic effects of the Pacific Coast groundfish fishery will be minor. The serious injury/mortality estimate results in a decrease in the population growth rate of about 0.03 percent due to groundfish fishing and by approximately 0.14 percent from all human sources including the groundfish fishery.

Based on the evaluation, NFMS PRD concluded that impacts of groundfish fishing, in addition to other human sources, are not likely to substantially reduce the population abundance or trend. The lack of substantial impacts on the eastern DPS combined with the increasing population trend for this listed entity supports the conclusion that the groundfish fishery will not reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution.

Subsequent to conclusion of this consultation NMFS removed the eastern DPS of Stellar sea lions from the list of threatened and endangered species under the authority of the ESA. This delisting became effective December 4, 2013 (78 FR 66140). Section 3.5.3 discusses past and present impacts of the groundfish fishery on non-ESA listed marine mammals. However, since the 2012 NMFS biological opinion contains information relevant to evaluating impacts, the eastern DPS of Stellar sea lions is discussed here.

Leatherback Sea Turtles (Endangered)

Leatherback sea turtles face a variety of threats depending on the region in which they occur; they are widely distributed across the oceans of the world. Identified threats in the marine environment include direct harvest, debris entanglement and ingestion, fisheries bycatch, and boat collisions, among other threats. In the Pacific Ocean, nesting aggregations occur in the eastern Pacific (primarily in Mexico and Costa Rica) and in the western Pacific (primarily Indonesia, the Solomon Islands, and Papua New Guinea). Leatherbacks that occur within the ESA action area are most likely to originate from nesting aggregations of the western Pacific. The abundance of leatherback sea turtles is currently unknown; however, the most recent global estimate for nesting females is 34,500 turtles. The trend for the western Pacific subpopulation has been declining over the past four decades; however, estimates of breeding females slightly increased from 2000 to 2007 (2,700 to 4,500 turtles in 2007 compared to 1,775 to 1,900 turtles in 2000), although this is likely due to additional nesting sites that were not previously factored into the estimate (Dutton, *et al.* 2007). Given recent monitoring over the last few years, however, the trend continues to decline (C. Fahy, pers. comm., NOAA Fisheries SWR, July 18, 2012, as cited in NMFS 2012a). NMFS PRD concluded that 0.38 turtles would be killed annually due to groundfish fishing and a total of 5.82 turtles killed due to all activities occurring in the ESA action area. Given that the anticipated mortality attributed to the proposed fishing is less than one turtle per year on average and no more than one turtle in a single year, the groundfish fishery is likely to result in a very small increase to the level of mortality already authorized for the species both inside and outside of the action area.

In addition to the direct and indirect effects to the species, the proposed fishing is likely to result in some bycatch of jellyfish, which will reduce prey availability in critical habitat. However, based on the general predicted pattern of food-web modeling, it is unlikely that the conservation value of critical habitat will be substantially impacted by food-web interactions caused by the groundfish fishery.

NMFS PRD concluded that groundfish fishing contributes a very small additional impact to those of other human sources. It also concluded that the conservation value of critical habitat will not be substantially impacted. In conclusion, effects of the groundfish fishery, when combined with effects of other human sources in the action area, are not anticipated to result in an appreciable change to the population abundance or trend. A lack of an appreciable change in population abundance or trend supports the conclusion that the Pacific Coast groundfish fishery will not appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution.

Likewise, a lack of substantial impact on the conservation value of critical habitat supports the conclusion that the proposed fishing will not adversely modify critical habitat.

Incidental Take Statement

The current biological opinion contains an incidental take statement, or ITS. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. The ITS is a formal statement of the estimated take of a listed species within a defined time period and is connected to provisions in the ESA that allow takes incidental to an otherwise lawful agency action, if the action is performed in compliance with the terms and conditions of this incidental take statement. Based on analysis in the biological opinion, take at or below this level has been determined not to cause "jeopardy." Actual takes that exceed the level identified in the ITS are a basis for reinitiating the section 7 consultation, which entails a new analysis of "jeopardy" or adverse habitat modification and new terms and conditions for the continuation of the proposed action. The ITS in the current biological opinion is summarized below.

- Incidental take of **southern DPS eulachon** occurs as a result of bycatch and handling in the fisheries, or mortalities resulting from encounter with fishing gear, as a consequence of fishing activity. Take of eulachon in the proposed action is expected to not exceed 1,004 fish per year. This take is expected to occur in the limited groundfish bottom trawl (shorebased IFQ) and at-sea hake (Pacific whiting) fisheries.
- Under the proposed action, incidental take of **Southern DPS green sturgeon** because of bycatch and handling in the fishery is not expected to exceed 28 fish per year; however, incidental take could be higher in some years. Therefore, this take statement allows for incidental take of up to 86 Southern DPS green sturgeon per year in no more than 2 years within a period of 9 consecutive years.
- Incidental take of **humpback whales** occurs as a result of entanglement with fishing gear, as a consequence of fishing activity. This take is expected to occur in the sablefish pot/trap fishery. The incidental take limit for humpback whales is a 5-year average of 1 humpback whale injury or mortality per year, and up to 3 humpback whale injuries or mortalities in any single year.
- Incidental take of **Steller sea lions** occurs as a result of entanglement with fishing gear as a consequence of fishing activity. This take is expected to occur in limited entry trawl (shorebased IFQ) and at-sea hake (Pacific whiting) fisheries. The incidental take limit for Steller sea lions is a 5-year average of 14 Steller sea lion injuries or mortalities per year, and up to 45 Steller sea lion injuries or mortalities in a single year.
- Incidental take of **leatherback sea turtles** occurs as a result of entanglement with fishing gear as a consequence of fishing activity. This take is expected to occur in the sablefish pot/trap fishery. The incidental take limit for leatherback sea turtles is a 5-year average of 0.38 leatherback sea turtle injury or mortality per year, and up to 1 leatherback sea turtle injury or mortality in a single year.

Reasonable and Prudent Measures, Terms and Conditions

Terms and conditions implement reasonable and prudent measures (50 CFR 402.14), both of which are described in the current ITS. These must be carried out for the exemption to the general ESA prohibition of take resulting from the consultation to apply. The current ITS enumerates reasonable and prudent measures and associated terms and conditions as summarized here:

- NMFS establishes a Pacific Coast Groundfish and Endangered Species Workgroup (PCGW) in cooperation with the USFWS and the Council. The PCGW will meet at least biennially to develop recommendations on methods for monitoring take and additional mitigation measures as needed. The PCGW has been organized as a Council committee and held its first meeting in November 2013.
- NMFS will analyze available data to detect changes in fishing effort by gear type as a consequence of implementation of the shorebased IFQ program and biennially report results. The PCGW will provide recommendations on the design of the analysis.
- The WCGOP will provide summaries of observed takes of the species considered in the biological opinion, and NMFS will report fleet-wide estimates of total take biennially. WCGOP will immediately report takes of leatherback sea turtles as well as any opportunistically observed whale or sea turtle entanglements.
- As appropriate, the NWFSC will update the risk assessment (NWFSC 2012).

3.5.2.3 Species Covered by the 2012 USFWS Biological Opinion

In 2011 a short-tailed albatross was observed killed in operations of a sablefish longline vessel. On July 30, 2012, at the request of NMFS, USFWS initiated a formal section 7 consultation on the effects of continued operation of the Pacific Coast groundfish fishery on the ESA-listed species enumerated above at the beginning of section 3.5.2. In the consultation USFWS concurred with NMFS's conclusion (NMFS 2012b) that operation of the Pacific Coast groundfish fishery is not likely to adversely affect marbled murrelet, California least tern, southern sea otter, bull trout or bull trout critical habitat. Therefore, the Section 7 consultation and biological opinion focused on the effects of the fishery on short-tailed albatross. Prior to the conclusion of the consultation the Council was notified that USFWS would include in the terms and conditions that NMFS establish regulations requiring the use of streamer lines on commercial groundfish longline vessels 55 feet in length or greater. The current biological opinion (USFWS 2012) was published on November 21, 2012. In November 2013, the Council took final action to recommend a regulatory package to implement the streamer line requirement (USFWS 2012).

In the 19th and early 20th centuries the short-tailed albatross population was decimated by hunting for feathers, oil, and fertilizer. By 1949 no breeding pairs were observed and the species was thought to be extinct. Subsequently, breeding colonies were found on two small volcanic islands in the western Pacific.[43] The population has been recovering since the 1950s. A third breeding colony is being established on another volcanic island through translocation of chicks. A breeding pair successfully hatched and reared a chick on Midway Island in 2011 and 2012, suggesting that a breeding colony may eventually establish there as well. With recovery, short-tailed albatross's foraging range has been reestablished and in recent years they have reappeared with more regularity in the west coast EEZ. Short-tailed albatross prefer foraging area over the continental shelf where food resources are more abundant. Population growth and habitat preference has increased its vulnerability to the Pacific Coast fisheries and other anthropogenic effects in the action area.

The USFWS's recovery plan for short-tailed albatross (USFWS 2012) lists the following criteria for delisting the species:

- The total breeding population of short-tailed albatross reaches a minimum of 1,000 pairs; (population totaling 4,000 or more birds); AND

[43] Both breeding sites, Torishima Island and the Senkaku Islands, are under the jurisdiction of Japan, although China and Taiwan dispute the claim to the Senkaku Islands. Eighty to eighty-five percent of the breeding population is estimated to breed on Torishima Island.

- The 3-year running average growth rate of the population as a whole is ≥6% for ≥7 years; AND
- At least 250 breeding pairs exist on two island groups other than Torishima [one of the two original breeding colony sites], each exhibiting ≥6% growth for ≥7 years; AND
- A minimum of 75 pairs occur on a site or sites other than Torishima and the Senkaku [the two original breeding colony sites]

As of the 2011-12 breeding season, the population is estimated at 3,441 birds and 851 breeding pairs. The population growth rate is estimated at about 6.5%.

Injury and mortality occurs primarily in longline fisheries. Birds dive on baited hooks as they are deployed during fishing operations. They may become hooked, pulled underwater, and drown or otherwise be injured or killed when interacting with the gear in this fashion.

In the biological opinion, USFWS describes the risk assessment methodology used in the NMFS biological assessment to estimate annual mortality of short-tailed albatross due to the operation of the Pacific Coast groundfish fishery. In the risk assessment the occurrence of black-footed albatross, a closely related species, was used as a surrogate to evaluate injury and mortality, because short-tailed albatross interactions are too rare to derive meaningful statistics. Essentially, the risk assessment scales WCGOP estimates of black-footed albatross mortality in the fishery based on the relative size of the two species' populations. Adjustment factors are included in the equation to account for unobserved mortality ("dropoff") and differences in the distribution of the two species relative to the action area considered in the biological opinion.[44] The resulting groundfish fixed gear (longline) mortality estimate is 0.8 birds per year. The risk assessment includes a sensitivity analysis based on uncertainty in the WCGOP mortality estimates and alternative dropoff rates. This produced a range of annual mortality rates between 0.3 (0% dropoff rate, lower 90% confidence interval on WCGOP estimate) and 1.9 (45% dropoff rate, upper confidence interval on WCGOP estimate). Although unquantified in the sensitivity analysis, it is noted that these estimates could be biased by uncertainty about actual exposure of short-tailed albatross to the groundfish fishery (i.e., occurrence in the action area considered in the biological opinion) and unknown differences in black-footed and short-tailed albatross behavior that could affect vulnerability to the gear. The biological opinion concludes that the estimated mortality of ~1 short-tailed albatross per year will not appreciably affect the population growth rate.

The incidental take allowed is one short-tailed albatross per year due to continued operation of the Pacific Coast groundfish fishery (including both fixed gear and trawl). The take limit will be calculated based on an average of no more than two birds in any two-year period to accommodate inter-annual variation. The extent of future take will be assessed using documented takes of short-tailed albatross and estimates of interactions with the surrogate species (black-footed albatross) based on observer reports.

Terms and conditions in the ITS include NMFS implementing regulations to require the use of streamer lines on commercial longline vessels in the Pacific Coast groundfish fishery and establishing the Pacific Coast Groundfish and Endangered Species Workgroup also mandated by the NMFS biological opinion described above. As noted above, the development of a regulatory package occurred in the Council process. At its November 2013 meeting the Council adopted a preferred alternative from a range evaluated in a draft EA (USFWS). The preferred alternative requires streamer lines be deployed during setting operations on commercial fixed gear vessels 55 feet or greater in length with a safety exception in

[44] A complete description of the methodology can be found on pages 24-28 of the biological opinion (USFWS).

the event of rough weather, which would be triggered by a National Weather Service forecast of a gale wind warning.[45]

3.5.3 Marine Mammals not Listed under the Endangered Species Act

The MMPA requires all commercial fisheries to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in the fishery:

- Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing;
- Category II designates fisheries with occasional serious injuries and mortalities;
- Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

Annually NMFS Office of Protected Resources publishes an updated List of Fisheries with these categorizations. NMFS published the final 2014 List of Fisheries on March 14, 2014 (79 FR 14418). The WA/OR/CA sablefish pot is a Category II fishery; all other groundfish fisheries are Category III.

As discussed above, potential biological removal, PBR, is used to assess the effects of human-caused incidental mortality under the MMPA. PBR represents the maximum level of human-caused mortality a stock can sustain and still have a high likelihood of achieving its optimum sustainable population level. PBR is calculated as N_{min}* 0.5 R_{max} * F, where N_{min} is the minimum current population size, R_{max} is the maximum annual rate of increase for the species or stock, and F is a recovery factor that ranges from 0.1 to 1 depending on the conservation status of the stock (Barlow, *et al.* 1995). PBR is reported in stock assessment reports and the most recent estimates of PBR can be found in Carretta et al. (2013).[46]

Table 3-34 shows non-ESA listed marine mammal stocks with observed interactions in groundfish fisheries. Stock definitions, PBR estimates, and estimates of human-caused and fishery-caused serious injury / mortality are taken from Caretta, et al. (2013). (The fishery component is a subset of all human-caused serious injury / mortality.) Stock assessment reports include a breakdown of serious injury / mortality by fishery based on observer information. As noted in the table footnote, where no estimate for groundfish fisheries is reported, but there is an estimate based on stranded animals, that is reported under the groundfish fishery column. Note that in most cases the stock assessment report data are presented as minimum estimates. The table also includes observed interactions and estimates of annual average interactions using WCGOP and A-SHOP (At-Sea Hake Observer Program) data reported in Jannot, et al. (2011).[47] Overall take could only be estimated from observed interactions for three species; California sea lion, harbor seal, and northern elephant seal. This information is used to assess past effects of groundfish fisheries.

Table 3-35 is similar in format but reports remaining non-ESA listed species occurring in the fishery management area but with no observed interactions in the Pacific Coast groundfish fishery. Since there are no observer interactions, the groundfish fishery column shows estimates based on strandings, if reported. These observations could not be attributed to any particular fishery.

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[45] Section 1.2 in NMFS (2013c) describes the elements of streamer lines. They are deployed above the groundline as it is paid out from the vessel and creates "a moving fence around the sinking groundline reducing or eliminating bird interactions."

[46] Marine mammal stock assessment reports are available at http://www.nmfs.noaa.gov/pRBSars/region.htm.

[47] Jannot et al. (2011) report estimated takes by year. These values are averaged in Table 3-33 to derive the annual estimate.

Estimates of total human-caused serious injury / mortality are below the PBR for all these stocks. Minimum estimates of fishery-caused serious injury / mortality is less than 1% of the PBR for most of the stocks. The California sea lion stock, the Monterey harbor porpoise stock, the Washington inland waters harbor porpoise stock, Pacific white-sided dolphin stock, and both common dolphin stocks have fractions between 1% and 10% of PBR. The average annual mortality estimate for California sea lion derived from Jannot, *et al.* (2011) is greater than the estimate from all fisheries from the stock assessment report but is still a small fraction of the large PBR for this stock. These data suggest that mortality of non-ESA listed marine mammal stocks occurring in the fishery management area caused by the operation of the Pacific Coast groundfish fishery will not prevent these stocks from reaching their optimum sustainable population level.

Observed takes reported in Jannot *et al.* (2011) break down by fishery sector / gear type as follows:

- California sea lion: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake (Pacific whiting)[48]
- Harbor seal: California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake (Pacific whiting)
- Northern elephant seal: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, at-sea hake (Pacific whiting)
- Harbor porpoise: California halibut trawl
- Dall’s porpoise: At-sea hake (Pacific whiting)
- Pacific white-sided dolphin: Shoreside groundfish trawl
- Risso’s dolphin: Shoreside groundfish trawl
- Common bottlenose dolphin: Non-nearshore fixed gear

Animals may interact with the gear or the vessel in a variety of ways. Interactions and takes are a function of gear type and co-occurrence of fisheries and species. Anderson, et al. (Andersen, *et al.* 2008) present criteria for classifying marine mammal fishery interactions with respect to serious injury. These criteria are with respect to hook-and-line gear (or entanglement in lines associated with gear without hooks, such as pot / trap gear). Marine mammals may be hooked externally, in the mouth region, or ingest the hook. They can also become entangled in the gear. In trawl fisheries the animal is more likely to be caught by the gear and become injured or drown. Large cetaceans are less likely to incur serious injury from hooks but gear entanglement can lead to serious injury in a variety of ways.

Large cetaceans have not been observed directly interacting with the gear in groundfish trawl fisheries. However, a 1997 paper (Fertl and Leatherwood 1997), reviewed global data and found that interactions do occur. These interactions are result of overlap between areas of high prey density for cetaceans and productive fishing areas. Furthermore, cetaceans may be attracted to trawls if fishing operations enhance prey opportunity or because of discards. Most of the interactions documented in this paper are between fishing vessels and various species of dolphins, like those listed above. Minke, humpback, and fin whales are the large cetacean species documented in this paper. Cetaceans are more often caught in midwater gear compared to bottom trawl, because this gear type more often targets pelagic species of interest to cetaceans, are towed at high speeds, and are large.

Saez, et al. (2013) report results of a fishery-large cetacean co-occurrence model for the west coast EEZ. The large cetaceans evaluated are blue whales, fin whales, gray whales, humpback whales, and sperm whales. Gray whales are not listed under the ESA. The gray whale migration is generally very near to shore, crossing through a variety of anthropogenic threats, including fixed-gear fisheries. Sablefish

[48] California halibut trawl is a state managed fishery and only subject to the proposed action with respect to catch accounting to ensure that ACLs are not exceeded.

longline and trap occur farther offshore than migrating gray whales and subsequently pose generally lower entanglement risk. However they are considered high risk fisheries considering all whale species, especially in central and northern California.

Table 3-34. Non-ESA listed marine mammal stocks occurring in the fishery management area with observed interactions by the West Coast Groundfish Observer Program and At-sea Pacific Whiting Observer Program, 2002-2009.

Species	Stock Area	PBR	Annual Mortality + Serious Injury	Fishery Annual Mortality + Serious Injury	2012 SAR Estimate of Groundfish Fishery Mortality + Serious Injury	WCGOP Total Observed 200-09	WCGOP Average Annual Fishery Estimate, 2002-09	WCGOP Average Annual Fishery Estimate, 2002-09 - Upper CI
California sea lion	U.S.	9,200	≥431	≥337	34.6	98	43.125	102.125
Harbor seal	California	1,600	31	18				
Harbor seal	Oregon/Washington Coast	unk	≥3.8	≥1.8	6.4	10	4.57*	12*
Harbor seal	Washington Inland Waters	unk	≥13.0	>3.8				
Northern Elephant Seal	California breeding	4,382	≥10.4	≥8.8	0.8	16	2.29*	3.86*
Harbor porpoise	Morro Bay	15	0	0	0			
Harbor porpoise	Monterey Bay	10	≥1.0	≥1.0	≥1.0†			
Harbor porpoise	San Francisco – Russian River	67	0	0	0	1		
Harbor porpoise	Northern CA/Southern OR	577	≥4	≥4	≥0.8†			
Harbor porpoise	Northern Oregon/Washington Coast	114	≥1.4	≥1.4	≥1.4†			
Harbor porpoise	Washington Inland Waters	63	≥2.2	≥2.6	0			
Pacific white-sided dolphin	California/Oregon/Washington	193	15.1	10.5	2.1	1		
Dall's porpoise	California/Oregon/Washington	257	≥0.4	≥0.4	0.2	1		
Risso's dolphin	California/Oregon/Washington	39	1.6	1.6	≥0.2†	1		
Common Bottlenose dolphin	California Coastal	2.4	0.2	0.2	≥0.2†	1		
Common Bottlenose dolphin	California/Oregon/Washington Offshore	5.5	≥0.4	≥0.4	≥0.2†			

*7 years of data only.
†Estimate from strandings assigned to unidentified/unknown fisheries.

Table 3-35. Non-ESA listed marine mammals occurring in the fishery management area with no observed interactions in groundfish fisheries.

Species	Stock Area	PBR	Annual Mortality + Serious Injury	Fishery Annual Mortality + Serious Injury	2012 SAR Estimate of Groundfish Fishery Mortality + Serious Injury
Common dolphin, short-beaked	California/Oregon/Washington	3,440	64	64	≥0.0†
Common dolphin, long-beaked	California	610	13.8	13	≥2.6†
Northern right whale dolphin	California/Oregon/Washington	48	4.8	3.6	0.0
Gray whale	Eastern North Pacific	558	128	3	--

†Estimate from strandings assigned to unidentified/unknown fisheries.

3.5.4 Seabirds not Listed under the Endangered Species Act

Section 3.1.4.5 in the 2013-14 Groundfish Harvest Specifications FEIS includes an overview of the occurrence and abundance of seabirds in the fishery management area. This information is reproduced here.

The California current system supports a diverse array of seabird species. Species found off the west coast include resident species and transitory species (migrating or foraging). All the California Current system seabirds are highly mobile and require an abundant food source to support their high metabolic rates (Ainley, *et al.* 2005). The abundance of most seabird species on the west coast is influenced by similar physical and biological factors, such as oceanic productivity and prey availability (Ainley, *et al.* 2005; Tyler, *et al.* 1993). Specifically, the seasonal and latitudinal distribution of seabirds is defined by the intensity of coastal upwelling, which delivers nutrient-rich water and supports higher prey biomass in surface waters accessible to seabirds (Tyler, *et al.* 1993). On the west coast, upwelling is most intense south of Cape Blanco, Oregon (42° 50' N lat.) (Bakun, *et al.* 1974; Barth, *et al.* 2000).

Three distinct oceanic seasons have traditionally been defined for the U.S. west coast: the Upwelling, Oceanic, and Davidson Current seasons. The distribution of seabirds varies by season. During the upwelling season in the late spring and summer, northerly winds transport surface waters southward and away from the coast. Commonly-observed visiting species in summer include the sooty shearwater (*Puffinus griseus*), Northern fulmar (*Fulmarus glacialis*), and black-footed albatross (*Phoebastria nigripes*) (Tyler, *et al.* 1993). In the fall (Oceanic season), northerly winds and upwelling intensity decrease, and sea surface temperature reaches its annual maximum. Several species that nest farther south in Mexico and southern California move northward, including the brown pelican (*Pelecanus occidentalis*) and storm-petrels. As winter approaches, these species again return south and breeders from boreal nesting colonies become more abundant, particularly off of California (Tyler, *et al.* 1993). The winter months along the west coast are characterized by warmer water delivered by the Davidson current and reduced levels of primary production (Davidson Current season). Seabird abundance during this time is generally low (Tyler, *et al.* 1993).

Table 3-36 summarizes information in Jannot, et al. (2011) on non-ESA listed seabird interactions in groundfish fisheries. The breakdown of interactions by fishery / gear type is as follows:

- Black-footed albatross (*Phoebastria nigripes*): Non-nearshore fixed gear fishery and at-sea whiting fishery
- Brandt's cormorant (*Phalacrocorax penicillatus*): Trawl and fixed gear fisheries.
- Brown pelican *(Pelecanus occidentalis*): Non-nearshore fixed gear fishery
- Common murre (*Uria aalge*): Shoreside trawl, fixed gear fisheries, and at-sea whiting fishery
- Leach's storm petrel (*Oceanodroma leucorhoa*): shoreside trawl
- Northern fulmar (*Fulmarus glacialis*): Shoreside trawl and non-nearshore fixed gear
- Sooty shearwater (*Puffinus griseus*): Non-nearshore fixed gear and at-sea whiting
- Western gull (*Larus occidentalis)*: Non nearshore fixed gear

Table 3-36. Non-ESA listed seabird species observed by the West Coast Groundfish Observer Program and At-sea Pacific Whiting Observer Program, 2002-2009, WCGOP annual fishery mortality estimate, and IUCN Red List status. Sources:

Species	Shoreside Trawl	CA Halibut Trawl	Fixed Gear	At-Sea Hake	WCGOP Average Annual Fishery Estimate, 2002-09	WCGOP Average Annual Fishery Estimate, 2002-09 - Upper CI	Actual no. years when observations made, 2002-2009	IUCN Red List Status	IUCN Red List Populatoin Trend
Black-footed albatross	0	0	123	8	43.8	93.5	8	Vulnerable	Increasing
Brown pelican	0	0	1	0			8	Least Concern	Increasing
Brandt's cormorant		7	4	0	4	10.8	5	Least Concern	Decreasing
Common murre	1	37	3	5	3.4	5.6	5	Least Concern	Increasing
Leach's storm petrel	8				0.3	1.2	6	Least Concern	Stable
Northern fulmar	1		2	108	15.7	16.1	7	Least Concern	Increasing
Sooty shearwater			20	10	1.7	1.7	6	Near Threatened	Decreasing
Western gull			7		6.3	18.5	4	Least Concern	Increasing
Unspecified/unidentified			3	15			6-8	N/A	N/A

3.6 Non-groundfish Species Caught in Groundfish Fisheries

The 2013-2014 Groundfish Harvest Specifications FEIS (PFMC and NMFS 2012) describes non-groundfish catch with particular attention to commercially important species. These economically important species include:

- Pacific halibut
- California halibut
- Dungeness crab
- Pink shrimp
- Several species of salmon
- Ridgeback and spot prawns

Information on the life history, distribution, and fisheries for these species may be found in the 2013-2014 FEIS, summarized here:

- Pacific halibut (*Hippoglossus stenolepis*) is a bottom-dwelling, right-eyed flatfish species from the family of flounders called *Pleuronectidae.* Pacific halibut are taken with trawl, as well as commercial and recreational fixed gears as they co-occur with groundfish stocks, including canary and yelloweye rockfish. As part of the trawl rationalization program Pacific halibut bycatch is managed with individual bycatch quota (IBQ), which limits bycatch mortality to quota levels. According to observer data, halibut bycatch in the trawl fishery averaged 204 mt annually from 2003 to 2010 but was only 32 mt in 2011. This demonstrates that IBQ has been effective in reducing halibut bycatch.
- California halibut (*Paralichthys californicus*) are a left-eyed flatfish of the family *Bothidae*. California halibut is taken incidentally in the groundfish fishery.
- Off the west coast, Dungeness crab is most abundant in nearshore areas from central California to the Washington-Canada border. Dungeness crab is found to a depth of about 180 m. Dungeness crab is taken incidentally, or harmed unintentionally, by groundfish gears. In some areas, interactions with Dungeness crab by nearshore flatfish trawls are a concern. Concentrating vessel effort in shallow water during the summer months (<75 fm) affects Dungeness crab in the north because they are less likely to survive discard during their summer molting season.
- Off the U.S. West Coast Pacific pink shrimp (*Pandalus jordani*) are harvested with trawl gear from Northern Washington to Central California, with the majority of the catch taken off the coast of Oregon. Concentrations of pink shrimp are associated with well-defined areas of green mud and muddy-sand bottoms. Most of the pink shrimp catch is taken with trawl gear with a minimum mesh size of one inch to three-eighths of an inch between the knots. Shrimp trawlers commonly take groundfish in association with shrimp, rather than the reverse. In the past, the pink shrimp fishery had been responsible in some years for a large proportion of canary rockfish incidental catch. However, the catch of groundfish has been reduced through the use of bycatch reduction devices (BRDs) which are required on all vessels in this fishery. BRDs are added to the trawl net and divert finfish out of the codend of the net, where the shrimp catch is accumulated.
- Salmon are anadromous fish, spending a part of their life in ocean waters, but returning to freshwater rivers and streams to spawn and then die. Groundfish fisheries catch salmon incidentally and the salmon troll fishery has an incidental catch of groundfish. Biological opinions addressing the take of ESA-listed salmon are summarized in Section 3.5.2.
- Ridgeback prawns (*Sicyonia ingentis*) are found from Monterey, California south to Baja California, Mexico, in depths of 145 m to 525 m. Spot prawns (*Pandalus platyceros*) are the largest of the pandalid shrimp and range from Baja California, Mexico, north to the Aleutian

Islands and west to the Korean Strait. The Ridgeback prawn fishery occurs exclusively in California, centered in the Santa Barbara Channel and off Santa Monica Bay. Spot prawn fisheries are state-managed. The use of trawl gear to target spot prawns has been banned in all three states; the spot prawn pot fishery that remains is considered to have no incidental bycatch of depleted groundfish species.

As suggested above, for most of these species it is the incidental catch of groundfish in fisheries targeting these species rather than the other way round. Groundfish catch in non-groundfish fisheries is accounted for through set asides, described in Section **Error! Reference source not found.**.

The West Coast Groundfish Observer Program's Groundfish Management Multiyear Data Product (Bellman, *et al.* 2013) includes catch estimates of nongroundfish species in groundfish fisheries. Focusing on groundfish directed fisheries (limited entry permit vessels, open access vessels targeting groundfish, tribal fisheries targeting groundfish), some 334 nongroundfish species or groups (including partially or unidentified species) were observed caught from 2002 to 2012. Nongroundfish catch, by weight, accounts for about 2% of total catch in these fisheries. Table 3-37 shows the most commonly caught nongroundfish by weight in rank order and accounting for just over 90% of the catch. About 54% of the nongroundfish catch by weight is invertebrate species, including crabs followed by grenadiers and sharks, each accounting for about 5%.

Table 3-37. Most commonly caught nongroundfish species, by weight, 2002-2012. (Source:

	Species	Catch (mt)	Percent of total nongroundfish catch	Cumulative Percent
1	Dungeness Crab	18,430	29.0%	29.0%
2	Humboldt Squid	8,848	13.9%	42.9%
3	Walleye Pollock	6,726	10.6%	53.5%
4	Pacific Halibut	4,897	7.7%	61.2%
5	Squid Unid	4,657	7.3%	68.5%
6	Tanneri Tanner Crab	3,609	5.7%	74.2%
7	King (Chinook) Salmon	2,427	3.8%	78.0%
8	Giant Grenadier	2,001	3.1%	81.1%
9	Shark Unid	1,129	1.8%	82.9%
10	Silver (Coho) Salmon	1,024	1.6%	84.5%
11	Grenadier Unid	877	1.4%	85.9%
12	Tanner Crab Unid	828	1.3%	87.2%
13	Brown Cat Shark	821	1.3%	88.5%
14	American Shad	808	1.3%	89.7%
15	Pacific Sardine	807	1.3%	91.0%

As shown in Table 3-38, Dungeness crab, which is the most economically important species listed above, are mostly caught in the shoreside trawl and tribal shoreside fisheries.

Table 3-38. Total catch of economically important nongroundfish (mt) by fishery sector, 2002-2012.

Species	Shoreside Trawl*	Nearshore Fixed Gear	Non nearshore Fixed Gear	Non Tribal At-Sea Hake	Shoreside Hake	Tribal At-Sea Hake	Tribal Shoreside	Total	Pct all Non groundfish
Dungeness Crab	3,352	133	83	<0.5	1		14,862	18,430	48%
Pacific Halibut	2,078	18	685	14	5	2	2,095	4,897	13%
King (Chinook) Salmon	56	3	1	69	75	36	2,188	2,427	6%
Silver (Coho) Salmon	<0.5	1	<0.5	1	3	2	1,016	1,024	3%
California Halibut	61	19	5	<0.5	<0.5			86	<0.5%
Pink (Humpback) Salmon	<0.5		<0.5	<0.5	12	8	17	36	<0.5%
Pink Shrimp	<0.5				0			<0.5	<0.5%
Ridgeback Prawn		<0.5						<0.5	<0.5%

Figure 3-29 shows catch of all non-groundfish by fishery sector. The tribal shoreside accounted for the largest share, 32%.

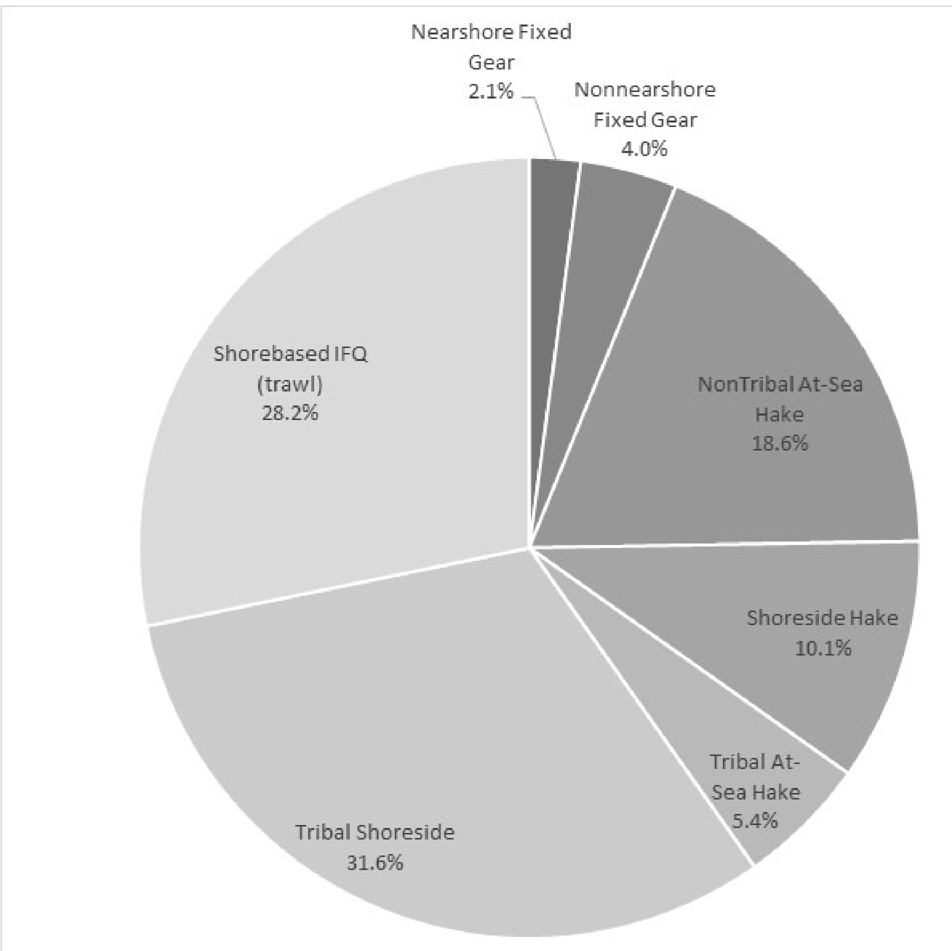


Figure 3-29. Catch of non-groundfish by groundfish fishery sector, 2003-2011. (Shorebased IFQ includes the limited entry trawl sector before 2011 and the non-trawl IFQ sector in 2011.)

Figure 3-30 shows catch of non-groundfish species as a percent of total catch during the baseline period for groundfish fishery sectors (as shown in Figure 3-29). The proportion varies between 1.4% (3,801 mt) in 2011 and 5.9% (8,551 mt) in 2009. Non-groundfish catch amounts show no correlation with total catch during this period (R-squared = 0.031).

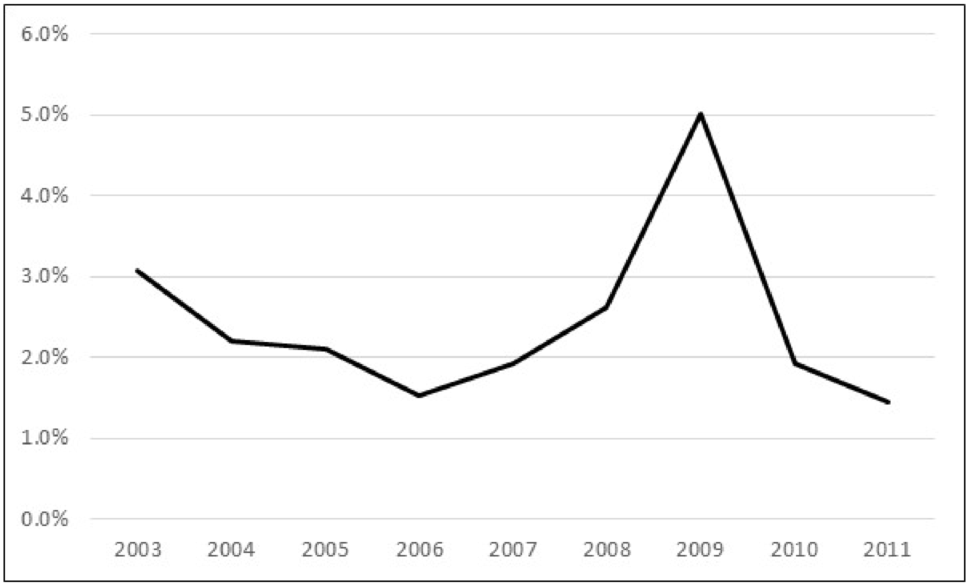


Figure 3-30. Catch of non-groundfish species as a percent of total catch in groundfish fishery sectors, 2003-2011.

Chapter 4 IMPACTS OF THE ALTERNATIVES

This chapter is organized into 14 sections. Sections 4.1 through 4.7 evaluate the impacts of alternative harvest specifications and management measures for the 2015-2016 biennial period. These sections are organized by environmental component, similar to Chapter 3, except that establishing management measures is considered an impact connecting the ACLs, or catch limits, to the ultimate impact on the environment. These sections cover harvest specifications, management measures, the socioeconomic environment, essential fish habitat, the California Current ecosystem, protected species, and non-groundfish. Sections 4.8 through 4.14 look at the long-term impacts of setting harvest specifications and management measures; these impacts are related to the Amendment 24 alternatives, which establish the default harvest control framework that would be used in setting harvest specifications beginning with the 2017-2018 biennial period. Section 4.15 evaluates cumulative impacts. The impacts of proposed changes to Slope Rockfish and Other Fish complexes and the designation of ecosystem component species are described in Section 4.1.

4.1 Biological Impacts of 2015-16 Biennial Harvest Specifications on Groundfish Stocks

This section evaluates the biological impacts of preferred 2015-2016 harvest specifications on a select list of groundfish stocks (the 2014 Stock Assessment and Fishery Evaluation document (PFMC 2014) provides more detailed information on all west coast groundfish stocks and the biological effects under the groundfish harvest specification framework). The focus of this section are on those overfished stocks currently managed under rebuilding plans, the stocks where the Council chose a range of alternative ACLs for analysis, those stocks and stock complexes where total catches in recent years have been at least 80 percent of specified ACLs, and those stocks preferred to be removed from a status quo stock complex and managed with stock-specific harvest specifications.

4.1.1 Overfished Groundfish Stocks

There are currently six overfished rockfish stocks (bocaccio south of 40º10’ N lat., canary rockfish, cowcod south of 40º10’ N lat., darkblotched rockfish, Pacific ocean perch, and yelloweye rockfish) and one overfished flatfish stock (petrale sole) managed under rebuilding plans. New assessments and rebuilding analyses for these overfished stocks do not indicate any need to modify existing rebuilding plans since all these analyses indicate progress towards rebuilding is on track and, in most cases, ahead of schedule. The only exception is cowcod where the new assessment and rebuilding analysis indicate the maximum time to rebuild the stock according to the MSA (i.e., T_{MAX}) is sooner than the target year to rebuild the stock (i.e., T_{TARGET}). Therefore, the Council’s preferred alternative is to maintain all the existing rebuilding plans with the exception of specifying a new T_{TARGET} for cowcod. Table 4-1 provides the estimated times to rebuild and rebuilding probabilities under alternative harvest control rules for the overfished stocks according to the most recent rebuilding analyses.

The choice of maintaining status quo rebuilding plans is underscored by the fact only one new rebuilding analysis was prepared in 2013; all the other rebuilding plan considerations for 2015 and beyond are informed by rebuilding analyses prepared in 2011 and thoroughly analyzed in the 2013-2014 harvest specifications and management measures process (PFMC and NMFS 2012). In fact, only catch reports were developed in 2013 for canary rockfish, POP, and yelloweye rockfish based on the SSC's advice that there was little new information to inform new assessments (or rebuilding analyses). While new assessments were conducted for bocaccio, darkblotched rockfish, and petrale sole, the SSC advised against preparing new rebuilding analyses since each of these stocks was predicted to be rebuilt by at least the start of 2015. The SSC recommended to stay the course with these rebuilding plans and conduct new assessments in 2015 to confirm the optimistic predictions in the 2013 assessments.

There are no differences in impacts for overfished species relative to the 2015-2016 alternatives, which are structured within a P* range of 0.25 to 0.45, except for petrale sole. The rockfish rebuilding plans specify conservative harvest control rules that result in 2015 and 2016 ACLs far below the ABCs calculated using a P* of 0.25. However, since the harvest control rule specified in the petrale sole rebuilding plan is the 25-5 rule and since the stock is projected to be above its B_{MSY} target in 2015 and 2016, the 2015 and 2016 petrale ACLs are equal to the ABCs and therefore vary by P* alternative.

The following sections provide more detail on overfished groundfish species' impacts. The 2014 Stock Assessment and Fishery Evaluation (SAFE) document provides further information on the distribution and life history, stock status and management history, stock productivity, and fishing mortality of each overfished species (PFMC 2014).

Table 4-1. Estimated time to rebuild and harvest control rule relative to alternative 2015-2016 ACLs for overfished west coast groundfish stocks (no changes to rebuilding plans were recommended for any of these stocks except cowcod where the target year to rebuild (T_{TARGET}) was changed to X).

Stock	Current T_{TARGET}	Current SPR or Harvest Control Rule	Pref. T_{TARGET}	ACL Alt.	ACLs (mt) 2015	ACLs (mt) 2016	SPR or Harvest Control Rule	Median Time to Rebuild	Rebuilding Duration Beyond T@F=0 (yrs.)	Prob. of Rebuilding by Current T_{TARGET}	Prob. of Rebuilding by T_{MAX}
Bocaccio S of 40°10' N lat. a/	2022	77.7%	2022		0	0	100%	2019	0	88.0%	99.0%
					150	158	90.0%	2019	0	77.0%	97.0%
				Pref.	349	362	77.7%	2021	2	60.0%	90.0%
					483	496	70.0%	2023	4	49.0%	70.0%
					670	679	60.0%	2027	8	33.0%	63.0%
					801	803	53.9%	2031	12	23.0%	51.0%
Canary	2030	88.7%	2030		0	0	100%	2028	0	68.0%	75.0%
					50	52	95.1%	2028	0	62.5%	75.0%
					106	109	90.0%	2029	1	55.8%	75.0%
				Pref.	122	125	88.7%	2030	2	54.6%	75.0%
					154	158	85.9%	2030	2	50.0%	75.0%
					191	196	82.9%	2031	3	44.6%	75.0%
					224	230	80.3%	2032	4	39.7%	74.9%
					310	316	74.0%	2035	7	30.6%	73.6%
					401	407	67.9%	2040	12	26.9%	66.3%
					454	459	64.7%	2045	17	25.7%	59.4%
					496	500	62.2%	2050	22	25.3%	50.0%

Stock	Current T_{TARGET}	Current SPR or Harvest Control Rule	Pref. T_{TARGET}	ACL Alt.	ACLs (mt) 2015	ACLs (mt) 2016	SPR or Harvest Control Rule	Median Time to Rebuild	Rebuilding Duration Beyond T@F=0 (yrs.)	Prob. of Rebuilding by Current T_{TARGET}	Prob. of Rebuilding by T_{MAX}
Cowcod	2068	82.7%	X		0	0	E = 0	2019	0	95.9%	93.8%
					1.8	1.9	E = 0.0013	2019	0	95.2%	93.0%
					2.4	2.5	E = 0.0018	2019	0	95.0%	92.7%
					3.0	3.1	E = 0.0022	2019	0	94.7%	92.4%
					3.6	3.7	E = 0.0027	2019	0	94.4%	91.9%
				Pref. ACT	4.2	4.4	E = 0.0031	2019	0	94.0%	91.5%
					4.8	5.0	E = 0.0036	2019	0	93.4%	91.3%
					5.5	5.6	E = 0.0040	2019	0	93.4%	91.0%
					6.1	6.2	E = 0.0045	2019	0	93.1%	90.6%
					6.7	6.9	E = 0.0049	2019	0	92.7%	90.2%
					7.3	7.5	E = 0.0054	2019	0	92.4%	89.8%
					7.9	8.1	E = 0.0058	2019	0	92.0%	89.6%
					8.5	8.7	E = 0.0063	2019	0	91.5%	89.2%
					9.1	9.3	E = 0.0067	2019	0	91.2%	88.8%
				Pref. ACL	9.5	9.7	E = 0.007	2020	1	90.9%	88.4%
					9.7	10.0	E = 0.0072	2020	1	90.9%	88.5%
					27.7	28.1	E = 0.0203	2022	3	76.7%	74.3%
					38.1	38.4	E = 0.0281	2025	6	67.5%	65.7%
					48.3	48.5	E = 0.0356	2030	11	60.6%	59.2%
					53.0	53.0	E = 0.0391	2035	16	57.5%	56.4%
					55.5	55.4	E = 0.0409	2039	20	55.0%	53.4%
					62.1	61.9	E = 0.0458	2057	38	51.4%	50.0%
Darkblotched	2025	64.9%	2025		0	0	100%	2016	0	100.0%	100.0%
				Pref.	338	346	64.9%	2017	1	100.0%	100.0%
					369	376	62.6%	2017	1	100.0%	100.0%
					375	382	62.1%	2018	2	100.0%	100.0%
					394	401	60.7%	2018	2	100.0%	100.0%
					445	452	57.1%	2018	2	100.0%	100.0%

Stock	Current T_{TARGET}	Current SPR or Harvest Control Rule	Pref. T_{TARGET}	ACL Alt.	ACLs (mt) 2015	ACLs (mt) 2016	SPR or Harvest Control Rule	Median Time to Rebuild	Rebuilding Duration Beyond T@F=0 (yrs.)	Prob. of Rebuilding by Current T_{TARGET}	Prob. of Rebuilding by T_{MAX}
POP	2051	86.4%	2051		0	0	100%	2043	0	67.6%	85.5%
					62	64	94.3%	2045	2	61.6%	81.0%
					138	143	88.0%	2050	7	52.6%	75.0%
				Pref.	158	164	86.4%	2051	8	50.0%	73.0%
					166	172	85.8%	2052	9	49.1%	72.6%
					191	198	83.9%	2054	11	45.7%	70.1%
					209	216	82.6%	2055	12	43.6%	68.0%
					258	266	79.2%	2060	17	38.1%	62.0%
					303	312	76.2%	2065	22	34.2%	55.8%
					341	350	73.8%	2071	28	31.8%	50.0%
Petrale	2016	25-5 Rule	2016		0	0	100%	2013	0	100.0%	100.0%
					1,116	1,197	60%	2013	0	100.0%	100.0%
					1,548	1,624	50%	2013	0	100.0%	100.0%
					2,081	2,118	40%	2013	0	100.0%	100.0%
				Pref.	2,816	2,910	25-5 Rule	2013	0	100.0%	100.0%
Yelloweye	2074	76.0%	2074		0	0	100%	2045	0	99.2%	99.9%
					10	10	86.4%	2053	8	85.3%	93.7%
					14	15	80.5%	2060	15	75.1%	82.8%
					15	16	79.5%	2061	16	73.2%	81.0%
					18	18	76.5%	2066	21	64.1%	73.9%
				Pref.	18	19	76.0%	2067	22	62.1%	72.9%
					22	22	72.7%	2074	29	50.0%	61.3%
					25	25	69.7%	2083	38	37.2%	50.0%

a/ All bocaccio alternatives have been reduced from the rebuilding analysis results by 6% to represent the portion of the stock south of 40°10' N lat.

4.1.1.1 Bocaccio South of 40º10' N lat.

A bocaccio stock assessment update (Field 2011b) and rebuilding analysis (Field 2011a) were prepared in 2011. The 2011 bocaccio assessment was originally scheduled to be an update of the 2009 full assessment; however, the STAT some limited changes in the 2009 model structure since a strict update estimated that the 2010 year class was extraordinarily and unrealistically strong, based on length frequency data collected in the 2010 NMFS trawl survey. The modified update was ultimately reviewed, endorsed by the SSC, and adopted for use in management decision-making. The 2011 bocaccio rebuilding analysis indicated rebuilding progress was well ahead of schedule with a predicted median year to rebuild of 2021 or one year earlier than the target rebuilding year (Field 2011a). The Council elected to maintain the revised rebuilding plan implemented in 2011.

An update of the 2011 bocaccio assessment model was prepared in 2013, which confirmed the 2009 and 2010 year classes were indeed strong (Field 2013). The assessment estimated a depletion of 31.4 percent at the start of 2013 and predicted the stock would rebuild by 2015. The SSC recommended maintaining the current rebuilding plan for the 2015-2016 management cycle and a full assessment be done in 2015 to confirm this prediction. The SSC further recommended against preparing a rebuilding analysis in 2013; therefore, the 2011 rebuilding analysis (Field 2011a) was used to inform the projections in Table 4-1.

The Council's preferred alternative is to maintain the rebuilding plan and wait for the next assessment to confirm whether the estimated strong recruitment will result in successfully rebuilding the stock as predicted.

Under the preferred alternative of maintaining the current bocaccio rebuilding plan, the probability of successful rebuilding by the T_{TARGET} of 2022 is 60% and the probability of rebuilding by T_{MAX} is 90% (Table 4-1) using the projections from the 2011 rebuilding analysis. The probabilities would undoubtedly be higher if a new bocaccio rebuilding analysis was prepared based on the 2013 assessment since the strength of recent recruitments was higher than previously estimated.

4.1.1.2 Canary Rockfish

The 2007 canary assessment estimated relative depletion level was 32.4 percent at the start of 2007 (Stewart 2008b). This was a significant departure from the previous assessment and largely driven by a higher assumed steepness (h = 0.51) relative to past assessments. The 2007 canary rebuilding analysis (Stewart 2008a) predicted the SPR harvest rate in the rebuilding plan (88.7%) would rebuild 42 years earlier (2021) than the originally estimated rebuilding schedule (2063). A modification of the Amendment 16-4 canary rockfish rebuilding plan specifying a target rebuilding year of 2021 while maintaining the SPR harvest rate of 88.7% was implemented in 2009.

The 2009 canary assessment (Stewart 2009c), an update of the 2007 assessment, estimated stock depletion at 23.7% at the start of 2009. This change in stock status was due to a lower estimate of initial, unfished biomass (B_0) largely attributable to the inclusion of revised historical California catches from a formal reconstruction of 1916-1980 California catch data (Ralston, *et al.* 2010). The 2009 canary rebuilding analysis (Stewart 2009a) predicted the stock would not rebuild to the target year of 2021 with at least a 50% probability even in the absence of fishing-related mortality starting in 2011 ($T_{F=0}$). The rebuilding plan was revised by changing the target to rebuild the stock to 2027 while maintaining the 88.7% SPR harvest rate; the revised rebuilding plan was implemented in 2011.

Another update assessment was prepared in 2011 (Wallace and Cope 2011), which estimated stock depletion was 23.2 percent at the start of 2011. This change in stock status was due to a lower estimate of initial, unfished biomass (B_0) largely attributable to the inclusion of revised historical Oregon catches from a formal reconstruction of Oregon catch data. For the period 2000-2011, the spawning biomass was estimated to have increased from 11.2 percent to 23.2 percent of the unfished biomass level.

The 2011 canary rebuilding analysis (Wallace 2011) predicted the stock would not rebuild to the target year of 2027 with at least a 50% probability. The rebuilding plan was revised slightly by changing the target to rebuild the stock to 2030 while maintaining the 88.7% SPR harvest rate; the revised rebuilding plan was implemented in 2013.

The SSC recommended against preparing a new canary rockfish rebuilding analysis in 2013; therefore, the 2011 rebuilding analysis (Wallace 2011) was used to inform the rebuilding projections in Table 4-1. A canary catch report was provided in 2013 (Agenda Item F.5.a, Attachment 9, June 2013), which indicated 2010-2012 total catches were below specified ACLs/OYs.

The Council's preferred alternative is to maintain the canary rockfish rebuilding plan and wait for new information that might compel a change in course. The probabilities of rebuilding by the specified canary T_{TARGET} of 2030 and the estimated T_{MAX} of 2050 are 54.6% and 75%, respectively (Table 4-1).

4.1.1.3 Cowcod South of 40º10' N lat.

A new cowcod assessment of the stock in the Southern California Bight was conducted in 2013 (Dick and MacCall 2013), which estimated stock depletion to be 33.9 percent of unfished spawning biomass at the start of 2013. The 2013 assessment suggested that cowcod in the Southern California Bight constitute a smaller, but more productive stock than was estimated from previous assessments. Median unfished and 2013 spawning biomasses were estimated to be 1,549 mt and 524 mt, respectively.

The 2013 assessment used the Extended Depletion-Based Stock Reduction Analysis (XDB-SRA) modeling platform to estimate stock status, scale, and productivity. Dick et al. (2013) fit five fishery-independent data sources: four time series of relative abundance (CalCOFI larval abundance survey, Sanitation District trawl surveys, NWFSC trawl survey, and NWFSC hook-and-line survey), and the 2002 Yoklavich et al. (2007) visual survey estimate of absolute abundance.

The 2013 rebuilding analysis (Dick and MacCall 2014) was unique in that the Punt rebuilding program (Punt 2005) was not used given its incompatibility with XDB-SRA. In each rebuilding model run, 15,000 simulated trajectories were generated using draws from the joint posterior distribution. Since XDB-SRA does not provide the information required to calculate spawning potential ratios, age-specific quantities from the 2009 rebuilding analysis were used to translate harvest control rules (SPR=82.7%) into exploitation rates (E=0.007 calculated as catch/estimated age 11+ biomass). Similar to the previous cowcod rebuilding analysis, variability in future recruitment was expressed as a weighted set of different states of nature (parameter values), rather than random deviations from an average stock-recruitment relationship. While the previous rebuilding analysis accounted only for uncertainty in the Beverton-Holt steepness parameter, the current analysis accounts for uncertainty in all estimated model parameters. Estimates of total cowcod mortality have not exceeded the ACL (or OY) in any year since 2003. The estimate of median time to rebuild under the current harvest rate (2020) is 48 years earlier than the current target year of 2068.

The Council's preferred alternative is to maintain the harvest rate in the current cowcod rebuilding plan. The SSC recommended that the cowcod ACL contribution for the area north of Point Conception be computed by applying the fishing mortality rate corresponding to the ACL for south of Point Conception to the biomass north of Point Conception from DB-SRA. This was considered more scientifically justified than the past approach of doubling the ACL value from south of Point Conception to produce the ACL for the entire area since the DB-SRA estimate of biomass north of Point Conception is considerably lower than for the stock in the assessed area in the Southern California Bight. The preferred 2015 and 2016 ACL using the status quo harvest rate and the SSC-recommended methodology is 10 mt, which compares to a 16 mt ACL calculated using the convention of doubling the assessed area ACL to determine the cowcod harvest limit for the entire area south of 40°10' N lat. The Council's preferred alternative also specifies an ACT of 4 mt, which defines the allowable harvest in all fisheries. The 6 mt difference between the ACL and the ACT would enable more research activities that may take cowcod to benefit future stock assessments. One of the research activities the Council hoped to expand is the current NWFSC hook-and-line survey in the Southern California Bight. The Council recommended that survey be extended into the CCAs to better estimate stock size.

The current T_{TARGET} in the cowcod rebuilding plan is 2068, which is nine years later than the new estimate of T_{MAX} of 2057 (Table 4-1). Therefore, the Council will have to modify the target rebuilding year. One of the considerations in this decision is the great uncertainty in the estimated cowcod biomass (Figure 4-1), which may compel a T_{TARGET} later than the median year to rebuild the stock of 2020, or one year later than $T_{F=0}$, under the preferred alternative. Specifying the median year to rebuild the stock provides only a 50% probability of meeting the rebuilding objective, while specifying a later year increases that probability. The probability of rebuilding by the new T_{MAX} of 2057 under the preferred alternative is 88.4%; however, if total catches are maintained closer to the preferred ACT of 4 mt, the probability of rebuilding by T_{MAX} is estimated to be closer to 91.5% (Table 4-1). The probabilities of rebuilding by the new T_{TARGET} will be calculated after the preferred T_{TARGET} is decided and will be published in the FEIS.

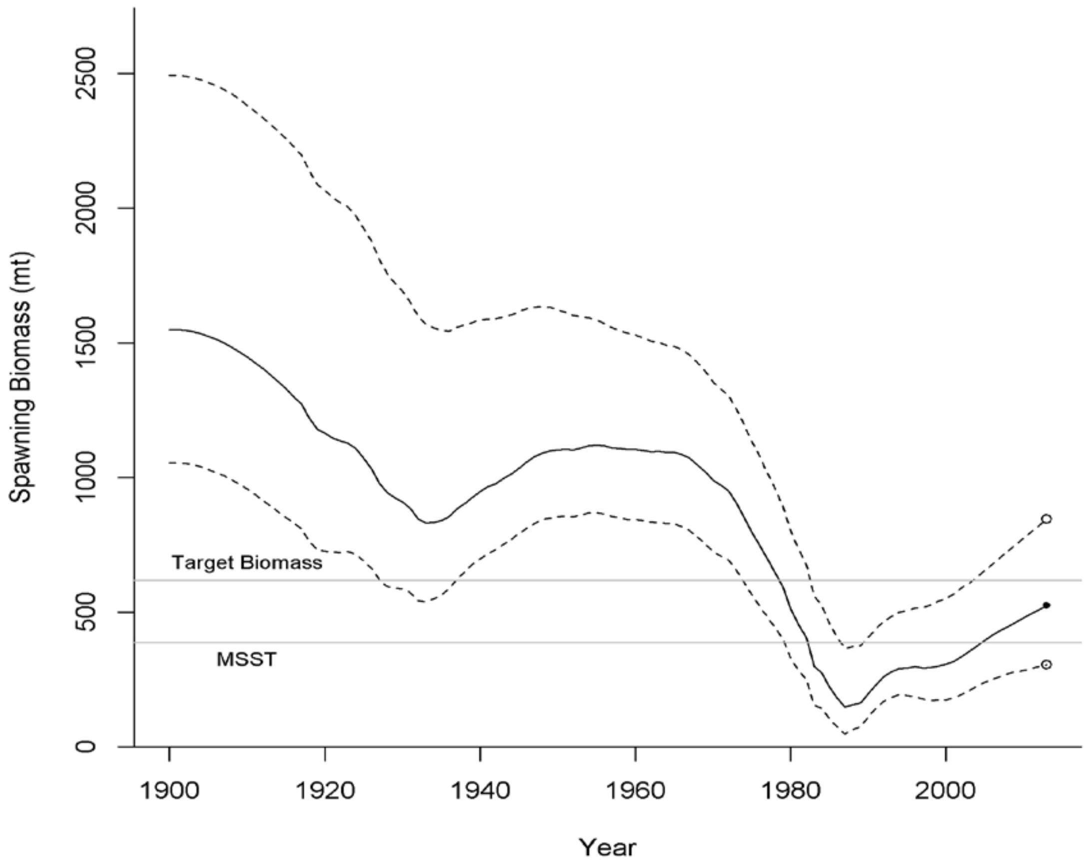


Figure 4-1. Distribution of cowcod spawning biomass trajectories from the 2013 base model (median = solid line, 5th and 95th percentile = dashed lines), relative to Target Biomass (40% of unfished biomass) and the Minimum Stock Size Threshold (MSST, 25% of unfished biomass). Circles indicate values in 2013.

4.1.1.4 Darkblotched Rockfish

A full darkblotched stock assessment in 2013 (Gertseva and Thorson 2013) estimated a stock depletion of 36 percent at the start of 2013. The assessment also predicts the stock will be rebuilt by the start of 2015. The improved stock status and rebuilding outlook were largely attributed to 1) reduced fishing mortality under the rebuilding program; 2) inferences that follow from more favorable perceptions of steepness, fecundity, and age at maturity of the stock; and 3) length and age data indicating relatively large recruitments in 1999, 2000, and 2008. The SSC recommended maintaining the current rebuilding plan for the 2015-2016 management cycle and a full assessment be done in 2015 to confirm this prediction. The SSC further recommended against preparing a rebuilding analysis in 2013; therefore, the 2011 rebuilding analysis (Stephens 2011) was used to inform the rebuilding projections in Table 4-1.

The Council's preferred alternative is to maintain the rebuilding plan and wait for the next assessment to confirm whether the stock will successfully rebuild as predicted.

Under the preferred alternative of maintaining the current darkblotched rebuilding plan, the probability of successful rebuilding by the T_{TARGET} of 2025 is 100% and the probability of rebuilding by T_{MAX} is also 100% (Table 4-1) using the projections from the 2011 rebuilding analysis.

4.1.1.5 Pacific Ocean Perch

A full assessment in 2011 estimated a stock depletion of 19.1 percent at the start of 2011 (Hamel and Ono 2011). The significant decrease in the estimated depletion of the stock was largely due to a much higher estimate of initial, unfished biomass (B_0). Previous assessments assumed a large recruitment in the late 1950s provided the higher biomass to support the estimated removals by the foreign fleets without any data to support that assumption. The assumption in the 2011 assessment is that the large foreign fleet catch fished the biomass down to critical levels, thus resulting in a substantially larger B_0 estimate. The 2011 assessment also estimated a longer sequence of higher recruitment based on fitting to the data available for early years of the assessment period. The 2011 rebuilding analysis (Hamel 2011) predicted rebuilding would not occur by the target year of 2020 with at least a 50% probability even in the absence of fishing-related mortality beginning in 2013 (i.e., $T_{F=0}$). Therefore the rebuilding plan was revised by changing the target rebuilding year to 2051 while maintaining the constant SPR harvest rate of 86.4%.

The SSC recommended against preparing a new POP rebuilding analysis in 2013; therefore, the 2011 rebuilding analysis (Hamel 2011) was used to inform the rebuilding projections in Table 4-1. A POP catch report was provided in 2013 (Agenda Item F.5.a, Attachment 10, June 2013), which indicated 2010-2012 total catches were below specified ACLs/OYs.

The Council's preferred alternative is to maintain the rebuilding plan and wait for new information that might compel a change in course. The probabilities of rebuilding by the specified POP T_{TARGET} of 2051 and the estimated T_{MAX} of 2071 are 50% and 73%, respectively (Table 4-1).

4.1.1.6 Petrale Sole

The 2013 petrale assessment (Haltuch, *et al.* 2013) estimated a stock depletion of 22.3 percent of its unfished biomass at the start of 2013 and short of the prediction from the 2011 rebuilding analysis; spawning biomass is predicted to reach the B_{MSY} target by the start of 2014. The 2013 stock assessment continued with the coastwide stock assessment, but was restructured to summarize petrale sole landings by the port of landing and combined Washington and Oregon into a single fleet. The down-weighting of the trawl CPUE index used in the 2011 assessment was largely responsible for the more pessimistic result and the one year lag in rebuilding relative to the previous assessment. However, the estimation of recent recruitments indicated two very strong year classes (2007 and 2008) recruiting into the spawning population, which increases the likelihood of imminent success in rebuilding this stock. The SSC recommended against preparing a new petrale sole rebuilding analysis in 2013; therefore, the 2011 rebuilding analysis (Haltuch 2011) was used to inform the rebuilding projections in Table 4-1.

The Council's preferred alternative is to maintain the rebuilding plan and wait for the next assessment to confirm whether the stock will successfully rebuild as predicted. The probabilities of rebuilding by the specified petrale T_{TARGET} of 2016 and the estimated T_{MAX} of 2021 are 100% (Table 4-1).

The petrale sole ACLs do vary by the 2015-2016 P* alternatives analyzed in this EIS. This is because the rebuilding strategy for petrale sole is to use the 25-5 rule, which progressively lowers the ACL relative to ABC the farther below the stock is from the B_{MSY} target of $B_{25\%}$. However, since the petrale stock is predicted to be above the B_{MSY} target in 2015 and 2016, the ACLs equal the ABCs and are affected by the P* choice. The preferred (and Alternative 1) 2015 and 2016 ACLs under a P* of 0.45 are 2,816 mt and 2,910 mt, respectively. The Alternative 2 ACLs are 2,310 mt and 2,386 mt in 2015 and 2016, respectively under a P* of 0.25. While implementation of Alternative 2 ACLs would predict a higher petrale biomass in the foreseeable future since removals in 2015 and 2016 would be less, the P* choice does not directly affect rebuilding probabilities since the stock is projected to be rebuilt now, before the start of 2015.

4.1.1.7 Yelloweye Rockfish

The benchmark 2009 yelloweye assessment estimated a stock depletion of 20.3 percent of initial, unfished biomass at the start of 2009 (Stewart, *et al*. 2009). The resource was modeled as a single stock, but with three explicit spatial areas: Washington, Oregon and California. Each area was modeled simultaneously with its own unique catch history and fishing fleets (recreational and commercial), with the stocks linked via a common stock-recruit relationship with negligible adult movement among areas. The assumed level of historical removals and estimated steepness were identified as the main axes of uncertainty.

The 2009 yelloweye rebuilding analysis (Stewart 2009b) was used to inform a revised rebuilding plan that was implemented under FMP Amendment 16-5. The revised rebuilding plan implemented in 2011 specified a constant harvest rate (SPR = 76%) strategy (the ramp-down strategy was abandoned) and a target year to rebuild the stock of 2074.

The 2011 yelloweye assessment (Taylor and Wetzel 2011), an update of the 2009 assessment, estimated stock depletion at 21.4 percent of initial, unfished biomass at the start of 2011. The update assessment results were very similar to those in the previous assessment. The 2011 yelloweye rebuilding analysis (Taylor 2011) indicated rebuilding progress was on schedule and no revisions were made to the rebuilding plan.

The SSC recommended against preparing a new yelloweye rockfish rebuilding analysis in 2013; therefore, the 2011 rebuilding analysis (Taylor 2011) was used to inform the rebuilding projections in Table 4-1. A yelloweye catch report was provided in 2013 (Agenda Item F.5.a, Attachment 11, June 2013), which indicated 2010-2012 total catches were below specified ACLs/OYs.

The Council's preferred alternative is to maintain the yelloweye rebuilding plan and wait for new information that might compel a change in course. The probabilities of rebuilding by the specified yelloweye T_{TARGET} of 2074 and the estimated T_{MAX} of 2083 are 62.1% and 72.9%, respectively (Table 4-1).

4.1.2 Non-Overfished Stocks with Annual Catch Limit Alternatives Identified for Analysis

4.1.2.1 Dover Sole

The 2011 Dover sole assessment indicated the stock was healthy with an increasing abundance trend. Spawning stock biomass depletion was estimated to be 83.7 percent of unfished biomass at the start of 2011 (Hicks and Wetzel 2011). The 2011 Dover sole assessment is data-rich and the species is readily tracked in the NMFS trawl survey (most survey tows are positive for Dover).

The spawning biomass of Dover sole reached a low in the mid-1990s before beginning to increase throughout the last decade. The estimated depletion has remained above the 25 percent biomass target and it is unlikely that the stock has ever fallen below this threshold. Throughout the 1970s, 1980s, and

1990s the exploitation rate and SPR generally increased, but never exceeded the SPR 30 percent F_{MSY} target. Recent exploitation rates on Dover sole have been much lower than F_{MSY}, even with increased catch levels since 2007.

Two ACL alternatives for 2015 and 2016 are analyzed: 1) the status quo ACL of 25,000 mt and 2) the preferred ACL of 50,000 mt. Given the productivity of the stock and constraints on fishing, projections assuming a 25,000 mt constant annual catch predict the stock would remain above the target B_{MSY} level in the next ten years even under the more pessimistic and less likely low state of nature in the assessment decision table (Table 4-2). The higher ACL of 50,000 mt is predicted to be sustainable; Table 4-2 indicates that future mortalities assuming full OFL removals in 2013-2022 would maintain the stock above the target level of $B_{25\%}$ under the most likely base case model in the 2011 assessment. This high catch stream in the decision table predicts a decline in spawning biomass in the ten-year projection to a level above the B_{MSY} target; the decline would be predicted to be less under a revised projection since 2013 and 2014 catches were well below the OFL (and below the 25,000 mt ACL). The average annual 2015-2022 catch in Table 4-2, assuming OFL removals, is higher (50,350 mt) than the alternative ACL of 50,000 mt.

Industry requested the higher 50,000 mt Dover sole ACL to improve supply and create a better market for Dover sole. The effective limit of Dover sole in the 2015 and 2016 shorebased IFQ fishery is likely to be driven by the sablefish allocation, which is increasing slightly relative to No Action. Sablefish quota is needed to target Dover sole and the other DTS species using trawl gear. Sablefish IFQ quota is also used in a single-species target fishery using fixed gears. The competition and price for sablefish quota is affected by Asian sablefish demand and supply from north Pacific fisheries outside the west coast EEZ (e.g., BC and the Gulf of Alaska fisheries). It may be the case that the supply and demand of west coast Dover sole will remain limited until there is an increased harvestable surplus of sablefish above the levels preferred for 2015 and 2016. On the other hand, access to a larger volume of Dover sole may allow west coast processors to develop better markets for Dover sole. To the extent that trawl IFQ fishermen can more selectively target quality Dover sole without running out of sablefish quota, a higher catch can be expected achieving a greater positive socioeconomic impact on trawl fishing communities.

The preferred Dover ACL of 50,000 mt is accommodated under Alternative 1 since the 2015 and 2016 ABCs calculated using a P* of 0.45 are greater than 50,000 mt. While the preferred Dover ACL is accommodated under Alternative 2 in 2015, it is not accommodated in 2016 since the ABC calculated using a P* of 0.25 is less than 50,000 mt (46,429 mt). The No Action ACL of 25,000 mt is accommodated under all the alternatives.

Table 4-2. Projected spawning biomass and depletion of Dover sole under three catch streams and two states of nature (the low state of nature and base case models) analyzed in the 2011 stock assessment, from Hicks and Wetzel (2011).

Catch Stream	Year	Catch (mt)	State of nature			
			Low $M_f = 0.110$ $M_m = 0.125$		Base case $M_f = 0.117$ $M_m = 0.142$	
			Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion
OFL	2013	90,411	240,029	70.20%	377,601	80.40%
	2014	75,517	195,784	57.20%	329,856	70.20%
	2015	64,885	158,399	46.30%	289,873	61.70%
	2016	57,488	127,579	37.30%	257,379	54.80%
	2017	52,453	102,664	30.00%	231,515	49.30%
	2018	49,065	82,887	24.20%	211,283	45.00%
	2019	46,768	67,323	19.70%	195,619	41.60%
	2020	45,158	54,995	16.10%	183,484	39.10%
	2021	43,964	45,020	13.20%	173,995	37.00%
	2022	43,017	36,676	10.70%	166,455	35.40%
Current ACL	2013	25,000	240,029	70.20%	377,601	80.40%
	2014	25,000	228,381	66.80%	362,668	77.20%
	2015	25,000	217,371	63.60%	348,791	74.20%
	2016	25,000	207,555	60.70%	336,770	71.70%
	2017	25,000	199,131	58.20%	326,838	69.60%
	2018	25,000	192,128	56.20%	318,967	67.90%
	2019	25,000	186,405	54.50%	312,909	66.60%
	2020	25,000	181,701	53.10%	308,280	65.60%
	2021	25,000	177,758	52.00%	304,702	64.80%
	2022	25,000	174,364	51.00%	301,870	64.20%
Status quo catches	2013	12,127	240,029	70.20%	377,601	80.40%
	2014	12,135	234,602	68.60%	368,952	78.50%
	2015	12,143	229,771	67.20%	361,268	76.90%
	2016	12,149	226,014	66.10%	355,274	75.60%
	2017	12,154	223,476	65.30%	351,155	74.70%
	2018	12,157	222,149	65.00%	348,848	74.20%
	2019	12,158	221,870	64.90%	348,089	74.10%
	2020	12,158	222,375	65.00%	348,485	74.20%
	2021	12,158	223,398	65.30%	349,654	74.40%
	2022	12,157	224,732	65.70%	351,296	74.80%

4.1.2.2 Widow Rockfish

The 2011 widow rockfish assessment indicated the stock was healthy with a spawning biomass depletion of 51 percent at the start of 2011 (He, *et al*. 2011). The assessment indicated the estimated spawning stock biomass had increased steadily from a low of 30.6 percent at the start of 2001 and the estimated relative spawning stock biomass never dropped below the 25 percent MSST.

Widow rockfish are caught mostly in midwater trawls used to target Pacific whiting and, before 2002 and after trawl rationalization was implemented in 2011, used to target widow and yellowtail rockfish. The exploitation rate was above the target SPR of 50 percent (i.e., $F<F_{MSY}$) until the late 1970s when trawl catches in the target midwater fishery increased to rates beyond the target. This continued until the stock was declared overfished and managed under a rebuilding plan. Harvest declined dramatically and the estimated SPR harvest rates increased rapidly above target F_{MSY}. The increase in biomass during the past decade was the result of reduced catches rather than strong year-classes. The stock was declared rebuilt in 2013 based on the results of the 2013 assessment.

Three ACL alternatives for 2015 and 2016 are analyzed: 1) the status quo ACL of 1,500 mt, 2) an ACL of 3,000 mt, and 3) the preferred ACL of 2,000 mt. Decision table projections in the 2011 assessment assumed constant annual catches varying between 1,500 and 3,000 mt (

Table 4-3). A 3,000 mt constant annual catch is predicted to maintain the stock above the target B_{MSY} level in the next ten years under the more likely state of nature in the assessment (

Table 4-3). However, there is great uncertainty in the stock's estimated biomass, relative productivity (steepness was fixed), and other aspects of the stock's dynamics.

Industry requested a higher widow rockfish ACL than the status quo 1,500 mt to access healthy yellowtail rockfish in the trawl IFQ fishery and to be less constrained by widow rockfish bycatch in the whiting-directed trawl fisheries. The Council's preferred alternative of 2,000 mt provides a slightly higher allowable harvest than under the No Action alternative while maintaining a relatively conservative management strategy for widow given the great uncertainty in the stock's estimated biomass, productivity, and depletion.

The preferred widow rockfish ACL of 2,000 mt is accommodated under all the alternatives since it is less than the 2015 and 2016 ABCs calculated under a P* of 0.25 (the lowest ABC rule analyzed). Likewise, the No Action ACL of 1,500 mt is accommodated for the same reason.

Table 4-3. Widow rockfish decision table (from He *et al.* 2011).

Management decision	Year	Catch (mt)	State of nature			
			h = 0.41		Base case (*h*=0.76)	
			Depletion (%)	Spawning biomass (mt)	Depletion (%)	Spawning biomass (mt)
Constant catch (1,500 mt)	2011	600	30.0%	22,765	51.1%	36,342
	2012	600	29.4%	22,288	50.7%	36,053
	2013	1,500	28.6%	21,686	49.9%	35,514
	2014	1,500	27.2%	20,619	48.5%	34,473
	2015	1,500	26.1%	19,839	47.5%	33,785
	2016	1,500	25.6%	19,443	47.2%	33,585
	2017	1,500	25.7%	19,515	47.8%	34,014
	2018	1,500	26.4%	19,993	49.2%	35,022
	2019	1,500	27.2%	20,655	51.1%	36,325
	2020	1,500	28.1%	21,354	53.1%	37,737
	2021	1,500	29.0%	22,029	55.1%	39,182
	2022	1,500	29.9%	22,648	57.1%	40,603
Constant catch (2,000 mt)	2011	600	30.0%	22,765	51.1%	36,342
	2012	600	29.4%	22,288	50.7%	36,053
	2013	2,000	28.6%	21,686	49.9%	35,514
	2014	2,000	26.8%	20,332	48.1%	34,184
	2015	2,000	25.4%	19,283	46.7%	33,223
	2016	2,000	24.6%	18,639	46.1%	32,770
	2017	2,000	24.4%	18,486	46.3%	32,967
	2018	2,000	24.7%	18,755	47.5%	33,759
	2019	2,000	25.3%	19,217	49.0%	34,860
	2020	2,000	26.0%	19,720	50.7%	36,082
	2021	2,000	26.6%	20,197	52.5%	37,347
	2022	2,000	27.2%	20,609	54.3%	38,596

Management decision	Year	Catch (mt)	State of nature			
			h = 0.41		Base case (*h*=0.76)	
			Depletion (%)	Spawning biomass (mt)	Depletion (%)	Spawning biomass (mt)
Constant catch (2,500 mt)	2011	600	30.0%	22,765	51.1%	36,342
	2012	600	29.4%	22,288	50.7%	36,053
	2013	2,500	28.6%	21,686	49.9%	35,514
	2014	2,500	26.4%	20,046	47.7%	33,896
	2015	2,500	24.7%	18,729	45.9%	32,663
	2016	2,500	23.5%	17,838	44.9%	31,957
	2017	2,500	23.0%	17,460	44.9%	31,922
	2018	2,500	23.1%	17,520	45.7%	32,499
	2019	2,500	23.4%	17,783	47.0%	33,398
	2020	2,500	23.8%	18,089	48.4%	34,429
	2021	2,500	24.2%	18,364	49.9%	35,513
	2022	2,500	24.5%	18,565	51.4%	36,589
Constant catch (3,000 mt)	2011	600	30.0%	22,765	51.1%	36,342
	2012	600	29.4%	22,288	50.7%	36,053
	2013	3,000	28.6%	21,686	49.9%	35,514
	2014	3,000	26.0%	19,758	47.2%	33,607
	2015	3,000	24.0%	18,171	45.1%	32,100
	2016	3,000	22.4%	17,032	43.8%	31,140
	2017	3,000	21.7%	16,430	43.4%	30,871
	2018	3,000	21.5%	16,281	43.9%	31,232
	2019	3,000	21.5%	16,341	44.9%	31,928
	2020	3,000	21.7%	16,447	46.1%	32,765
	2021	3,000	21.8%	16,516	47.3%	33,665
	2022	3,000	21.7%	16,500	48.6%	34,565

4.1.3 Non-Overfished Stocks with Higher Annual Catch Limit Attainment Rates or Preferred to be Removed from a Status Quo Stock Complex and Managed with Stock-Specific Harvest Specifications

4.1.3.1.1 Cabezon in Oregon

Cope and Key (2009) estimated the spawning biomass depletion of the Oregon substock of cabezon (*Scorpaenichthys marmoratus*) was 52% at the start of 2009. The stock was managed as a component of the Other Fish complex until 2011 when the stock was removed from the complex and managed under stock-specific specifications.

Total estimated catch by sector in 2004-2012 is provided in Table 4-4, with an estimated average annual catch of 43.1 mt. Oregon recreational catches were obtained from a March 23, 2014 Recreational

Fisheries Information Network (RecFIN) query by querying for landed catch (A) plus the reported dead catch (B1).

Table 4-4. Estimated total catch (in mt) of cabezon in Oregon by sector, 2004-2012.

Sector	2004	2005	2006	2007	2008	2009	2010	2011	2012
Set-Aside	**0.002**	**0.01**	**0.003**	**0.01**		**0.01**	**0.002**		
Incidental	0.002		0.003				0.002		
Pink Shrimp		0.01		0.01		0.01			
Trawl	**0.03**	**0.1**	**0.1**	**0.02**	**0.1**	**0.1**	**0.01**		**0.1**
Limited Entry Trawl Permit - Trawl Gear	0.03	0.1	0.1	0.02	0.1	0.1	0.01		0.1
Non-Trawl	**44.6**	**45.9**	**38.4**	**38.3**	**41.4**	**46.5**	**40.2**	**47.3**	**44.5**
Nearshore Fixed Gear	27.2	28.3	22.3	21.9	24.8	30.3	23.6	29.8	29.0
OR Recreational	17.4	17.6	16.1	16.3	16.6	16.2	16.5	17.5	15.5
Grand Total	**44.6**	**46.1**	**38.5**	**38.3**	**41.5**	**46.6**	**40.2**	**47.3**	**44.6**

The 2015 and 2016 OFL and ABC are 49 mt and 47 mt (P* = 0.45), respectively. Total estimated catch in 2004-2012 of Oregon cabezon has never been over the 2015 OFL or ABC (Figure 4-2), although the 2011 total catch was equal to the new preferred ABC. The estimated cumulative 2004-2012 catch was 87.9% and 91.9% of the cumulative 2015 OFL and ABC, respectively. Continued management of this stock under the default harvest control rules is predicted to be sustainable.

The preferred alternative for Oregon cabezon is the same as Alternative 1 (ACL = ABC using a P* of 0.45). The alternative 2 ACL of 38 mt in 2015 and 2016 will likely cause the Oregon recreational cabezon to be shorter; however, this may not have a significant impact on projected angler trips since the regulatory action when attaining this ACL early is to go to non-retention of cabezon. If, as suspected, the recreational fishery targets many different groundfish species, non-retention of cabezon is not likely to deter anglers. The nearshore commercial landings of cabezon would also likely be less under Alternative 2, which would decrease economic benefits to the industry.

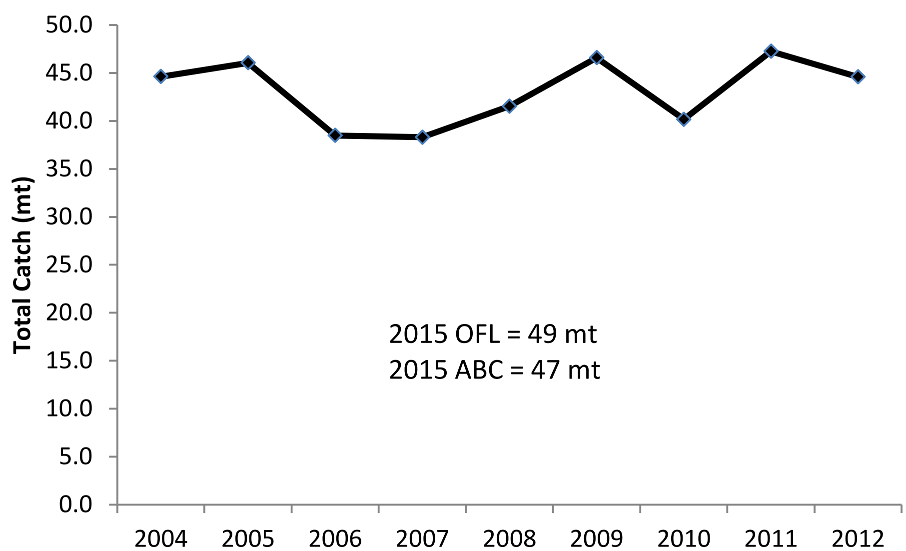


Figure 4-2. Estimated total catch of cabezon in Oregon, 2004-2012, relative to the preferred 2015 OFL and ABC.

4.1.3.2 Sablefish North of 36º N lat.

The 2011 sablefish (*Anoplopoma fimbria*) assessment estimated spawning stock biomass to be at 33 percent of its unfished biomass at the beginning of 2011 (Stewart, *et al.* 2011). The resource was modeled as a single stock; however, there is some dispersal to and from offshore seamounts and along the coastal waters of the continental U.S., Canada, Alaska, and across the Aleutian Islands to the western Pacific which was not explicitly accounted for in this analysis. They are found in waters as from 27-1,000 fm but are most common in the 110-550 fm depth zone.

Sablefish is a major target species in offshore fixed gear and bottom trawl fisheries and is the most valuable commercial groundfish stock on a per pound basis. While the assessment is coastwide and coastwide OFLs and ABCs are specified for the stock, ACLs are apportioned north and south of 36º N lat. since long-term formal allocations have been decided for the portion of the population north of 36º N lat. Only the population north of 36º N lat. has experienced catches with high attainment rates relative to specified ACLs/OYs; the percent difference in the cumulative 2002-2012 catch of sablefish south of 36º N lat. has been 27.1% of the cumulative 2015 ACL.

The preferred coastwide OFL of 7,857 mt is projected from the 2011 assessment. The preferred ABC of 7,173 mt is based on a P* of 0.4. The coastwide ABC is apportioned 73.6% to the north based on the average annual 2003-2010 proportion of estimated swept-area biomass from the NWFSC trawl survey. The 2015 40-10 adjusted ACL for sablefish north of 36º N lat. is 4,793 mt.

Total catches by sector of sablefish north of 36º N lat. are provided in Table 4-5. The cumulative 2002-2012 total catch of sablefish north of 36º N lat. was 19.5% higher than the cumulative 2015 ACL, although the OY (now ACL) was only exceeded in 2007 due to a data glitch in a PacFIN data feed which has now been fixed. In hindsight, the 2015 ACL was exceeded in 9 of the 11 years analyzed (Figure 4-3). Sablefish is one of the most closely tracked species in the U.S. west coast groundfish fishery and the chance of overfishing the stock in 2015 and 2016 is low.

The preferred ACLs for sablefish north of 36º N lat. are 4,793 mt and 5,241 mt in 2015 and 2016, respectively and are based on an ABC using a P* of 0.4 and application of the 40-10 rule to calculate the ACLs. In contrast, the Alternative 1 ACLs of 5,012 mt and 5,467 mt in 2015 and 2016, respectively are based on a higher ABC with the 40-10 rule applied and the Alternative 2 ACLs of 4,114 mt and 4,540 mt in 2015 and 2016, respectively are based on a lower ABC with the 40-10 rule applied. Therefore, with fewer 2015-2016 sablefish removals relative to Alternative 1, the stock would reach the B_{MSY} target faster under the preferred alternative. However, the preferred removals would be higher than under Alternative 2, which would project a slower attainment of the B_{MSY} target under the preferred alternative relative to Alternative 2.

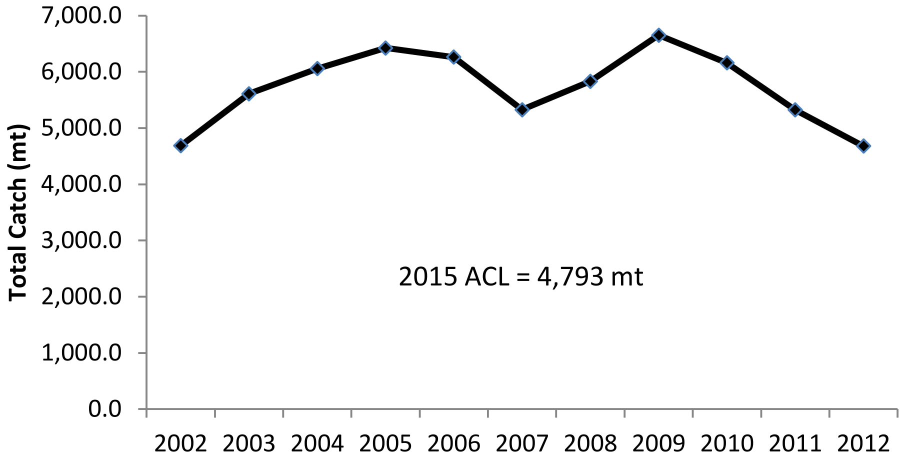


Figure 4-3. Estimated total catch of sablefish north of 36º N lat., 2002-2012 relative to the preferred 2015 ACL.

Table 4-5. Estimated total catch by sector of sablefish north of 36º N lat., 2001-2012.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sablefish (North of 36° N. lat.)											
Set-Aside	**492.3**	**734.4**	**871.8**	**803.6**	**735.0**	**597.8**	**570.8**	**673.2**	**593.0**	**551.9**	**593.7**
California Halibut		0.0	0.1	0.0			0.0				
Incidental	42.3	131.2	161.1	109.7	66.1	82.1	41.3	32.8	12.2	18.7	31.6
Pink Shrimp	13.8	0.6	0.7	0.4		0.3	2.2	0.9	1.3	0.1	0.2
Tribal At-Sea Hake	0.5	0.1	0.1	0.0		0.0	0.8	0.0		0.1	
Tribal Shoreside	435.7	602.5	709.9	693.5	668.8	515.5	526.5	639.5	579.5	533.0	561.9
Non-Trawl	**1,700.0**	**2,450.9**	**2,580.9**	**3,075.6**	**2,890.3**	**2,119.0**	**2,323.3**	**2,791.6**	**2,791.6**	**2,388.3**	**1,899.4**
Nearshore Fixed Gear	14.9	10.7	2.1	41.5	8.6	2.6	3.3	3.2	2.9	1.4	1.7
Non-nearshore Fixed Gear	1,685.1	2,440.2	2,578.8	3,034.1	2,881.7	2,116.3	2,319.9	2,788.5	2,788.7	2,386.8	1,897.7
Trawl	**2,494.1**	**2,425.6**	**2,603.6**	**2,543.7**	**2,637.5**	**2,609.1**	**2,937.2**	**3,187.5**	**2,773.4**	**2,383.6**	**2,186.8**
Non-Tribal At-Sea Hake	21.1	17.1	28.5	15.2	2.4	3.2	1.6	0.2	12.4	5.0	5.1
Shoreside Hake	132.9	40.3	129.4	22.4	11.1	9.0	0.3	49.2	20.8	30.4	47.2
Limited Entry Trawl Permit - Trawl Gear	2,340.0	2,368.2	2,445.7	2,506.1	2,624.1	2,596.9	2,935.3	3,138.1	2,740.2	1,661.0	1,407.7
Limited Entry Trawl Permit - Fixed Gear										687.2	726.8
Grand Total	**4,686.3**	**5,610.9**	**6,056.4**	**6,422.9**	**6,262.8**	**5,325.9**	**5,831.3**	**6,652.3**	**6,158.0**	**5,323.7**	**4,679.8**

4.1.3.3 Spiny Dogfish

Gertseva and Taylor (2011) estimated the spawning stock output of spiny dogfish to be 44,660 thousands of fish, which represented 63% of the unfished spawning output level at the start of 2011. While this depletion level indicated the stock was healthy, fishing at the target SPR of 45% was predicted to severely reduce the spawning output over the long term because of the extremely low productivity and other reproductive characteristics of the stock.

The SSC's recommended change in the proxy F_{MSY} harvest rate to calculate the OFL for this stock from an SPR of 45% to an SPR of 50% addresses the conservation need for a more conservative OFL (see the 2014 Stock Assessment and Fishery Evaluation document (PFMC 2014) for more information on the meta-analysis used to recommend the new proxy F_{MSY} harvest rate for elasmobranchs). The new preferred 2015 and 2016 OFLs based on the 50% SPR harvest rate of 2,523 and 2,503 mt, respectively compare to 2015 and 2016 OFLs based on the status quo 45% SPR harvest rate of 2,921 and 2,893 mt, respectively.

Total annual catches of spiny dogfish from 2004-2012 by sector of the groundfish fishery are provided in Table 4-6. Spiny dogfish catches prior to 2004 were not included in the biological impact analysis due to a lack of confidence in the precision of catch estimates derived from the Marine Recreational Fisheries Statistical Survey (MRFSS), which was the basis of California recreational catch estimates prior to implementation of the California Recreational Fisheries Survey (CRFS) in 2004. Spiny dogfish catches in recreational fisheries by state were generated from a March 15, 2014 Recreational Fisheries Information Network (RecFIN) query by querying for landed catch (A) plus the reported dead catch (B1). Since spiny dogfish catches in the Washington recreational fishery are reported in the Unidentified Sharks category, the A + B1 catches of Unidentified Sharks were used with an assumption 100% of that reported catch was spiny dogfish. Gertseva and Taylor (2011) made a similar assumption in the 2011 assessment. Catches by sector in the non-tribal at-sea hake fishery (Catcher-Processors and Mothership) were generated from a NMFS Alaska Fisheries Information Network NORPAC database query on March 14, 2014. Catches for all other sectors were generated from the Groundfish Mortality Multiyear Data Product database provided by the NMFS NWFSC WCGOP program.

Figure 4-4 compares the 2004-2012 annual total catches of spiny dogfish to the preferred 2016 OFL and ABC limits (2016 limits are slightly lower than 2015 limits so these values were chosen). In hindsight, the stock did not exceed the 2016 OFL and experience overfishing during the time series (Figure 4-4). The 2016 ABC was exceeded twice (2005 and 2008) primarily due to high bottom trawl catches (Table 4-6). Trawl catches seem to have stabilized at levels below the 2016 ABC in recent years with the lowest bottom trawl catches occurring since 2011 when the sector was rationalized under IFQ management (catches in the trawl IFQ sector since 2011 are the sum of those in the limited entry trawl permit – fixed gear, limited entry trawl permit – trawl gear, and shoreside hake categories in Table 4-6) While spiny dogfish is not an IFQ species, the distribution of bottom trawl effort in the shorebased IFQ sector changed dramatically since implementation of trawl rationalization. Total catches of spiny dogfish in 2012 were the lowest in the time series.

Managing the stock with its own OFL and ABC starting in 2015 will provide more direct catch accounting and control. There does not appear to be a high risk of the stock being subject to overfishing in the next management cycle. If further catch controls are needed in the future to reduce impacts, the Council and NMFS can consider a trawl allocation designating the species as an IFQ species through a regulatory amendment. However, determining an equitable catch history-based allocation of quota shares by trawl permit may be very difficult given the uncertain catch history of spiny dogfish (dogfish are rarely landed and have been discarded in most fisheries). In the meantime, cumulative landing limits and area closures are the catch control tools available to manage spiny dogfish (PFMC and NMFS 2012).

The cumulative catch of spiny dogfish in 2004-2012 was 39.4% less than the cumulative 2016 OFL (the 2016 OFL times the number of years in the analysis (9)), indicating the preferred harvest specifications and the total catch since 2004 have not created a significant biological risk for the stock of spiny dogfish on the U.S. west coast.

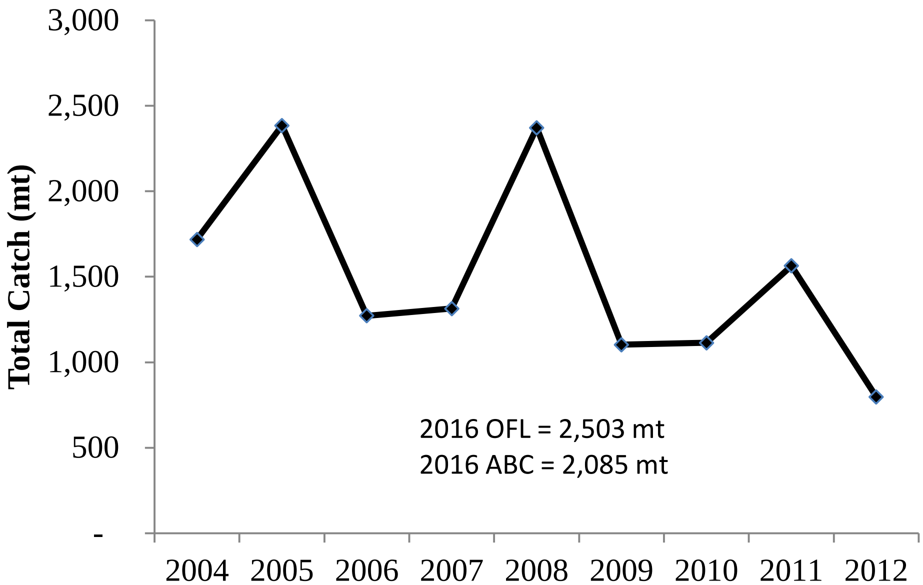


Figure 4-4. Estimated total catch of spiny dogfish, 2004-2012 relative to the preferred 2016 OFL and ABC.

The preferred alternative is to set the 2015 and 2016 spiny dogfish ACLs equal to the ABCs calculated using a P* of 0.4. These ACLs are 2,101 mt and 2,085 mt in 2015 and 2016, respectively. The choice of a higher P* (thus higher ABCs) in 2015 and 2016 than those used to determine the 2014 status quo ABC contribution of spiny dogfish to the Other Fish complex (i.e., P* = 0.3) was based on the SSC addressing the uncertainty in the proxy F_{MSY} harvest rate used to decide the spiny dogfish OFL. The SSC meta-analysis of proxy F_{MSY} harvest rates for elasmobranchs led to a more conservative proxy harvest rate of SPR = 50%. Therefore, with less uncertainty in estimating the OFL, the Council preferred a higher P* and lesser ABC buffer to determine the ACL. The risk of exceeding the 2015 and 2016 ACLs is therefore lower with a lower risk of spiny dogfish bycatch constraining fishing opportunities on healthy target stocks.

The preferred ACLs for spiny dogfish are lower than the the Alternative 1 ACLs (2,303 mt and 2,285 mt in 2015 and 2016, respectively) and higher than the Alternative 2 ACLs (1,551 mt and 1,540 mt in 2015 and 2016, respectively). Therefore, predicted spiny dogfish biomass in the foreseeable future would be lower under Alternative 1 and higher under Alternative 2 relative to the preferred alternative.

Table 4-6. Annual total catches of spiny dogfish by sector, 2004-2012.

Sector	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Set-Aside	**453**	**324**	**127**	**192**	**485**	**259**	**149**	**191**	**5**	**2,185**
California Halibut	35	25	8	3	3	3	3	2	2	84
Incidental	98	8	6	0.2	15	1	1	0.1	0.1	131
Pink Shrimp	5	1		1	4	0.5	16	3	1	31
Tribal At-Sea Hake	275	285	35	69	159	128	122	59	1	1,133
Tribal Shoreside	40	6	77	119	303	125	7	128	2	806
Non-Trawl	**251**	**303**	**351**	**347**	**290**	**125**	**135**	**73**	**85**	**1,961**
Nearshore Fixed Gear	0.04	0.18	0.03	0.27	0.78	0.49	0.11	0.28	0.02	2.20
Non-nearshore Fixed Gear	247	298	347	342	286	120	133	63	82	1,918
CA rec a/	2.3	4.1	3.2	5.0	2.5	3.7	1.3	9.5	2.6	34.10
OR rec a/	0.07	0.09	0.005	0.04	0.02	0.07	0.08	0.05	0.06	0.48
WA rec a/	1.6	0.5	0.8	-	0.9	0.7	1.1	0.2	0.4	6.3
Trawl	**1,015**	**1,757**	**794**	**775**	**1,596**	**719**	**830**	**1,300**	**707**	**9,499**
Limited Entry Trawl Permit - Fixed Gear								27	29	56
Limited Entry Trawl Permit - Trawl Gear	644	1,591	737	637	1,024	663	523	367	340	6,530
Catcher-Processor b/	331	42	6	63	488	28	110	641	148	1,859
Mothership b/	10	28	17	23	24	7	45	85	30	269
Shoreside Hake	30	96	34	51	59	21	151	181	160	785
Total Non-Treaty Groundfish Sectors	**1,266**	**2,060**	**1,145**	**1,122**	**1,886**	**844**	**965**	**1,373**	**793**	**11,461**
Grand Total	**1,719**	**2,385**	**1,272**	**1,314**	**2,371**	**1,103**	**1,114**	**1,564**	**798**	**13,647**

a/ Catches generated from a RecFIN query (03/15/2014) of spiny dogfish catches (A + B1) in CA and OR; and of unidentified shark catches (A + B1), assumed to be spiny dogfish, in WA.
b/ Catches generated from a NORPAC query (03/14/2014).

4.1.4 Stock Complexes and Component Stocks Currently Managed in Stock Complexes with Higher Annual Catch Limit Attainment Rates

4.1.4.1 Nearshore Rockfish North of 40º10' N lat.

In recent years, the ACL (formerly OY) for the Nearshore Rockfish complex north of 40º10' N lat. has typically had a high attainment rate. The bulk of the harvest has occurred in nearshore recreational fisheries in all three states and nearshore commercial fisheries in California and Oregon. The preferred ACL for the northern nearshore rockfish complex in 2015 and 2016 is 69 mt, a 26.6% decrease from the 2014 ACL of 94 mt. Most of this decrease is due to new assessments for brown, China, and copper rockfish, as well as a blue rockfish ACL contribution that is trending downwards. Figure 4-5 depicts the annual total catch estimated in 2004-2012 for the complex relative to the preferred 2015 OFL and ACL. In only one year in this time period (2009) has total catch been below the preferred 2015 ACL. In hindsight, total catch has been at or above the preferred 2015 OFL in 5 of the 9 years analyzed.

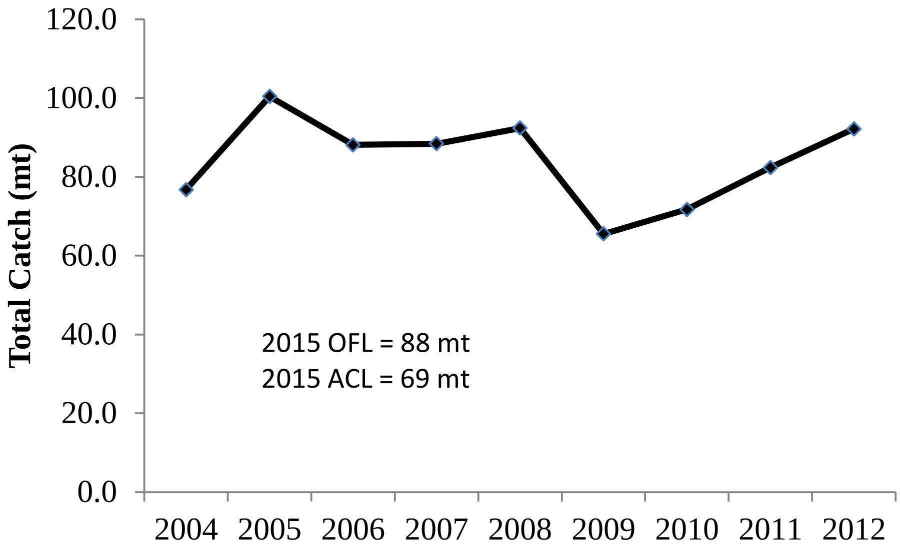


Figure 4-5. Estimated total catch of nearshore rockfish north of 40º10' N lat. in 2004-2012 relative to the preferred 2015 OFL and ACL.

Table 4-7 shows the 2004-2012 total catches of species in the northern Nearshore Rockfish complex by sector. Northern Nearshore Rockfish catches prior to 2004 were not included in the biological impact analysis due to a lack of confidence in the precision of catch estimates derived from the Marine Recreational Fisheries Statistical Survey (MRFSS), which was the basis of California recreational catch estimates prior to implementation of the California Recreational Fisheries Survey (CRFS) in 2004. Northern Nearshore Rockfish catches in recreational fisheries by state were generated from a March 18, 2014 RecFIN query by querying for landed catch (A) plus the reported dead catch (B1). Catch estimates for the Redwood District (Humboldt and Del Norte counties) were used in the query to represent catches north of 40º10' N lat. Catches for all other sectors were generated from the Groundfish Mortality Multiyear Data Product database provided by the NMFS NWFSC WCGOP program.

Two of the assessed stocks managed in the northern Nearshore Rockfish complex (blue rockfish in California and China rockfish) are in the precautionary zone. Both stocks are category 2 stocks with the status of China rockfish informed by a 2013 data-moderate assessment (PFMC 2014). Blue rockfish catches in California have been managed with a statewide HG since 2009. The HG was calculated using the default 40-10 ACL harvest control rule. Total mortality has been maintained within the HG and the stock is predicted to be increasing in abundance. The Council is considering HG management for the entire complex to be implemented in 2015.

Other assessed stocks managed in the northern Nearshore Rockfish complex include brown rockfish in California, copper rockfish, and gopher rockfish in California. All of these stocks are estimated to be healthy.

The preferred 2015 and 2016 ACL of 69 mt for the complex is the same as the Alternative 1 ACL. This compares to the Alternative 2 ACL of 40 mt using a P* of 0.25 to calculate the ABC contributions of component stocks. The Alternative 2 ACL would provide greater conservation benefits to component stocks of concern (e.g., China rockfish), but would further impact nearshore commercial and recreational fisheries already facing a 26.6% decrease in allowable harvest relative to the No Action ACL for this high attainment complex.

Table 4-7. Annual total catches of nearshore rockfish north of 40°10' N lat. by sector, 2004-2012.

Sector and Stocks	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Set-Aside	**0.2**	**0.3**	**0.3**	**0.4**	**0.0**	**0.1**	**0.0**	**0.0**	**0.2**	**1.6**
Incidental	**0.1**	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.4**
Black and Yellow Rockfish										0.0
Blue Rockfish	0.0	0.0		0.0					0.1	0.1
Brown Rockfish							0.0			0.0
China Rockfish				0.0						0.0
Copper Rockfish				0.0						0.0
Gopher Rockfish				0.0						0.0
Nearshore Rockfish Unid	0.1	0.0	0.0	0.0						0.1
Olive Rockfish							0.0			0.0
Quillback Rockfish	0.0								0.1	0.1
Pink Shrimp	**0.0**	**0.0**	**0.0**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.3**
Blue Rockfish				0.2	0.0					0.2
Copper Rockfish		0.0								0.0
Olive Rockfish								0.0		0.0
Quillback Rockfish										0.0
Tribal Shoreside	**0.1**	**0.2**	**0.3**	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**0.9**
Copper Rockfish	0.0									0.0
Nearshore Rockfish Unid	0.0	0.2	0.0		0.0	0.1		0.0	0.1	0.4
Quillback Rockfish	0.1	0.1	0.2	0.1						0.5
Non-Trawl	**74.2**	**99.8**	**85.2**	**87.9**	**92.3**	**65.3**	**71.7**	**82.2**	**91.8**	**750.5**
Nearshore Fixed Gear	**28.3**	**38.0**	**35.5**	**34.5**	**51.5**	**26.4**	**19.3**	**28.8**	**28.0**	**290.2**
Black and Yellow Rockfish	0.1	0.5	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.9
Blue Rockfish	15.0	21.2	19.8	14.5	29.7	11.7	10.8	15.2	12.3	150.2
Brown Rockfish	0.3	0.9	0.7	0.4	0.4	0.2	0.1	0.0	0.3	3.3
China Rockfish	7.5	4.7	5.8	8.1	9.8	8.8	5.3	8.5	9.4	68.0
Copper Rockfish	2.0	2.5	2.1	3.2	3.8	1.9	1.2	1.7	2.2	20.5

Sector and Stocks	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Gopher Rockfish	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.8
Grass Rockfish	0.9	2.0	1.3	0.9	0.4	0.3	0.2	0.2	0.2	6.4
Nearshore Rockfish Unid	0.3	1.4	0.8	0.2						2.8
Olive Rockfish	0.0		0.0	0.4	0.0	0.7	0.0	0.1	0.1	1.3
Quillback Rockfish	2.2	4.7	4.9	6.6	7.1	2.6	1.5	2.9	3.4	35.9
Non-nearshore Fixed Gear	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**0.0**	**0.0**	**0.0**	**0.3**
Copper Rockfish						0.1				0.1
Olive Rockfish	0.2									0.2
Quillback Rockfish						0.1				0.1
CA Rec	**11.5**	**11.9**	**14.6**	**16.0**	**7.2**	**9.6**	**10.6**	**8.7**	**10.1**	**100.1**
Black and Yellow Rockfish	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
Blue Rockfish	8.0	8.5	9.3	6.6	2.2	3.1	4.1	2.7	2.9	47.4
Brown Rockfish	0.1	0.2	0.7	0.6	0.7	0.5	0.8	0.4	0.5	4.6
China Rockfish	0.5	0.5	0.6	1.5	1.0	1.6	0.9	1.2	1.4	9.2
Copper Rockfish	1.3	0.8	1.6	3.5	1.5	2.2	2.4	1.5	1.4	16.4
Gopher Rockfish	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.2	0.1	0.8
Grass Rockfish	0.1	0.1	0.0	0.2	0.2	0.3	0.6	0.2	0.1	2.0
Olive Rockfish	0.4	0.1	0.4	0.4	0.0	0.2	0.2	0.1	0.1	1.8
Quillback Rockfish	1.0	1.7	1.8	2.9	1.4	1.7	1.4	2.2	3.6	17.7
OR Rec	**27.2**	**41.9**	**27.2**	**29.4**	**26.9**	**24.9**	**32.8**	**36.7**	**45.9**	**292.8**
Black and Yellow Rockfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue Rockfish	20.8	33.2	16.0	17.3	16.2	15.9	22.0	21.4	26.1	188.8
Brown Rockfish	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.6
China Rockfish	2.0	2.1	2.6	3.1	2.9	2.3	2.6	3.4	3.7	24.6
Copper Rockfish	2.0	3.2	3.7	4.2	3.7	2.8	3.8	5.9	7.2	36.6
Grass Rockfish	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
Olive Rockfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Quillback Rockfish	2.4	3.3	4.8	4.8	4.1	3.7	4.2	5.7	8.8	41.8

Sector and Stocks	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand
WA Rec	**7.1**	**8.0**	**8.0**	**8.0**	**6.7**	**4.3**	**9.0**	**8.1**	**7.9**	**67.0**
Blue Rockfish	1.4	2.3	2.1	1.8	1.0	0.6	2.6	1.4	1.8	15.0
China Rockfish	2.1	2.0	2.4	2.6	2.4	1.7	3.5	2.8	2.7	22.1
Copper Rockfish	0.9	1.2	1.1	1.2	1.3	0.6	1.3	2.2	1.2	11.1
Quillback Rockfish	2.8	2.5	2.4	2.3	2.1	1.3	1.6	1.7	2.2	18.8
Trawl	**2.4**	**0.3**	**2.6**	**0.1**	**0.1**	**0.1**	**0.0**	**0.1**	**0.1**	**5.8**
Limited Entry Trawl Permit - Trawl Gear	**2.4**	**0.3**	**2.5**	**0.1**	**0.1**	**0.1**	**0.0**	**0.1**	**0.1**	**5.7**
Blue Rockfish		0.0						0.0		0.0
Brown Rockfish	0.4	0.0	0.0		0.0			0.0	0.0	0.4
China Rockfish										0.0
Copper Rockfish	0.0	0.1	0.1		0.0					0.2
Nearshore Rockfish Unid	0.3	0.1	0.1	0.0					0.0	0.6
Olive Rockfish	0.1									0.1
Quillback Rockfish	1.5	0.1	2.3	0.1	0.1	0.1	0.0	0.1	0.1	4.3
Non-Tribal At-Sea Hake	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Blue Rockfish			0.0							0.0
Quillback Rockfish			0.0		0.0					0.0
Shoreside Hake	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
Blue Rockfish			0.0							0.0
Nearshore Rockfish Unid			0.1	0.0	0.0		0.0			0.1
Quillback Rockfish		0.0			0.0					0.0
Grand Total	**76.7**	**100.4**	**88.1**	**88.4**	**92.4**	**65.5**	**71.7**	**82.3**	**92.2**	**757.9**

China Rockfish North of 40º10' N lat.

The populations of China rockfish (*Sebastes nebulosus*) north and south of 40º10' N lat. were assessed by Dick and Cope (2014) in a new 2013 data-moderate assessment. The southern population was estimated to be healthy with an estimated depletion of 72% at the start of 2013. However, the northern population, managed as a component stock in the northern Nearshore Rockfish complex, was estimated to at 33% of unfished biomass at the start of 2013 (*cite new figure of SpB and depl time series*), and hence in the precautionary zone.

(*insert new figure of SpB and depl time series*)

China rockfish have a shallow distribution and are most common in the 10-50 fm zone (Love, *et al.* 2002). They are primarily caught in nearshore commercial fisheries in California and Oregon, as well as nearshore recreational fisheries in waters off all three states. Table 4-8 provides the estimated annual catches of China rockfish north of 40º10' N lat. by sector in 2004-2012. The average annual total catch in 2004-2012 is estimated to be 13.8 mt.

The estimated 2015 OFL contribution of China rockfish in the north Nearshore Rockfish complex is 7.2 mt. Under the preferred P* of 0.45, the 2015 ABC contribution is 6.6 mt and the 40-10 adjusted ACL contribution is 6.2 mt. Figure 4-6 depicts total estimated catch of China rockfish north of 40º10' N lat. relative to the 2015 OFL and ACL contributions to the complex. The cumulative 2004-2012 total estimated catch of China rockfish north of 40º10' N lat. was 191% and 221% of the cumulative 2015 OFL and ACL contributions, respectively. Maintaining these catch levels is predicted to lead to continued stock decline (*need final decision table with depletion projections*).

It is reasonable to assume that as the ACL decreases for the northern Nearshore Rockfish complex, the risk of potential overfishing decreases for China rockfish. Therefore, the Alternative 2 ACL for the complex likely entails less risk to China rockfish than the preferred/Alternative 1 ACL.

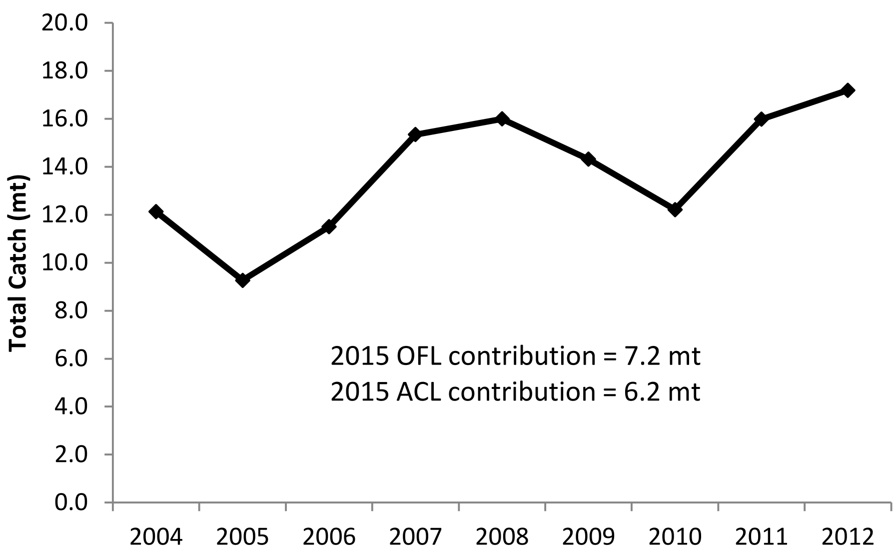


Figure 4-6. Estimated total catch of China rockfish north of 40º10' N lat. in 2004-2012 relative to the preferred 2015 OFL contribution and ACL contribution.

Table 4-8. Annual total catches of China rockfish north of 40º10' N lat. by sector, 2004-2012.

Sector and Stocks	2004	2005	2006	2007	2008	2009	2010	2011	2012
Set-Aside				**0.01**					
Incidental				**0.01**					
China Rockfish				0.01					
Non-Trawl	**12.1**	**9.3**	**11.5**	**15.3**	**16.0**	**14.3**	**12.2**	**16.0**	**17.2**
Nearshore Fixed Gear	**7.5**	**4.7**	**5.8**	**8.1**	**9.8**	**8.8**	**5.3**	**8.5**	**9.4**
China Rockfish	7.5	4.7	5.8	8.1	9.8	8.8	5.3	8.5	9.4
CA Rec	**0.5**	**0.5**	**0.6**	**1.5**	**1.0**	**1.6**	**0.9**	**1.2**	**1.4**
China Rockfish	0.5	0.5	0.6	1.5	1.0	1.6	0.9	1.2	1.4
OR Rec	**2.0**	**2.1**	**2.6**	**3.1**	**2.9**	**2.3**	**2.6**	**3.4**	**3.7**
China Rockfish	2.0	2.1	2.6	3.1	2.9	2.3	2.6	3.4	3.7
WA Rec	**2.1**	**2.0**	**2.4**	**2.6**	**2.4**	**1.7**	**3.5**	**2.8**	**2.7**
China Rockfish	2.1	2.0	2.4	2.6	2.4	1.7	3.5	2.8	2.7
Grand Total	**12.1**	**9.3**	**11.5**	**15.3**	**16.0**	**14.3**	**12.2**	**16.0**	**17.2**

4.1.4.2 Slope Rockfish Complexes North and South of 40º10' N lat.

Alternative Slope Rockfish complex structures are under consideration due primarily to concerns about catches exceeding new OFL contributions for rougheye/blackspotted and shortraker rockfish. The following sections address potential biological risks for rougheye/blackspotted and shortraker rockfish, as well as considerations for an alternative structure to the status quo slope rockfish complexes north and south of 40º10' N lat.

Rougheye/Blackspotted Rockfish

Rougheye and blackspotted rockfish are currently managed in the Slope Rockfish complexes north and south of 40º10' N lat., although they are a very minor component of the southern Slope Rockfish complex. Both species share broad overlap in their depth and geographic distributions from the Eastern Aleutian Islands along the North American continental margin to southern Oregon, with blackspotted rockfish's range extending east beyond the Aleutian chain to the Pacific Coast of Japan (Gharrett, *et al.* 2005; Hawkins, *et al.* 2005; Orr and Hawkins 2008). It is very difficult to visually distinguish between the two species and they have been persistently confused in surveys and catches. It has only been from recent genetic studies in the early 2000s that the two separate species have been identified and described (Orr and Hawkins 2008).

Hicks et al. (2013) conducted the first assessment of the U.S. west coast stock of rougheye and blackspotted rockfish as a complex of two species. The coastwide population was modeled assuming parameters for combined sexes (a single-sex model) and assuming removals beginning in 1916. The predicted spawning biomass from the base model generally showed a slight decline over the entire time series with a period of steeper decline during the 1980s and 1990s. Since 2000, the spawning biomass has stabilized and possibly increased because of reduced catches and above average recruitment in 1999. The 2013 spawning biomass relative to unfished equilibrium spawning biomass was estimated to be 47 percent of its unfished equilibrium at the start of 2013. The stock has been estimated to be healthy throughout the time series in the new assessment (Figure 4-7).

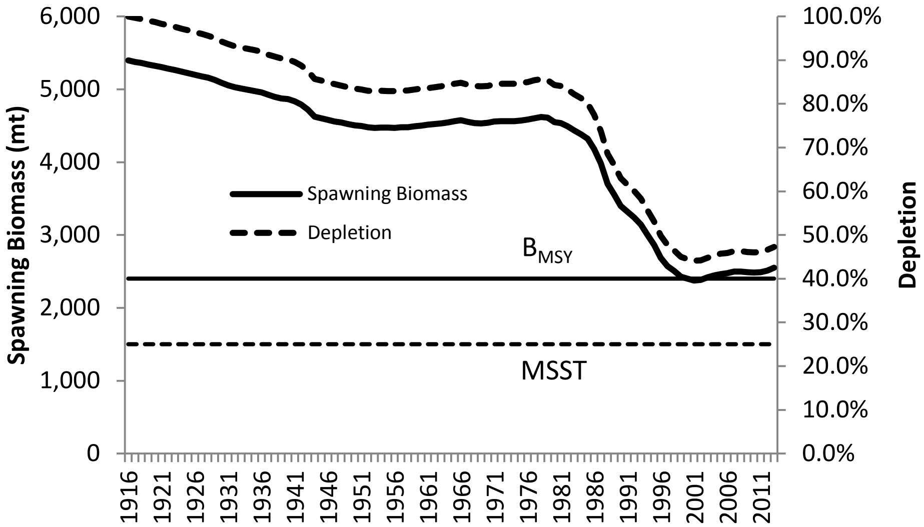


Figure 4-7. Time series of estimated spawning biomass and depletion of rougheye/blackspotted rockfish, 1916-2013 (from Hicks et al. 2013).

Total estimated annual catches of rougheye/blackspotted by sector of the groundfish fishery in 2002-2012 are provided in Table 4-9. Catches by sector in the non-tribal at-sea hake fishery (Catcher-Processors and Mothership) were generated from a NMFS Alaska Fisheries Information Network NORPAC database query on March 14, 2014. Catches for all other sectors were generated from the Groundfish Mortality Multiyear Data Product database provided by the NMFS NWFSC WCGOP program. Catches by sector in Table 4-9 are the sum of rougheye/blackspotted rockfish catches plus the proportion of rougheye/blackspotted rockfish catches reported in the shortraker-rougheye market category.

Figure 4-8 compares the 2002-2012 annual total catches of rougheye/blackspotted rockfish to the preferred 2015 OFL and ABC limits (2015 limits are slightly lower than 2016 limits so these values were chosen). In hindsight, the stock has exceeded the 2015 OFL and experienced overfishing since 2008 during the time series (Figure 4-4). The 2007 catch also slightly exceeded the 2015 ABC.

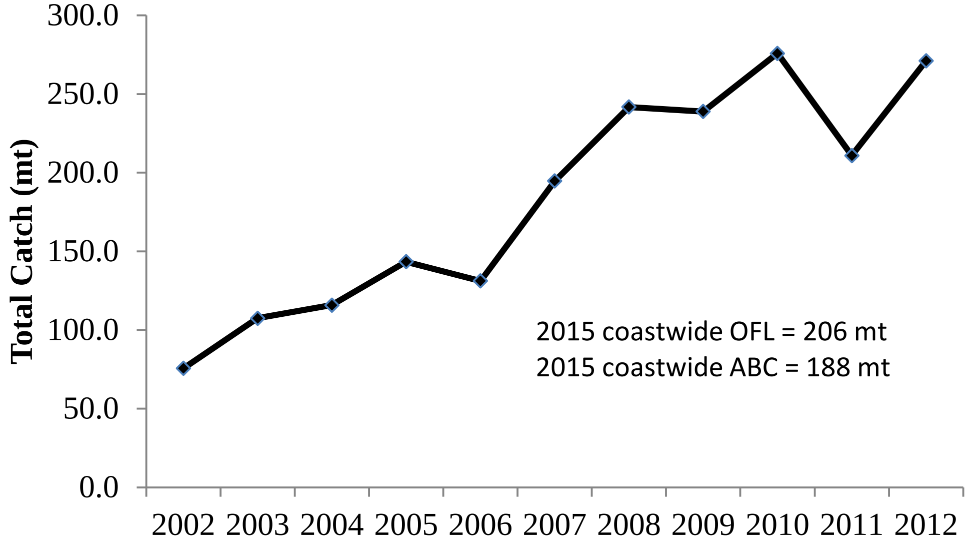


Figure 4-8. Estimated total catch of rougheye/blackspotted rockfish, 2002-2012 relative to the preferred 2015 OFL contribution and ABC contribution.

The cumulative coastwide catch of rougheye/blackspotted rockfish in 2002-2012 was 97% of the cumulative 2015 OFL (the 2015 OFL times the number of years in the analysis (11)); however, the cumulative catch since 2008 was 120.2% of the cumulative OFL for that period. This indicates there may be a concern for maintaining the observed harvest levels since 2008. Notwithstanding the recent catches, the average 2015-2024 catch predicted to stabilize the population at the proxy B_{MSY} level of $B_{40\%}$ is 266 mt (Table 4-10) or 145.8% and 107.4% of the average 2002-2012 and 2008-2012 catches, respectively. The 2015-2024 equilibrium yield catch assumes the F_{MSY} harvest rate estimated in the 2013 assessment (SPR = 29.6%). To the extent the actual F_{MSY} harvest rate for the stock is closer to or over the estimated F_{MSY} harvest rate in the 2013 assessment, the risk of future overfishing under status quo management is lessened. Additionally, a forward projection of rougheye/blackgill depletion using the base model in the 2013 assessment and assuming annual removals in the next ten years equal to the 2008-2012 average total catch of these species of 247.7 mt predicts the stock(s) would remain healthy with a depletion above the B_{MSY} proxy of 0.4 (Figure 4-9).

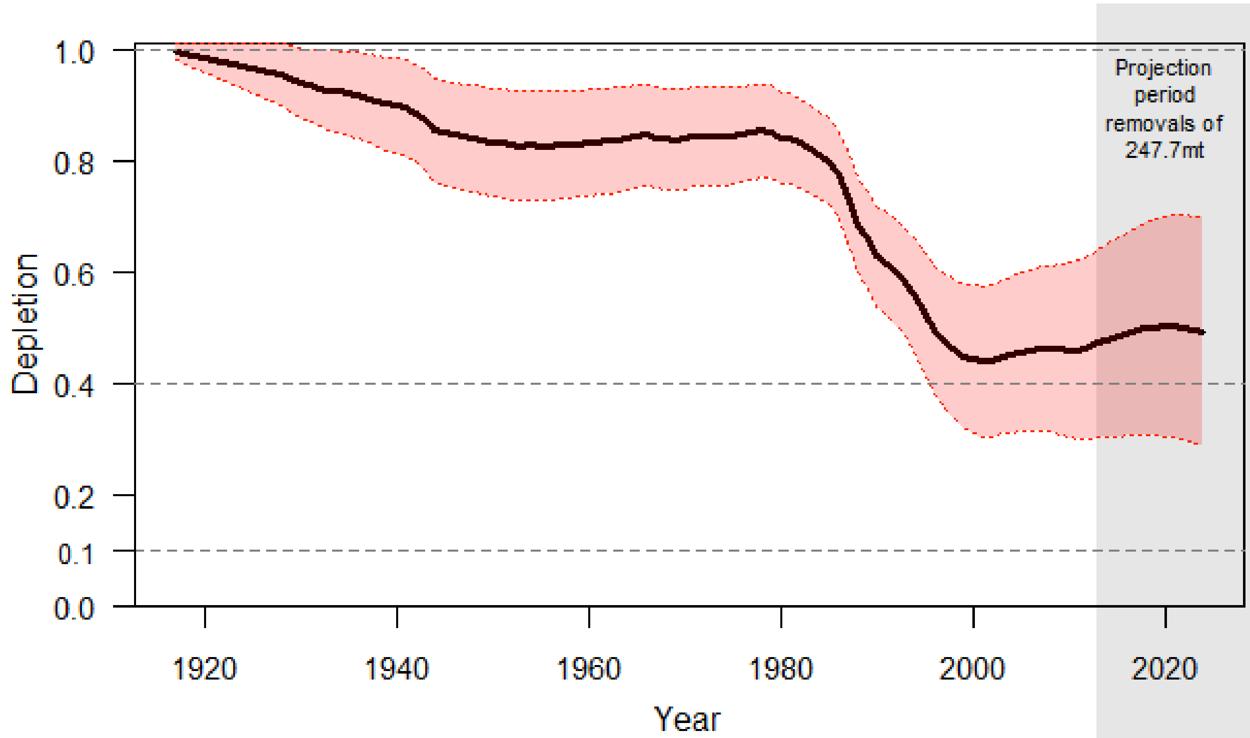


Figure 4-9. Projected depletion of rougheye/blackspotted rockfish through 2024 assuming annual removals of 247.7 mt. Shading indicates the estimated 95% confidence interval about estimated depletion.

Since 2011, slope rockfish targeting in the bottom trawl fishery has decreased dramatically (only 17% of the 2011 quota of the northern slope rockfish was attained) under IFQ management. The 2011 catch levels are more likely than those preceding implementation of trawl rationalization. Higher than normal catch of rougheye in the 2011 catcher-processor (CP) sector occurred because the CP sector fished much later in the year and concentrated effort more than usual off northern Washington where large numbers of hake were aggregated. This is not typical behavior as evidenced by highly variable catch and effort distribution in the CP sector.

The center of distributions for rougheye and blackspotted rockfish is the Gulf of Alaska and these species are at the fringe of their distributions on the U.S. west coast. The 2013 assessment of the rougheye-blackspotted rockfish complex in the Gulf of Alaska estimated an age 3+ biomass of almost 43,000 mt and predicted an increasing trend in that biomass (Shotwell and Hanselman 2013). The recommended 2015 OFL for Gulf of Alaska fisheries is 1,518 mt (ABC = 1,262 mt). It is likely the small proportion of removals in west coast fisheries will have little effect on overall stock status.

Considerations for restructuring the slope rockfish complexes to either manage rougheye/blackspotted in a coastwide management unit or in a coastwide rougheye/blackspotted/shortraker complex will also reduce risk of future overfishing but could disrupt limited entry trawl and fixed gear fisheries. Risk of future overfishing may also be mitigated by establishing an HG for rougheye/blackspotted rockfish, which would establish a sorting requirement and aid in inseason catch monitoring. Fishermen would have to carefully track their catches to avoid rougheye and blackspotted rockfish or risk an inseason action to close areas where these species are caught. The HG could be allocated by sector, but the contention associated with this would likely require more process and time than available in the 2015-

2016 specifications decision-making cycle. A shared HG would put industry on notice and allow them to devise strategies for reducing impacts on rougheye/blackspotted rockfish with less immediate disruption of the fishery. Risk of overfishing could be evaluated in the next management cycle before slope rockfish restructuring and sector allocations are considered necessary.

The preferred ABC/ACL contributions of rougheye/blackspotted rockfish to the complex is the same as under Alternative 1 (188 mt and 193 mt in 2015 and 2016, respectively coastwide). This compares to coastwide ABC/ACL contributions of 127 mt and 130 mt in 2015 and 2016, respectively under Alternative 2. If harvest of rougheye and blackspotted rockfish in 2015 and 2016 were constrained to the ABC/ACL levels, the biomasses of these species would be slightly higher in the foreseeable future under Alternative 2.

Table 4-9. Estimated total catch of rougheye/blackspotted rockfish by sector, 2002-2012.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Total estimated Rougheye/Blackspotted Rockfish coastwide catches by sector, 2002-2012.												
Set-Aside	**9.3**	**16.7**	**18.5**	**21.5**	**21.4**	**24.0**	**19.5**	**36.4**	**18.9**	**18.8**	**15.9**	**220.9**
Incidental	2.4	5.0	2.6	1.5	0.5	2.0	1.0	2.2	0.5	0.3	0.7	18.7
Pink Shrimp	0.0	0.0	1.7	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	2.0
Tribal At-Sea Hake	0.0	0.0	0.0	0.0	0.0	0.1	2.9	0.6	0.0	2.4	0.0	6.0
Tribal Shoreside	6.9	11.6	14.3	19.8	20.9	21.8	15.7	33.6	18.4	16.1	15.2	194.2
Non-Trawl	**21.5**	**13.3**	**24.2**	**37.3**	**42.2**	**47.0**	**62.1**	**71.6**	**86.2**	**41.3**	**84.7**	**531.3**
Nearshore Fixed Gear	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Non-nearshore Fixed Gear	21.5	13.1	24.2	36.6	42.1	47.0	62.1	71.6	86.2	41.3	84.6	530.4
Trawl	**44.8**	**77.6**	**73.1**	**84.6**	**67.7**	**123.7**	**160.0**	**130.9**	**170.7**	**150.9**	**170.5**	**1,254.4**
Limited Entry Trawl Permit - Fixed Gear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.1	21.7	36.7
Limited Entry Trawl Permit - Trawl Gear	44.1	75.4	58.5	45.6	61.1	92.9	86.9	120.7	144.0	53.1	47.9	830.2
Catcher-Processor	0.3	2.0	13.7	30.5	6.0	27.2	69.4	8.3	17.0	74.4	42.0	290.8
Mothership	0.4	0.2	0.0	8.3	0.6	1.7	3.1	0.4	4.6	4.0	11.8	35.1
Shoreside Hake	0.0	0.0	0.8	0.2	0.0	1.9	0.6	1.6	5.1	4.2	47.1	61.6
Grand Total	**75.6**	**107.5**	**115.8**	**143.4**	**131.2**	**194.7**	**241.7**	**238.9**	**275.8**	**210.9**	**271.1**	**2,006.6**

Table 4-10. Summary table of 12-year projections of rougheye/blackspotted rockfish beginning in 2015 for alternate states of nature based on the axis of uncertainty. Total catches in 2013 and 2014 are determined from 5 year averages of the landings for each fleet (trawl, hook & line, and at-sea), and are also used as status quo catches. Table from Hicks et al., 2013.

			State of nature					
			Low *M* = 0.037		Base case *M* estimated at 0.042		High *M* = 0.047	
Relative probability of ln(SB_2013)			0.25		0.5		0.25	
Management decision	Year	Catch (mt)	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion
ABC (σ = 0.72; P* = 0.45)	2015	188	1,855	39%	2,653	49%	3,779	60%
	2016	192	1,888	39%	2,706	50%	3,859	61%
	2017	197	1,918	40%	2,755	51%	3,932	62%
	2018	201	1,942	40%	2,797	52%	3,993	63%
	2019	204	1,959	41%	2,829	52%	4,042	64%
	2020	206	1,969	41%	2,851	53%	4,077	64%
	2021	208	1,972	41%	2,864	53%	4,100	65%
	2022	209	1,968	41%	2,868	53%	4,111	65%
	2023	209	1,958	41%	2,865	53%	4,112	65%
	2024	208	1,945	41%	2,856	53%	4,106	65%
Recent 5-year average catches	2015	189	1,855	39%	2,653	49%	3,779	60%
	2016	189	1,888	39%	2,706	50%	3,859	61%
	2017	189	1,919	40%	2,756	51%	3,933	62%
	2018	189	1,946	41%	2,801	52%	3,997	63%
	2019	189	1,968	41%	2,837	53%	4,051	64%
	2020	189	1,983	41%	2,865	53%	4,091	65%
	2021	189	1,992	42%	2,884	53%	4,120	65%
	2022	189	1,995	42%	2,895	54%	4,138	65%
	2023	189	1,993	42%	2,900	54%	4,147	65%
	2024	189	1,987	41%	2,899	54%	4,148	65%
Catch that stabilizes equilibrium depletion at 40% in the base model	2015	258	1,855	39%	2,653	49%	3,779	60%
	2016	261	1,862	39%	2,680	50%	3,833	61%
	2017	265	1,867	39%	2,704	50%	3,880	61%
	2018	267	1,866	39%	2,720	50%	3,917	62%
	2019	269	1,859	39%	2,728	51%	3,942	62%
	2020	270	1,844	38%	2,726	51%	3,954	62%
	2021	270	1,823	38%	2,715	50%	3,953	62%
	2022	269	1,796	37%	2,697	50%	3,942	62%
	2023	267	1,764	37%	2,673	50%	3,923	62%
	2024	264	1,730	36%	2,644	49%	3,897	62%

Shortraker Rockfish

Shortraker rockfish (*Sebastes borealis*) is an unassessed category 3 stock on the U.S. west coast. This is one of the largest rockfish species with a broad distribution throughout the North Pacific, from Japan, the Okhotsk Sea, and southeastern Kamchatka to the Bering Sea and Aleutian Islands south to Point Conception (Love, *et al.* 2002). They are common from at least eastern Kamchatka to British Columbia, and are considered at the fringe of their population on the U.S. west coast.

Shortraker are caught in both trawl and fixed gear fisheries on the slope (Table 4-11), almost exclusively off Washington. Total catch of shortraker rockfish has been estimated to be at or above the 2015 OFL contribution in 9 of the 11 years analyzed (Figure 4-10). Trawl catches have been decreasing since the recent year high in 2007. However, the fixed gear fishery on the slope had a recent year high catch in 2012. It is unknown how much of this catch was targeted and how much was incidental to sablefish targeting. Given the large size and higher market value of shortraker, some targeting is likely. A reduction in cumulative landing limits for rougheye and shortraker could reduce some of this targeting and impacts in this sector. Such efforts appear to have been successful in reducing southern blackgill rockfish mortalities in 2013 in fixed gear fisheries that were targeting that stock.

The vast majority of the shortraker rockfish biomass and catch occurs north of the west coast EEZ in waters off British Columbia and Alaska. It is likely the small proportion of removals in west coast fisheries will have little effect on overall stock status.

The preferred ABC/ACL contribution of shortraker rockfish to the complex is the same as under Alternative 1 (15.7 mt in 2015 and 2016 coastwide). This compares to a coastwide ABC/ACL contributions of 7.1 mt in 2015 and 2016 under Alternative 2. If harvest of shortraker rockfish in 2015 and 2016 were constrained to the ABC/ACL level, the biomass of this species would be slightly higher in the foreseeable future under Alternative 2.

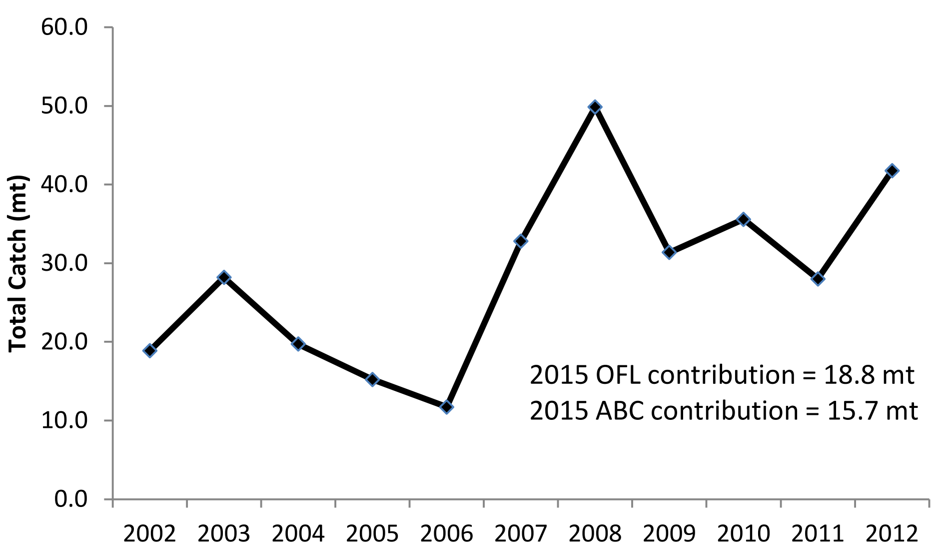


Figure 4-10. Estimated total catch of shortraker rockfish, 2002-2012 relative to the preferred 2015 OFL contribution and ABC contribution.

Table 4-11. Estimated total catch of shortraker rockfish by sector, 2002-2012.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Set-Aside	**1.7**	**2.0**	**1.1**	**1.2**	**1.5**	**1.2**	**1.7**	**1.1**	**1.1**	**1.3**	**1.5**	**15.3**
Incidental	0.6	1.4	0.5	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.2	3.1
Pink Shrimp				0.2		0.0	0.1					0.3
Tribal At-Sea Hake						0.0		0.0	0.0			0.0
Tribal Shoreside	1.0	0.6	0.6	1.0	1.4	1.0	1.6	1.0	1.1	1.3	1.3	11.9
Non-Trawl	**1.8**	**0.9**	**3.2**	**4.2**	**1.9**	**1.7**	**18.9**	**2.9**	**5.5**	**3.0**	**20.0**	**64.0**
Nearshore Fixed Gear				0.1							0.0	0.1
Non-nearshore Fixed Gear	1.8	0.9	3.2	4.1	1.9	1.7	18.9	2.9	5.5	3.0	20.0	63.9
Trawl	**15.4**	**25.3**	**15.4**	**9.9**	**8.4**	**29.9**	**29.2**	**27.3**	**28.9**	**23.7**	**20.3**	**233.7**
Limited Entry Trawl Permit - Fixed Gear										0.4	1.3	1.7
Limited Entry Trawl Permit - Trawl Gear	15.4	25.2	14.3	9.4	8.0	28.3	28.7	27.0	27.2	20.7	12.7	216.9
Catcher-Processor Mothership	0.1	0.1	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.7	3.5
Shoreside Hake		0.0	0.6			1.2	0.2	0.1	1.4	2.4	5.6	11.6
Grand Total	**18.9**	**28.2**	**19.7**	**15.2**	**11.7**	**32.8**	**49.8**	**31.4**	**35.6**	**28.0**	**41.8**	**313.1**

Alternative Slope Rockfish Stock Complexes

The two alternative slope rockfish complex alternatives decided for detailed analysis are the No Action status quo slope rockfish complexes north and south of 40º10' N lat. (preferred) and an alternative structure where rougheye, blackspotted, and shortraker rockfish are removed from the status quo complexes and managed together in a new coastwide complex. The preferred alternative for the slope rockfish complexes has one feature different from the No Action alternative; a sorting requirement is specified for rougheye and blackspotted rockfish. The alternative analyzed for the slope rockfish complexes that contemplates managing a coastwide rougheye/blackspotted/shortraker complex (RBS complex) would establish a shared fishery harvest guideline that would be used as the limit for non-tribal groundfish fisheries. Specification of a sorting requirement for rougheye and blackspotted rockfish under the preferred alternative will improve catch estimation and inseason monitoring for these stocks. The alternative of managing a coastwide rougheye/blackspotted/shortraker rockfish complex will also improve catch monitoring; however, catches would be monitored and estimated at the level of the complex aggregation for the three species combined (i.e., the species would not be separately sorted).

The preferred alternative for the slope rockfish complex north of 40º10' N lat. specifies 2015 OFLs and ABCs of 1,804 mt and 1,669 mt, respectively. Total estimated catches during 2002-2012 have been well under the preferred harvest specifications for the next management period with the maximum catch during that period (568.5 mt) being 34% of the proposed 2015 ABC for the complex (Table 4-12, Figure 4-11). The preferred alternative for the slope rockfish complex south of 40º10' N lat. specifies 2015 OFLs and ABCs of 806 mt and 698 mt, respectively. Total estimated catches during 2002-2012 have been well under the preferred harvest specifications for the next management period with the maximum catch during that period (508 mt) being 73% of the proposed 2015 ABC for the complex (Table 4-13, Figure 4-12). There is little risk of exceeding the proposed harvest limits for these two complexes in 2015 or 2016.

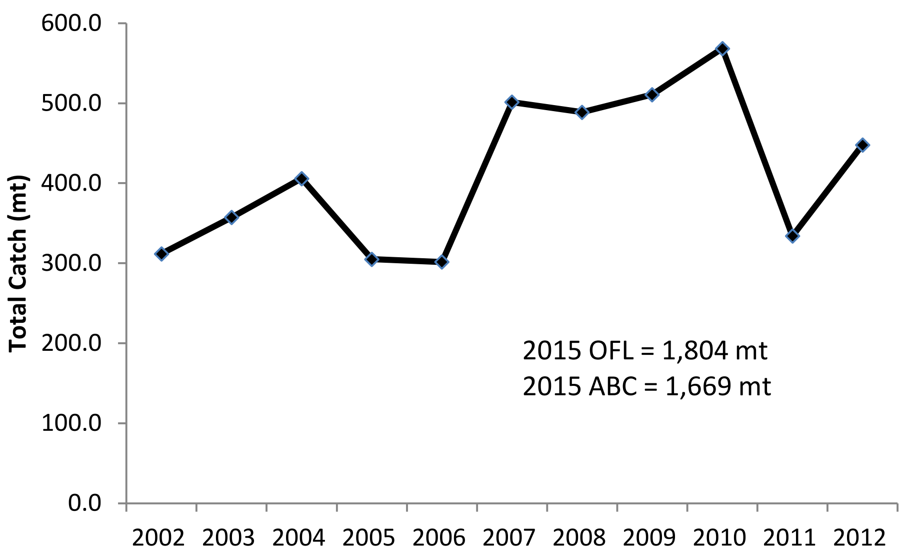


Figure 4-11. Estimated total catch of stocks in the Slope Rockfish complex north of 40º10' N lat., 2002-2012.

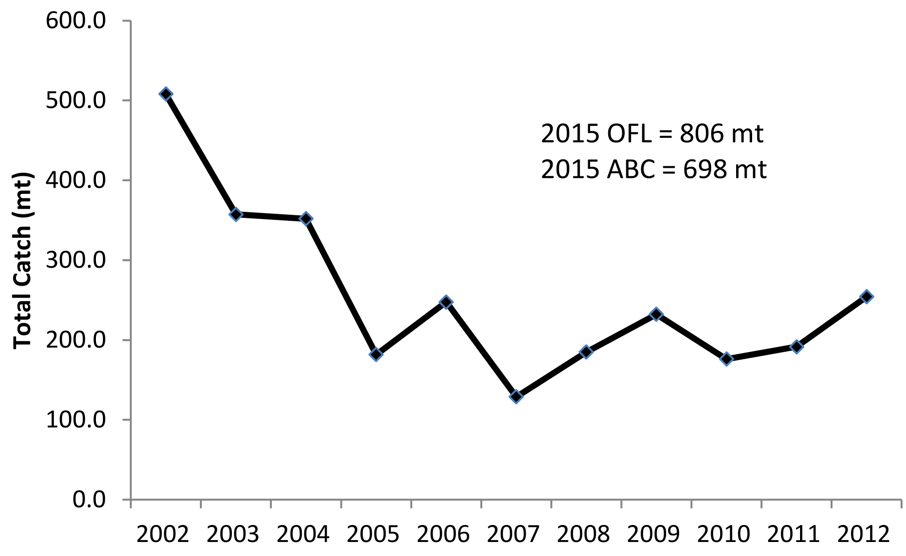


Figure 4-12. Estimated total catch of stocks in the Slope Rockfish complex south of 40º10' N lat. by sector, 2002-2012.

The 2015 and 2016 OFLs and ABCs for the alternative coastwide RBS complex would be the summed contribution of the OFLs and ABCs of the three component stocks. The 2015 OFL and ABC for the alternative RBS complex are 225 mt and 204 mt, respectively. While these were never harvest limits historically, catches of these three species in aggregate have been consistently over the 2015 RBS complex ABC since 2007 (Table 4-14 and Figure 4-13), a pattern similar to and driven by the historical catches of rougheye and blackspotted rockfish (Figure 4-8).

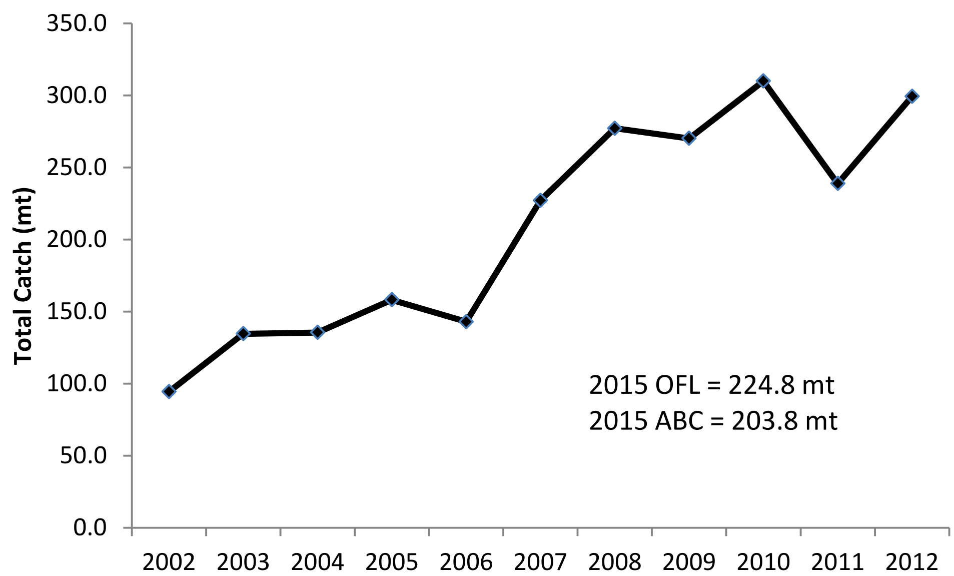


Figure 4-13. Estimated total catches by sector of rougheye/blackspotted/shortraker rockfish, 2002-2012.

The concerns for rougheye, blackspotted, and shortraker catches in excess of their component OFLs since 2007 (for shortraker rockfish and the alternative RBS complex) or 2008 (for rougheye/blackspotted rockfish) are discussed above for these individual stocks.

While status quo management of slope rockfish, which might lead to a logical prediction that catches of rougheye/blackspotted would remain above the component OFL and ABC may not risk driving stock depletion down below the target B_{MSY} level (as indicated in Figure 4-9), the Council and NMFS are concerned with the implications of exceeding the assessment-based OFLs. Managing these stocks in a separate coastwide complex is one way to address these concerns. However, the preferred alternative is to manage these stocks in the status quo complexes with a sorting requirement for rougheye and blackspotted rockfish. Public and GAP testimony on this issue indicated that removing these stocks from the status quo complexes would be disruptive to industry. Further, any measures that would require new sector allocations for these stocks would be a divisive and protracted process that cannot be done in time for the 2015-16 decision-making cycle that anticipates implementation of new regulations on January 1, 2015. Therefore, as part of the preferred alternative, the Council and NMFS expect industry to take voluntary measures to avoid these stocks. A sorting requirement will enable better catch monitoring and estimation, which should help industry more quickly realize when catches are approaching a concerning level. Further, lower slope rockfish cumulative landing limits are being considered for the non-trawl sectors to remove any incentive to target these stocks.

Industry awareness of this problem, coupled with the sorting requirement, should facilitate avoidance of rougheye. Realizing this issue was emerging, the catcher-processor fleet started to pay attention to rougheye catches by their fleet and move from areas where higher rougheye bycatch was occurring in 2013. Using the services of a private contractor, Sea State, Inc., the fleet was apprised in real time of areas where rougheye bycatch was relatively high so vessels could move to other areas to target whiting. Total catch of rougheye in 2013 by the CP fleet was 11.2 mt, down significantly from the high 2011 catch of 74.4 mt (Table 4-9). The whiting vessels in the Mothership fleet and the shorebased IFQ trawl fleet also use Sea State and can enact a similar strategy to reduce their impacts. If the non-whiting vessels in the shorebased IFQ trawl fleet can use Sea State or other strategies to avoid rougheye areas, then the risk of potential overfishing of rougheye is greatly ameliorated.

Neither the preferred alternative nor the RBS complex alternative, where all sectors would be managed under a shared fishery harvest guideline, contemplates modifying the current formal sector allocations. However, the Council stated they may consider removing these stocks from the status quo complexes in the future and modifying formal sector allocations for slope rockfish if voluntary measures do not decrease total catch impacts to prevent potential overfishing of rougheye in the next two years. Other potential accountability measures that can be considered in the future include rockfish excluders in trawl nets and implementation of Groundfish Conservation Areas (i.e., closing discrete areas where rougheye are more prevalent).

Table 4-12. Estimated total catch of stocks managed in the Slope Rockfish complex north of 40º10’ N lat. by sector, 2002-2012.

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Minor slope rockfish (North of 40°10' N. lat.)	**311.7**	**357.3**	**405.8**	**305.1**	**301.6**	**501.3**	**488.8**	**510.8**	**568.5**	**334.1**	**448.0**	**4,533.0**
Aurora Rockfish	**7.6**	**27.9**	**30.1**	**12.1**	**14.0**	**34.4**	**37.5**	**52.1**	**37.5**	**22.9**	**19.8**	**296.1**
Incidental		0.0	0.3	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.3
Nearshore Fixed Gear	0.0	0.0		0.0				0.0	0.0			0.0
Non-nearshore Fixed Gear	0.0	0.1	0.1	0.2	0.0	0.1	0.1	0.3	0.1	0.1	0.2	1.4
Non-Tribal At-Sea Hake	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.1	0.0	0.2
Pink Shrimp			0.0			2.4	0.3	0.3	0.1	0.1	0.1	3.4
Shoreside Hake	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	13.1	0.3	0.5	14.4
Tribal Shoreside	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7
Limited Entry Trawl Permit - Trawl Gear	7.5	27.2	29.5	11.8	14.0	31.5	37.1	51.5	24.2	22.3	18.9	275.5
Limited Entry Trawl Permit - Fixed Gear										0.0	0.1	0.1
Bank Rockfish	**0.2**	**1.6**	**3.6**	**1.4**	**1.1**	**2.0**	**1.3**	**1.0**	**0.5**	**0.6**	**0.3**	**13.6**
Incidental			0.0			0.0		0.0		0.0		0.0
Nearshore Fixed Gear						0.0	0.0	0.0	0.0			0.0
Non-nearshore Fixed Gear	0.0		0.0	0.0	0.1	0.6	0.1	0.0	0.0	0.2	0.0	1.2
Non-Tribal At-Sea Hake	0.1		0.1	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.7
Pink Shrimp										0.0		0.0
Shoreside Hake			0.0		0.1	0.0	0.0		0.0	0.0		0.2
Tribal Shoreside										0.0		0.0
Limited Entry Trawl Permit - Trawl Gear	0.1	1.6	3.4	1.3	0.9	1.2	1.1	1.0	0.4	0.2	0.3	11.5
Limited Entry Trawl Permit - Fixed Gear										0.0	0.0	0.0
Blackgill Rockfish	**16.0**	**8.2**	**6.4**	**3.8**	**5.1**	**7.0**	**9.7**	**6.4**	**12.6**	**4.8**	**8.9**	**89.0**
Incidental	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Nearshore Fixed Gear	1.4	0.1		0.0				0.0	0.0	0.0		1.6
Non-nearshore Fixed Gear	8.1	2.2	1.0	1.6	1.2	1.6	3.0	1.4	6.1	1.4	3.4	30.9
Non-Tribal At-Sea Hake	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.2
Pink Shrimp				0.0				0.0		0.0	0.0	0.0
Shoreside Hake	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1		0.2	0.4
Tribal Shoreside	0.3	0.3	0.3	0.2	0.1	0.0	0.2	0.2	0.0	0.0	0.0	1.4
Limited Entry Trawl Permit - Trawl Gear	6.1	5.4	4.9	2.0	3.8	5.3	6.6	4.8	6.4	3.1	4.7	53.0
Limited Entry Trawl Permit - Fixed Gear										0.3	0.5	0.9
Blackspotted Rockfish							**0.2**	**0.8**	**1.2**	**1.1**	**0.4**	**3.8**
Incidental							0.0	0.0	0.0	0.0	0.0	0.0
Non-nearshore Fixed Gear							0.1	0.5	0.8	0.3	0.2	1.9
Shoreside Hake										0.1		0.1
Tribal Shoreside							0.0	0.1	0.1	0.0	0.0	0.3
Limited Entry Trawl Permit - Trawl Gear							0.1	0.2	0.3	0.6	0.2	1.4

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Limited Entry Trawl Permit - Fixed Gear										0.0	0.0	0.0
Redbanded Rockfish	**29.1**	**29.3**	**37.0**	**42.7**	**26.6**	**34.7**	**31.6**	**29.1**	**39.7**	**31.9**	**35.6**	**367.2**
Incidental	0.8	2.2	2.4	2.6	0.2	0.9	0.3	0.3	0.1	0.1	0.2	10.1
Nearshore Fixed Gear	0.1	0.2		0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Non-nearshore Fixed Gear	10.8	11.9	14.5	29.4	14.8	17.0	17.3	13.8	23.5	18.7	21.9	193.5
Non-Tribal At-Sea Hake	0.0	0.0		0.0			0.0		0.0	0.0	0.0	0.1
Pink Shrimp			0.2	0.1		0.1	0.0	0.0	0.1	0.1	0.0	0.5
Shoreside Hake	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.8	1.1
Tribal Shoreside	5.6	5.5	6.0	5.6	6.0	6.7	3.9	5.1	4.1	8.2	6.1	62.7
Limited Entry Trawl Permit - Trawl Gear	11.7	9.5	14.1	4.5	5.6	9.8	10.0	9.9	11.8	4.1	5.9	96.9
Limited Entry Trawl Permit - Fixed Gear										0.7	0.8	1.4
Rougheye Rockfish	**74.4**	**98.9**	**115.3**	**135.7**	**130.1**	**186.4**	**221.7**	**233.5**	**265.1**	**209.2**	**236.4**	**1,906.8**
Incidental	2.4	5.0	2.6	1.5	0.5	2.0	1.0	2.2	0.5	0.3	0.7	18.7
Nearshore Fixed Gear	0.0	0.2		0.6	0.0	0.0		0.0	0.0	0.0	0.0	0.9
Non-nearshore Fixed Gear	20.7	12.5	23.9	32.1	41.7	42.8	43.1	67.2	75.9	40.5	52.5	452.9
Non-Tribal At-Sea Hake	0.7	2.2	13.7	35.9	6.6	29.0	72.7	8.6	21.6	78.5	54.0	323.7
Pink Shrimp			1.7	0.2		0.1	0.0	0.0	0.0	0.0	0.0	2.0
Shoreside Hake	0.0	0.0	0.8	0.2	0.0	1.9	0.6	1.6	5.1	4.1	47.1	61.5
Tribal At-Sea Hake						0.1	2.9	0.6	0.0	2.4		6.0
Tribal Shoreside	6.9	11.6	14.3	19.8	20.9	21.8	15.7	33.5	18.3	16.1	15.2	193.9
Limited Entry Trawl Permit - Trawl Gear	43.6	67.4	58.4	45.3	60.4	88.7	85.7	119.8	143.7	52.5	47.4	812.9
Limited Entry Trawl Permit - Fixed Gear										14.9	19.5	34.3
Sharpchin Rockfish	**28.6**	**22.1**	**31.5**	**6.5**	**1.5**	**10.3**	**4.9**	**7.6**	**8.6**	**1.2**	**9.5**	**132.4**
Incidental	0.6	0.0	0.5	0.1	0.0		0.0	0.0	0.0			1.2
Non-nearshore Fixed Gear	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.1		0.0	0.2
Non-Tribal At-Sea Hake	0.1	2.5	0.3	0.0	0.0	0.8	0.0		0.0	0.0	0.0	3.9
Pink Shrimp			0.5	0.1		1.3	0.1	0.0	0.0	0.0	0.0	2.0
Shoreside Hake	0.1		0.0				0.0	0.0	0.0	0.0	0.7	0.8
Tribal At-Sea Hake	0.0		0.0						0.0			0.0
Tribal Shoreside	0.3	0.8	0.4	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.2	2.2
Limited Entry Trawl Permit - Trawl Gear	27.5	18.8	29.8	6.1	1.4	8.2	4.7	7.5	8.5	1.2	8.5	122.1
Limited Entry Trawl Permit - Fixed Gear											0.0	0.0
Shortraker Rockfish	**18.9**	**27.1**	**19.7**	**14.8**	**11.7**	**31.8**	**34.8**	**27.8**	**33.6**	**28.0**	**28.3**	**276.5**
Incidental	0.6	1.4	0.5	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.2	3.1
Nearshore Fixed Gear				0.1							0.0	0.1
Non-nearshore Fixed Gear	1.8	0.9	3.2	3.8	1.9	1.7	4.6	2.7	4.2	3.0	6.5	34.3
Non-Tribal At-Sea Hake	0.1	0.1	0.5	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.7	3.3
Pink Shrimp				0.2		0.0	0.1					0.3

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Shoreside Hake		0.0	0.6			1.2	0.2	0.1	1.4	2.4	5.6	11.6
Tribal At-Sea Hake						0.0		0.0	0.0			0.0
Tribal Shoreside	1.0	0.6	0.6	1.0	1.4	1.0	1.6	1.0	1.1	1.3	1.3	11.9
Limited Entry Trawl Permit - Trawl Gear	15.4	24.1	14.3	9.4	8.0	27.4	28.0	23.7	26.6	20.7	12.7	210.2
Limited Entry Trawl Permit - Fixed Gear										0.4	1.3	1.7
Shortraker/Rougheye Rockfish	**0.3**	**9.6**	**0.4**	**6.4**	**1.1**	**5.7**	**34.3**	**1.4**	**10.8**	**0.3**	**38.5**	**108.7**
Non-nearshore Fixed Gear	0.2	0.5	0.4	3.1	0.3	1.3	33.0	0.6	10.8	0.2	36.4	86.6
Non-Tribal At-Sea Hake				3.1		0.0	0.1			0.0	0.0	3.3
Limited Entry Trawl Permit - Trawl Gear	0.1	9.1	0.0	0.2	0.8	4.4	1.2	0.7		0.0		16.4
Limited Entry Trawl Permit - Fixed Gear										0.2	2.2	2.3
Slope Rockfish Unid	**25.1**	**25.4**	**13.5**	**13.9**	**38.7**	**9.9**	**10.7**	**58.5**	**30.3**	**6.5**	**10.4**	**242.8**
Incidental	0.3	0.0	0.0	0.2	0.6	0.1	0.0	0.1	0.0	0.1	0.7	2.2
Nearshore Fixed Gear		0.0	0.1	0.0	0.0	0.1	0.0	0.0			0.0	0.3
Non-nearshore Fixed Gear	5.1	5.6	5.5	6.5	4.7	3.2	3.6	6.0	3.7	1.5	6.6	52.0
Non-Tribal At-Sea Hake				0.0		0.0	0.0	0.0			0.0	0.0
Pink Shrimp	0.2			0.0						0.0	0.1	0.3
Shoreside Hake	0.4	0.5	2.0	3.2	0.4	0.3	0.2	2.2	7.8	0.1	0.1	17.1
Tribal Shoreside	0.7	0.3	0.6	1.7	0.1	0.7	0.1	0.0	0.7	1.1	0.4	6.5
Limited Entry Trawl Permit - Trawl Gear	18.4	18.9	5.2	2.3	32.9	5.5	6.8	50.1	18.1	2.7	1.4	162.2
Limited Entry Trawl Permit - Fixed Gear										1.0	1.2	2.1
Splitnose Rockfish	**103.3**	**94.2**	**137.3**	**60.4**	**70.0**	**169.0**	**99.4**	**89.7**	**123.3**	**26.2**	**50.9**	**1,023.6**
Incidental	0.9	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
Nearshore Fixed Gear	0.0	0.0	0.0	0.1	0.0	0.0		0.0	0.0	0.0		0.1
Non-nearshore Fixed Gear	0.0	0.0	0.0	0.0	0.1	0.4	0.4	1.3	0.2	0.2	0.2	2.9
Non-Tribal At-Sea Hake	11.5	12.0	7.3	15.1	1.1	2.2	0.9	0.1	43.5	11.9	20.5	126.0
Pink Shrimp			51.2	5.6		14.1	13.8	1.7	0.2	2.0	1.1	89.6
Shoreside Hake	0.0	0.0	0.6	0.6	2.4	14.6	0.0	0.8	19.8	3.7	16.4	58.9
Tribal At-Sea Hake						0.0	0.0	0.0		0.2		0.2
Tribal Shoreside	0.0	0.0	0.0	0.0	0.0	0.7	1.1	0.1	0.0	0.1	0.0	2.2
Limited Entry Trawl Permit - Trawl Gear	90.9	81.1	77.9	39.0	66.4	137.1	83.1	85.7	59.6	8.1	12.7	741.5
Limited Entry Trawl Permit - Fixed Gear										0.0	0.0	0.0
Spotted Rockfish Unid					**0.1**	**0.0**						**0.1**
Non-nearshore Fixed Gear					0.1	0.0						0.1

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Yellowmouth Rockfish	**8.3**	**13.1**	**10.9**	**7.3**	**1.6**	**10.3**	**2.7**	**2.9**	**5.2**	**1.3**	**8.9**	**72.4**
Incidental	0.0	0.0	0.3		0.0	0.0	0.0	0.0	0.1		0.0	0.4
Non-nearshore Fixed Gear	0.0	0.0	0.0		0.1	0.1	0.9	0.4	1.2	0.0	1.3	3.9
Non-Tribal At-Sea Hake	0.6	0.0	0.0		0.0	0.0	0.1	0.0	0.1	0.1	0.3	1.1
Pink Shrimp									0.0			0.0
Shoreside Hake						0.2	0.1				0.5	0.9
Tribal At-Sea Hake									0.0	0.0		0.0
Tribal Shoreside	0.0	0.0	0.0			0.0	0.4	0.0	0.0		0.0	0.4
Limited Entry Trawl Permit - Trawl Gear	7.6	13.1	10.6	7.3	1.6	10.0	1.2	2.5	3.8	1.1	6.6	65.5
Limited Entry Trawl Permit - Fixed Gear										0.0	0.2	0.2

Table 4-13. Estimated total catch of stocks managed in the Slope Rockfish complex south of 40°10' N lat. by sector, 2002-2012.

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Minor slope rockfish (South of 40°10' N. lat.)	**508.0**	**357.4**	**351.9**	**181.8**	**247.6**	**128.8**	**185.0**	**232.1**	**176.1**	**191.5**	**254.2**	**2,814.5**
Aurora Rockfish	**47.7**	**48.7**	**53.4**	**41.8**	**46.0**	**29.7**	**11.5**	**16.2**	**4.9**	**6.8**	**24.9**	**331.4**
California Halibut	0.0											0.0
Incidental	0.0		0.1	0.1	0.0		0.0	0.1	0.1			0.4
Nearshore Fixed Gear	0.0	0.0	0.0		0.0		0.0	0.0	0.0			0.0
Non-nearshore Fixed Gear	1.3	3.0	1.7	0.6	0.3	0.3	1.0	7.0	0.8	0.7	0.3	17.1
Pink Shrimp			0.0									0.0
Shoreside Hake	0.0			0.0								0.0
Limited Entry Trawl Permit - Trawl Gear	46.4	45.6	51.5	41.0	45.7	29.4	10.5	9.0	4.0	6.0	24.4	313.6
Limited Entry Trawl Permit - Fixed Gear										0.1	0.2	0.2
Bank Rockfish	**290.4**	**101.4**	**130.3**	**37.0**	**37.3**	**36.6**	**92.2**	**57.9**	**13.5**	**28.9**	**18.1**	**843.6**
California Halibut	0.0											0.0
Incidental	18.6	14.8	19.4	10.4	11.3	7.5	1.1	0.1			1.0	84.4
Nearshore Fixed Gear	0.1	0.0	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.8
Non-nearshore Fixed Gear	2.3	1.1	1.0	1.8	3.7	1.1	0.3	0.2	0.1	1.1	0.4	13.2
Pink Shrimp	0.0											0.0
Shoreside Hake	22.6			0.4								23.0
Limited Entry Trawl Permit - Trawl Gear	246.7	85.5	109.8	24.2	22.1	27.9	90.8	57.5	13.4	27.8	16.6	722.2

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Blackgill Rockfish	**149.8**	**192.7**	**153.0**	**88.4**	**95.2**	**48.3**	**74.4**	**135.4**	**152.1**	**151.2**	**195.1**	**1,435.7**
California Halibut	0.0											0.0
Incidental	1.2	9.9	1.9	0.3	1.2	0.2	3.1	0.5	5.6			23.9
Nearshore Fixed Gear	4.4	4.1	3.2	2.0	3.8	0.3	0.4	2.4	0.5	0.4	2.3	23.9
Non-nearshore Fixed Gear	72.7	123.9	67.5	33.9	54.0	22.1	33.3	79.0	84.8	134.8	113.7	819.9
Pink Shrimp	0.0											0.0
Shoreside Hake	0.0				0.0							0.0
Limited Entry Trawl Permit - Trawl Gear	71.5	54.8	80.4	52.1	36.2	25.7	37.6	53.4	61.2	14.3	73.1	560.2
Limited Entry Trawl Permit - Fixed Gear										1.7	6.0	7.8
Blackspotted Rockfish											**8.9**	**8.9**
Nearshore Fixed Gear											0.0	0.0
Non-nearshore Fixed Gear											8.8	8.8
Limited Entry Trawl Permit - Trawl Gear											0.1	0.1
Redbanded Rockfish	**2.3**	**3.3**	**3.3**	**1.3**	**2.8**	**1.7**	**4.9**	**3.6**	**1.6**	**0.5**	**1.7**	**27.1**
California Halibut	0.0											0.0
Incidental	0.1	0.0	0.1	0.0			0.0			0.0		0.2
Nearshore Fixed Gear	0.2		0.2		0.0	0.0		0.0		0.0	0.0	0.4
Non-nearshore Fixed Gear	0.5	0.5	2.4	0.6	2.0	0.3	2.0	1.3	0.3	0.3	1.0	11.2
Pink Shrimp	0.0		0.0									0.0
Shoreside Hake	0.0											0.0
Limited Entry Trawl Permit - Trawl Gear	1.5	2.8	0.7	0.6	0.8	1.4	3.0	2.3	1.3	0.2	0.7	15.3
Rockfish Unid	**5.4**	**0.0**	**1.8**	**0.0**	**51.6**	**3.3**		**6.8**		**0.1**	**0.0**	**69.0**
Non-nearshore Fixed Gear	4.8	0.0				0.0						4.8
Limited Entry Trawl Permit - Trawl Gear	0.6		1.8	0.0	51.6	3.3		6.8		0.1	0.0	64.2
Rougheye Rockfish	**0.9**	**0.2**	**0.1**	**1.7**	**0.2**	**3.0**	**0.2**	**3.2**		**0.4**	**0.5**	**10.3**
Nearshore Fixed Gear		0.0			0.0			0.0				0.0
Non-nearshore Fixed Gear	0.5	0.1		1.7	0.2	3.0	0.2	3.1		0.3	0.2	9.5
Limited Entry Trawl Permit - Trawl Gear	0.3	0.0	0.1				0.0	0.0		0.0	0.2	0.7
Sharpchin Rockfish	**7.5**		**0.8**	**5.6**	**0.2**	**0.2**		**4.7**	**0.6**	**0.0**	**0.3**	**19.8**
Non-nearshore Fixed Gear								0.0			0.0	0.1
Pink Shrimp			0.0									0.0
Limited Entry Trawl Permit - Trawl Gear	7.5		0.8	5.6	0.2	0.2		4.7	0.6	0.0	0.3	19.7
Shortraker Rockfish	**0.0**		**0.0**			**0.7**	**0.7**	**3.5**	**0.6**		**0.0**	**5.7**
Non-nearshore Fixed Gear								0.2				0.2
Limited Entry Trawl Permit - Trawl Gear	0.0		0.0			0.7	0.7	3.3	0.6		0.0	5.5
Shortraker/Rougheye Rockfish		**0.0**										**0.0**
Non-nearshore Fixed Gear		0.0										0.0

Complex and Stocks	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Slope Rockfish Unid	**3.8**	**11.1**	**8.1**	**5.9**	**14.2**	**5.1**	**0.9**	**0.8**	**2.9**	**3.6**	**4.6**	**61.1**
California Halibut								0.0				0.0
Incidental	0.3	1.2	0.3	0.3	4.8	0.0	0.0	0.0	0.1	0.1	0.0	7.0
Nearshore Fixed Gear	0.5	0.1	0.2	0.3	0.4	0.1	0.1	0.0	0.0	0.0	0.1	1.8
Non-nearshore Fixed Gear	2.7	7.5	6.9	4.8	2.0	1.3	0.5	0.7	2.0	1.7	3.5	33.7
Pink Shrimp	0.2	0.1	0.0	0.0				0.0	0.0			0.4
Limited Entry Trawl Permit - Trawl Gear	0.1	2.2	0.7	0.6	7.0	3.7	0.3		0.8	1.6	1.0	17.9
Limited Entry Trawl Permit - Fixed Gear										0.3	0.0	0.3
Spotted Rockfish Unid										**0.0**		**0.0**
Limited Entry Trawl Permit - Trawl Gear										0.0		0.0
Yellowmouth Rockfish					**0.0**			**0.0**			**0.0**	**0.1**
Nearshore Fixed Gear					0.0			0.0				0.0
Non-nearshore Fixed Gear					0.0			0.0				0.0
Limited Entry Trawl Permit - Trawl Gear											0.0	0.0
Pacific Ocean Perch	**0.1**	**0.0**	**1.1**	**0.0**	**0.1**	**0.2**	**0.2**	**0.1**	**0.0**	**0.0**	**0.1**	**2.0**

Table 4-14. Estimated total catch of stocks managed in the alternative coastwide rougheye/blackspotted/shortraker complex by sector, 2002-2012.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Set-Aside	**11.0**	**18.6**	**19.7**	**22.6**	**22.9**	**25.2**	**21.3**	**37.5**	**20.1**	**20.0**	**17.4**	**236.2**
Incidental	3.0	6.4	3.1	1.5	0.5	2.2	1.0	2.3	0.5	0.3	0.9	21.8
Pink Shrimp	0.0	0.0	1.7	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	2.3
Tribal At-Sea Hake	0.0	0.0	0.0	0.0	0.0	0.1	2.9	0.7	0.0	2.4	0.0	6.0
Tribal Shoreside	8.0	12.2	14.9	20.7	22.3	22.7	17.3	34.6	19.5	17.3	16.5	206.1
Non-Trawl	**23.2**	**14.2**	**27.4**	**41.5**	**44.0**	**48.7**	**81.0**	**74.5**	**91.7**	**44.3**	**104.7**	**595.3**
Nearshore Fixed Gear	0.0	0.2	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Non-nearshore Fixed Gear	23.2	14.0	27.4	40.7	44.0	48.7	81.0	74.5	91.7	44.3	104.6	594.3
Trawl	**60.2**	**102.9**	**88.5**	**94.5**	**76.0**	**153.6**	**189.2**	**158.2**	**199.6**	**174.6**	**190.8**	**1,488.1**
Limited Entry Trawl Permit - Fixed Gear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	22.9	38.4
Limited Entry Trawl Permit - Trawl Gear	59.4	100.6	72.8	55.0	69.1	121.2	115.7	147.7	171.3	73.8	60.6	1,047.1
Catcher-Processor	0.4	2.1	14.2	31.1	6.4	27.5	69.7	8.4	17.2	74.6	42.7	294.3
Mothership	0.4	0.2	0.0	8.3	0.6	1.7	3.1	0.4	4.6	4.0	11.8	35.1
Shoreside Hake	0.0	0.0	1.4	0.2	0.0	3.2	0.8	1.7	6.6	6.7	52.7	73.2
Grand Total	**94.4**	**135.7**	**135.5**	**158.6**	**142.9**	**227.5**	**291.5**	**270.2**	**311.4**	**238.9**	**312.8**	**2,319.7**

4.1.4.3 Other Fish

The status quo Other Fish complex is comprised of all the unassessed groundfish FMP species that are neither rockfish (family *Scorpaenidae*) nor flatfish, except for spiny dogfish which was assessed in 2011. These species include big skate (*Raja binoculata*), California skate (*Raja inornata*), leopard shark (*Triakis semifasciata*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias*), finescale codling (*Antimora microlepis*), Pacific grenadier (*Coryphaenoides acrolepis*), ratfish (*Hydrolagus colliei*), cabezon (*Scorpaenichthys marmoratus*) (off Washington), and kelp greenling (*Hexagrammos decagrammus*).

The status quo Other Fish complex is an aggregation of species with different life history characteristics, depth distributions, and vulnerabilities to potential overfishing. Therefore, the preferred alternative is to restructure this complex by removing spiny dogfish and managing this stock coastwide with its own harvest specifications (see section 4.1.3.3); and removing all the skates, Pacific grenadier, soupfin shark, spotted ratfish, and finescale codling by designating them as Ecosystem Component species (see section 1.1.1). The remaining stocks (i.e., kelp greenling, Washington cabezon, and leopard shark) are preferred to be the only stocks managed in the Other Fish complex in 2015-2016.

The preferred 2015 and 2016 harvest specifications for the Other Fish complex are the summed contributions of OFL and ABC contributions of those component stocks with an SSC-endorsed OFL estimate. The SSC endorsed OFL estimates for kelp greenling in California (118.9 mt based on a DB-SRA estimate calculated in 2011), leopard shark (167.1 mt based on a DB-SRA estimate calculated in 2011), and the Washington substock of cabezon. The SSC endorsed a new OFL estimate for Washington cabezon based on a DB-SRA methodology that assumes depletion in 2010 equals that inferred from the 2009 assessment for Oregon (48%, (Cope and Key 2009). Since the 2016 harvest specifications are based on assumed ABC removals of Washington cabezon in 2015, the 2016 specifications are dependent on the preferred P*. The Council chose a P* of 0.45 for Washington cabezon, which determines 2015 and 2016 OFL contributions of 4.5 mt and 4.8 mt, respectively (Table 4-15). The SSC originally recommended a similar methodological approach for estimating OFL contributions for kelp greenling in Oregon and Washington that used a depletion estimated from the 2005 kelp greenling assessment for the Oregon substock (Cope and MacCall 2006). However, the SSC did not endorse the 2015 and 2016 OFLs for the Oregon and Washington substocks of kelp greenling after realizing the catch stream used to determine the DB-SRA OFL estimate of kelp greenling in Oregon was dramatically different than the catch stream in the 2005 assessment. Therefore, there are no OFL or ABC contributions for kelp greenling in Washington and Oregon to inform the 2015 and 2016 harvest specifications for the reconfigured Other Fish complex. The preferred 2015 and 2016 OFL for the Other Fish complex is 291 mt. The preferred 2015 and 2016 ABCs for the Other Fish complex are 242 mt and 243 mt, respectively and are based on a P* of 0.45 for the component stocks with known OFL contributions.

Total catches of stocks in the reconfigured Other Fish complex have not exceeded the preferred 2015 OFL or ABC during 2004-2012 (Figure 4-14). Total estimated annual catches of stocks in the Other Fish complex by sector of the groundfish fishery in 2004-2012 are provided in Table 4-16. All commercial catch estimates were from the WCGOP Multi-year Data Product and recreational catches of Washington cabezon and leopard shark were obtained from March 22 and 23, 2014 RecFIN queries of landed catch (A) and reported dead catch (B1). Recreational catches of kelp greenling by state were provided by the GMT. The average annual total catch of stocks in the Other Fish complex during 2004-2012 was 70.9 mt. The cumulative 2004-2012 catch of these stocks was 24.3% and 29.3% of the preferred 2015 OFL and ABC, respectively. There is little risk of the complex OFL or ABC being exceeded in the 2015-2016 management cycle.

The preferred 2015 and 2016 ACLs of 242 and 243 mt, respectively are the same as under Alternative 1. This compares to the 2015 and 2016 ACL of 110 mt under Alternative 2. The Alternative 2 ACL has a higher risk of being exceeded (assuming the same management measures and no inseason adjustment) than the preferred ACLs. Total catch in 2006 was slightly lower (108.5 mt) than the Alternative 2 ACL (Table 4-16).

The preferred alternative for a restructured Other Fish complex is more compliant to the FMP and National Standard 1 guidelines than the No Action structure that managed disparate species with different vulnerabilities to overfishing, different distributions, and different interactions with fisheries together in one complex. Removing spiny dogfish from the complex and managing that stock on its own also reduces the risk of overharvesting that stock relative to the status quo strategy of managing spiny dogfish within the complex. There are no immediate concerns with managing kelp greenling, Washington cabezon, and leopard shark together in a complex.

Table 4-15. Washington cabezon OFLs and ABCs for 2015 and 2016, assuming different depletion levels and ABC catches in 2015 (preferred harvest specification contributions to the Other Fish complex in bold).

Depletion	P*	OFL		ABC	
		2015	2016	2015	2016
62% in 1997	0.45	4.0	4.4	3.3	3.6
62% in 1997	0.25	4.0	4.7	1.5	1.8
48% in 2010	**0.45**	**4.5**	**4.8**	**3.7**	**4.0**
48% in 2010	0.40	4.5	4.9	3.1	3.4
48% in 2010	0.35	4.5	5.0	2.6	2.9
48% in 2010	0.30	4.5	5.1	2.1	2.4
48% in 2010	0.25	4.5	5.1	1.7	1.9

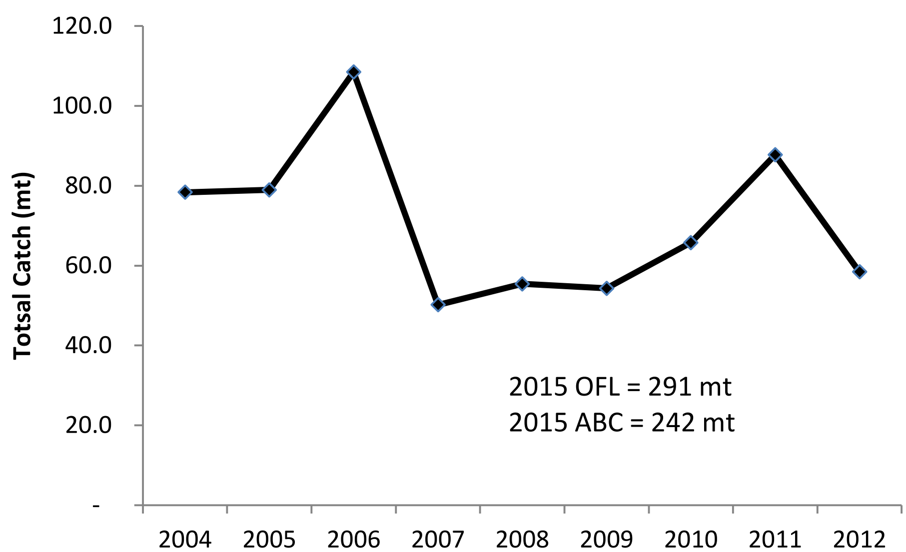


Figure 4-14. Estimated total catch of stocks in the Other Fish complex, 2004-2012 relative to the preferred 2015 OFL and ABC.

Table 4-16. Annual total catches of stocks in the Other Fish complex by sector, 2004-2012.

Sectors	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Kelp Greenling - Coastwide										
Set-Aside	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**			**0.0**	**0.0**	**0.1**
California Halibut		0.0								0.0
Incidental	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.1
Non-Trawl	**44.3**	**34.9**	**28.9**	**31.4**	**37.4**	**43.3**	**45.8**	**55.8**	**24.4**	**346.2**
Nearshore Fixed Gear	25.7	23.0	17.0	20.1	24.1	23.1	20.4	23.6	24.4	201.4
Non-nearshore Fixed Gear			0.6							0.6
Washington Recreational	2.0	1.9	1.3	1.2	1.0	1.3	2.7	2.1		13.6
Oregon Recreational	4.4	4.1	3.1	3.5	3.6	4.2	6.8	7.5		37.2
California Recreational	12.3	5.8	6.9	6.6	8.8	14.6	15.8	22.6		93.4
Trawl	**0.1**	**0.1**	**0.0**	**0.2**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.7**
Limited Entry Trawl Permit - Trawl Gear	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.7
Non-Tribal At-Sea Hake		0.0	0.0							0.0
Kelp Greenling Total	**44.4**	**35.0**	**29.0**	**31.5**	**37.4**	**43.3**	**45.8**	**55.9**	**24.6**	**347.0**
Washington Cabezon										
Non-Trawl	**5.9**	**7.9**	**5.8**	**4.3**	**2.7**	**5.2**	**2.7**	**8.7**	**6.5**	**49.8**
Washington Recreational	5.9	7.9	5.8	4.3	2.7	5.2	2.7	8.7	6.5	49.8
Washington Cabezon Total	**5.9**	**7.9**	**5.8**	**4.3**	**2.7**	**5.2**	**5.3**	**8.7**	**6.5**	**52.4**
Leopard Shark										
Set-Aside	**5.9**	**13.3**	**12.1**	**9.1**	**4.6**	**2.5**	**2.3**	**7.6**	**1.7**	**59.1**
California Halibut	1.0	7.8	4.9	1.2	2.8	1.2	0.5	5.6	0.0	25.1
Incidental	4.9	5.5	7.1	7.9	1.8	1.3	1.8	2.0	1.6	33.9
Pink Shrimp	0.1		0.0				0.0		0.0	0.1
Non-Trawl	**22.0**	**21.8**	**61.6**	**5.2**	**10.7**	**3.3**	**12.3**	**15.6**	**25.4**	**177.9**
Nearshore Fixed Gear	0.2	0.5	1.1	1.0	0.4	0.1	0.2	0.2	0.2	3.9
Non-nearshore Fixed Gear	5.6	5.8	2.6	1.8	0.7	0.3	0.7	0.2	1.0	18.7
California Recreational	16.2	15.5	58.0	2.4	9.6	2.8	11.4	15.2	24.2	155.2
Trawl	**0.0**	**0.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.3**	**1.2**
Limited Entry Trawl Permit - Trawl Gear	0.0	0.9	0.0	0.0				0.0	0.3	1.2
Leopard Shark Total	**28.0**	**36.0**	**73.7**	**14.3**	**15.3**	**5.7**	**14.6**	**23.2**	**27.3**	**238.2**
Other Fish Total	**78.4**	**79.0**	**108.5**	**50.2**	**55.4**	**54.3**	**65.7**	**87.7**	**58.4**	**637.7**

4.1.5 Ecosystem Component Species

Under the preferred alternative the following species would be designated Ecosystem Component (EC) species: big skate, California skate, all other endemic skates, soupfin shark, finescale codling, Pacific grenadier, all other endemic grenadier species, and spotted ratfish. An EC species can be so designated if it is not targeted, is not subject to overfishing or being overfished in the absence of conservation measures, and not generally retained for sale or personal use. No harvest specifications or management reference points are required for EC species; however, there is a monitoring requirement to determine changes in their status or their vulnerability to the fishery. If new information shows than an EC species' vulnerability to overfishing has increased, the stock should be reclassified as "in the fishery". Any designation of a species as an EC species or a change from an EC designation to a species considered to be "in the fishery" requires an FMP amendment. Designating these species as EC species is part of the purpose and need for Amendment 24.

The Council directed the GMT to focus on species in the Other Fish complex for reclassification of their FMP status. The GMT evaluated the species currently in the Other Fish complex and also took a broader look at non-FMP species to evaluate whether these species should be included in the FMP because they are either in the fishery or their inclusion in the FMP as an EC species made sense to address ecosystem considerations or to enhance monitoring of other EC species. In consideration of determining whether species were in the fishery or not, the GMT analyzed fish species caught predominantly in Federal waters and not managed under other FMPs or by the states. Further filtering of candidate FMP species for an EC designation was done by flagging species that had either less than 1 mt of average catch per year from 2007-2011 or more than a 1 mt of catch (rounded to the nearest mt) but less than 50 percent retention (i.e., 50 percent or more of the catch is discarded) and a PSA score of ~2.0 and lower. Then to create an overlapping range of non-FMP species, all stocks related to species in the Other Fish complex with an average catch per year of 1 mt and higher were included (Table 4-17, Table 4-18, and Table 4-19).

The GMT also evaluated NWFSC trawl survey catches and provided some ad hoc biomass and OFL estimates for non-FMP species. Survey biomass estimates and associated OFL estimates are included in Table 4-17 and Figure 4-15. Biomass estimates have also been calculated for all additional species that are encountered by the NWFSC Groundfish Trawl Survey. Biomass estimates are based on the most recent 3 years of survey abundance available at the time of this analysis (Figure 4-15) and are only calculated for species that were encountered in all 3 years. A small subset of these species that were encountered annually, were seen in so few tows that the survey biomass estimates are unlikely to provide reliable estimates of biomass or OFL contributions. These species are Aleutian skate, Pacific sleeper shark, other slickheads (including tubeshoulders), and snailfish, all of which have occurred in fewer than 100 tows total (and never more than 20 tows in any given year). Of these species, Aleutian Skate is the only one for which an OFL contribution was presented in Table 4-17.

The OFL contributions for Other Skates and Other Grenadiers should not be directly compared to the average catches listed in these categories in Table 4-17. Landings in both of these groups have often not been identified to the species level. For instance, for the years 2007–2011, the average catch of unidentified skates was 725 mt, but this average includes longnose skate in the years prior to the individual management of that species. For the years 2010–2012, when longnose skate was landed separately, the unidentified skate landings averaged 305 mt, but this number still likely included large amounts of big skate. In contrast, the estimated 24.9 mt OFL contribution for Other Skates is based on survey observations of only starry skate and deepsea skate. Likewise, in the case of grenadiers, the average catch of unidentified grenadiers has been 135 mt for the years 2007–2011, but this is likely to include large amounts of Pacific grenadier that was not identified by species in landings records. That number should therefore not be compared to the 40.1 mt estimated OFL contribution for Other Grenadiers which is based on survey observations of smooth grenadier, popeye grenadier, softhead grenadier and California grenadier. It is noted that if all species are combined then the sum of all skate catches have been below the sum of all skate OFL contributions and the sum of all grenadier catches has been below the sum of all grenadier OFL contributions.

Big skate, California skate, and Pacific grenadier are FMP species currently managed in the Other Fish complex. The GMT recommended bringing all the other endemic skates in the family *Arhynchobatidae* and the endemic grenadiers in the family *Macrouridae* into the FMP regardless of whether they are designated as EC species or not. The practical reason for this is skates and grenadiers have been landed in unspecified market categories and, with little or no available compositional sampling of these landings, the landed amounts of each species are uncertain. Therefore, more accurate estimation of OFLs using catch-based methods such as DCAC or DB-SRA can be made for the respective aggregations of skates and grenadiers. The preferred alternative adds these species to the FMP. The preferred alternative also designates these species as EC species, which entails a monitoring requirement to better understand fishing impacts.

All of the species proposed for an EC designation have relatively low vulnerabilities to potential overfishing (Table 4-17) and none are explicitly targeted. For example, of the skates that are caught on the west coast, longnose skate have been the most frequently landed and are presumably targeted by some trawl vessels. However, longnose skate is not proposed for an EC designation and continued management of longnose skate with stock-specific harvest specifications is preferred. The amount of unidentified skate catch has lowered from what is reported in Table 4-17 to an average of 305 mt over 2010-2012. The main reason for this is that longnose skate was removed from the Other Fish complex beginning in 2009 and sorting of the species was implemented then. Considering the 305 mt of unidentified skate catch still occurring, there is no data to inform species composition. Assuming that none is longnose skate, then average catch of the all other skates combined would be about 50 percent of their combined OFLs for all other skates. Aleutian skate, the skate species with the highest catch relative to its estimated OFL: in Table 4-17, was seen in fewer than 20 tows over the course of several years of the trawl survey (Figure 4-15). Aleutian skate is abundant in the waters off Alaska, with a biomass estimate for the Eastern Bering Sea and Aleutian Islands of 33,293 mt (Ormseth 2012). This is second only to Alaska skate in estimated abundance in that area. This suggests that the biomass estimate of 72 mt for the west coast represents the tail of the stock's distribution. Monitoring of the catch of all endemic skates by bringing them into the FMP and the Federal management framework coupled with an EC designation will provide a better sense if this is targeted catch or unavoidable bycatch that is landed because there is some market value.

Grenadiers are present and occasionally caught on the west coast with Pacific grenadier being the most landed of the grenadier species. However, they are not explicitly targeted and their low value does not provide an incentive to develop target strategies. The "Catch/OFL" and "Biomass Estimate" metrics shown in Table 4-17 are misleading for grenadier. Grenadiers are distributed as deep as 1,350 fm. The depth limit for the west coast trawl fishery is 700 fm and the NMFS trawl survey only goes as deep as 550 m (300 fm). Therefore, OFLs are underestimated for grenadiers since neither the fishery nor the survey operates in the species' overall depth distribution, which will bias catch-based or survey-based estimates low. This also is an indicator of the low vulnerability of grenadiers to potential overfishing.

A designation of spotted ratfish as an EC species is based on the fact that this species is easily identifiable and is not marketed. The catch relative to its estimated OFL is just over 10% (Table 4-17). Likewise, finescale codling (AKA Pacific flatnose) and soupfin shark are not targeted and are good candidates for an EC designation. Soupfin shark have not been targeted since the end of the Vitamin A fishery (synthetic vitamin A now supplies any demand). The stock may extend into deeper waters but is largely taken by gillnet gears in California that target species not managed in the Groundfish FMP. Based on the 2007-2011 averages, over 80 percent of the catch comes from sectors managed elsewhere. The Council's ability to control catch through this FMP is therefore limited.

All of the proposed EC species designations reflect the lack of a conservation concern for these species, the lack of targeting of these species, and the lack of an ability to effectively control harvest of these species since much of the bycatch of these species occurs in fisheries outside the Council's jurisdiction. There is also a benefit to establishing a monitoring requirement through an EC designation to ensure that these fishery conditions do not change such that risks due to potential overfishing of these species do not emerge. The inclusion of all endemic skates in the family *Arhynchobatidae* and the endemic grenadiers in the family *Macrouridae* into the FMP will allow more precise catch monitoring without the need for a sorting requirement for these species since skates and grenadiers are generally landed in unidentified species' market categories (e.g., Unidentified Skates).

The preferred alternative of removing the existing FMP species recommended for an EC designation from the Other Fish complex also reduces the risks to the other species left in the complex. This is because some of the recommended EC species were effectively inflator stocks to the complex with relatively larger OFL contributions that increased the risk of overfishing more vulnerable stocks managed in the complex. For example, under the No Action Other Fish complex, Pacific grenadier contributed 1,519 mt to the complex OFL, which increased the risk of overharvesting co-managed species of concern such as spiny dogfish.

Table 4-17. PSA scores, average catch, OFL estimates, and biomass estimates for Other Fish-related candidate stocks from Agenda Item H.4.b, GMT Report 2, November 2013. Biomass estimates with darker shading are those for which the survey has few encounters and is unlikely to provide reliable estimates. The Catch/OFL column represents the ratio of average catch (2007–2011) to the OFL estimate for those cases where these values are both available and reasonable to compare.

Species Groups	Species	PSA score	Avg. Catch (mt)	OFL estimate	Catch/OFL	Biomass estimate	Notes
Skates & Rays	Aleutian Skate	1.71	3	3.6	83%	72*	*Biomass estimate based on few encounters
	Bering/Sandpaper Skate	1.8	70	177.4	39%	5,727	
	Big Skate	1.99	95	540.8	18%	10,376	
	Black/Roughtail Skate	1.68	44	184.8	24%	6,497	
	California Skate	2.12	14*	129.6	11%	2,487	*Only 29% from FMP sectors
	Deepsea Skate	--	1	--	--	*	*Biomass estimate included with "Other Skates"
	Other Skates	--	725*	24.9	--	785	*Unidentified catch, should not be compared to OFL estimate.
	Thornback Skate	--	2	--	--	--	
Cat Sharks	Brown Cat Shark	1.84	90	320	28%	9,918	
	Filetail Cat Shark	--	11	--	--	5,176	
	Longnose Cat Shark	--	3	--	--	1,808	
Other Chondrich.	Leopard Shark	2	35*	--	--	--	*Only 3% from FMP sectors (other than CA Recreational = 82%).
	Pacific Black Dogfish	--	1	--	--	--	
	Pacific Sleeper Shark	--	8	--	--	228*	*Biomass estimate based on few encounters
	Salmon Shark	--	1	--	--	--	
	Soupfin Shark	2.02	8*	--	--	--	*Only 16% from FMP sectors
	Spotted Ratfish	1.72	146	1,272.40	11%	19,846	
Slickheads	California Slickhead	1.1	28	6,248.80	0.40%	26,118	
	Threadfin Slickhead	--	1	--	--	369	
	Other (incl. Tubeshoulders)	--	1	--	--	10*	*Biomass estimate based on few encounters
Grenadiers	California Grenadiers	--	4	--	--	--	*Biomass estimate included with "Other Grenadiers"
	Giant Grenadiers	1.87	170	638.6	27%	17,634	
	Other Grenadiers	--	135*	40.1	--	1,108	*135 mt of unidentified catch. Other species in data all < 1 mt per year. Should not be compared to OFL
	Pacific Grenadier	1.82	131	1,386.00	9%	38,344	
Eelpouts	Bigfin Eelpout	--	3	--	--	3,965	
	Twoline Eelpout	--	3	--	--	4,830	

Species Groups	Species	PSA score	Avg. Catch (mt)	OFL estimate	Catch/OFL	Biomass estimate	Notes
	Other Eelpouts	1.51	43	--	--	4,639	
Misc. Fish	Cabezon*	1.68	101	--	--	--	*Included b/c they're potentially distributed in state waters
	Duckbill Barracudina	--	1	--	--	--	
	Finescale Codling/Pacific Flatnose	1.48	13	316	4%	3,091	
	Kelp Greenling*	1.59	43	--	--	--	*Included b/c they're potentially distributed in state waters
	King-of-the-Salmon	--	6	--	--	--	
	Longnose Lancetfish	--	1	--	--	--	
	Ragfish	1.8	43	--	--	--	
	Snailfish spp.	--	5	--	--	3*	*Biomass estimate based on few encounters
	Walleye Pollock	--	4	--	--	--	*Prior to 2007, catch has reached 1,000s of metric tons in some years

Table 4-18. Average catch estimates for the non-FMP species meeting the GMT's first filtering criteria (reproduced from Table 1 in Agenda Item G.8.b, GMT Report 2, September 2013). The "% FMP" column refers to the percentage of catch coming from sectors regulated under the Groundfish FMP.

	Avg. catch (mt)					Avg. catch (mt)			
Species	**FMP Sectors**	**All Sectors**	**% FMP**	**Retained %**	**Species**	**FMP Sectors**	**All Sectors**	**% FMP**	**Retained %**
1. Skate Unid.	725	741	97.8%	95.8%	25. Hornyhead Turbot	0	4	5.5%	55.6%
2. Giant Grenadier	170	170	100.0%	0.0%	26. Longnose Cat Shark	3	3	100.0%	0.0%
3. Slender Sole	21	149	14.4%	0.0%	27. Aleutian Skate	3	3	100.0%	0.0%
4. Grenadier Unid.	135	135	99.9%	93.8%	28. Bigfin Eelpout	2	3	75.5%	0.0%
5. Shark Unid.	114	116	97.8%	7.2%	29. Twoline Eelpout	3	3	100.0%	0.0%
6. Brown Cat Shark	90	90	99.8%	12.6%	30. Eel Unid.	0	2	7.7%	100.0%
7. Bat Ray	26	75	35.5%	34.3%	31. Thornback Skate	1	2	33.6%	32.4%
8. Bering/sandpaper skate	70	70	99.9%	0.1%	32. Threadfin Slickhead	1	1	100.0%	0.0%
9. Black/Roughtail Skate	44	44	100.0%	0.1%	33. Gray Smoothhound Shark	1	1	100.0%	87.7%
10. Ragfish	43	43	100.0%	51.2%	34. Pacific Dogfish Shark	1	1	100.0%	0.0%
11. Eelpout Unid.	33	43	76.4%	0.1%	35. Duckbill Barracudina	1	1	100.0%	75.5%
12. Deepsea Sole	32	32	99.4%	2.5%	36. Cat Unid. Shark	1	1	100.0%	0.0%
13. California Slickhead	28	28	100.0%	0.0%	37. Salmon Shark	1	1	100.0%	0.0%
14. Sanddab Unid.	21	22	96.7%	84.0%	38. Longspine Combfish	0	1	20.5%	0.0%
15. Shovelnose Guitarfish	19	22	87.0%	80.0%	39. Starry Skate	0	1	46.8%	0.0%
16. Pacific Angel Shark	0	13	0.2%	78.7%	40. Tubeshoulder Unid.	1	1	99.9%	3.7%
17. Pacific Electric Ray	1	11	12.2%	0.0%	41. Deepsea Skate	1	1	100.0%	0.0%
18. Filetail Cat Shark	11	11	100.0%	0.0%	42. Slickhead Unid.	1	1	100.0%	0.0%
19. Pacific Sleeper Shark	8	8	100.0%	2.3%	43. Swell Shark	0	1	5.8%	0.0%
20. Brown Smoothhound Shark	2	7	26.5%	13.7%	44. Fantail Sole	0	1	0.0%	18.3%
21. King of the Salmon	6	6	100.0%	44.6%	45. Pacific Black Dogfish	1	1	100.0%	0.0%
22. Snailfish Unid.	5	5	99.2%	0.3%	46. Longnose Lancetfish	1	1	100.0%	64.8%
23. Walleye Pollock	4	4	100.0%	96.2%	47. Sixgill Shark	0	1	75.6%	0.0%
24. California Grenadier	4	4	100.0%	0.0%					

Table 4-19. Average catch estimates for the FMP species flagged for initial consideration by the GMT (reproduces Table 2 in September's Agenda Item G.8.b, GMT Report 2, September 2013).

	catch (mt)				catch (mt)				catch (mt)		
Species	avg.	max	retain. %	Species	avg.	max	retain. %	Species	avg.	max	retain. %
1. Spotted Ratfish	146	228	0.2%	*26.* Grass Rockfish	19	23	99.4%	*51.* Rosethorn Rockfish	4	5	23.4%
2. Pacific Ocean Perch Rockfish	135	179	68.9%	*27.* Starry Flounder	17	24	79.6%	*52.* Yellowmouth Rockfish	4	10	53.6%
3. Pacific Grenadier	131	212	0.0%	*28.* Greenstriped Rockfish	15	25	29.2%	*53.* Redstripe Rockfish	4	11	89.1%
4. Blackgill Rockfish	120	164	95.8%	*29.* Quillback Rockfish	15	20	96.6%	*54.* Squarespot Rockfish	3	6	94.0%
5. Blue Rockfish	120	192	91.8%	*30.* Greenspotted Rockfish	15	19	95.1%	*55.* Tiger Rockfish	1	1	96.3%
6. Cabezon	101	128	98.4%	*31.* California Skate	14	18	0.6%	*56.* Butter Sole	1	2	8.1%
7. Big Skate	95	170	1.7%	*32.* Finescale codling/Pacific Flatnose	13	19	0.0%	*57.* Nearshore Rockfish Unid.	1	3	100.0%
8. Brown Rockfish	90	116	97.8%	*33.* Stripetail Rockfish	12	15	0.7%	*58.* Halfbanded Rockfish	1	2	61.2%
9. Gopher Rockfish	85	120	96.7%	*34.* Slope Rockfish Unid.	12	21	100.0%	*59.* Greenblotched Rockfish	1	1	98.8%
10. California Scorpionfish	76	104	90.2%	*35.* Silvergray Rockfish	11	44	17.5%	*60.* Blackspotted Rockfish	1	1	100.0%
11. Bocaccio Rockfish	73	115	77.8%	*36.* Shortraker/Rougheye Unid.	10	34	0.3%	*61.* Cowcod Rockfish	1	1	17.3%
12. Copper Rockfish	69	80	94.4%	*37.* Yelloweye Rockfish	9	12	13.6%	*62.* Calico Rockfish	1	2	17.5%
13. Aurora Rockfish	50	68	51.0%	*38.* Treefish Rockfish	8	14	94.0%	*63.* Mexican Rockfish	0	0	100.0%
14. Sand Sole	49	85	94.5%	*39.* Kelp Rockfish	8	18	96.4%	*64.* Chameleon Rockfish	0	0	99.4%
15. Bank Rockfish	47	93	99.7%	*40.* Soupfin Shark*	8	18	91.9%	*65.* Pinkrose Rockfish	0	0	100.0%
16. Kelp Greenling	43	56	97.1%	*41.* Sharpchin Rockfish	8	12	15.0%	*66.* Pygmy Rockfish	0	0	0.3%
17. Canary Rockfish	42	52	36.4%	*42.* Shelf Rockfish Unid.	7	21	100.0%	*67.* Bronzespotted Rockfish	0	0	78.2%
18. Redbanded Rockfish	36	40	76.9%	*43.* Flag Rockfish	7	9	92.0%	*68.* Swordspine Rockfish	0	0	40.2%
19. Leopard Shark	35	38	81.4%	*44.* Rock Sole	6	8	80.8%	*69.* Freckled Rockfish	0	0	100.0%
20. Shortraker Rockfish	32	35	69.7%	*45.* Shortbelly Rockfish	6	11	2.9%	*70.* Spotted Rockfish Unid.	0	0	0.0%
21. China Rockfish	32	35	92.1%	*46.* Rosy Rockfish	6	7	83.3%	*71.* Dusky Rockfish	0	0	0.0%
22. Olive Rockfish	32	54	94.2%	*47.* Flathead Sole	6	11	36.2%	*72.* Harlequin Rockfish	0	0	43.0%
23. Rockfish Unid.	29	69	7.7%	*48.* Speckled Rockfish	5	8	94.7%	*73.* Pink Rockfish	0	0	100.0%
24. Starry Rockfish	24	30	91.1%	*49.* Honeycomb Rockfish	5	10	85.2%	*74.* Dwarf Red Rockfish	0	0	#N/A
25. Black And Yellow Rockfish	23	32	99.0%	*50.* Curlfin Sole/Turbot	5	10	17.9%				

*Note: Only 15.6% of the catch of Soupfin Shark comes in the FMP's commercial and recreational sectors. The remainder is taken in the California Halibut and other non-FMP sectors.

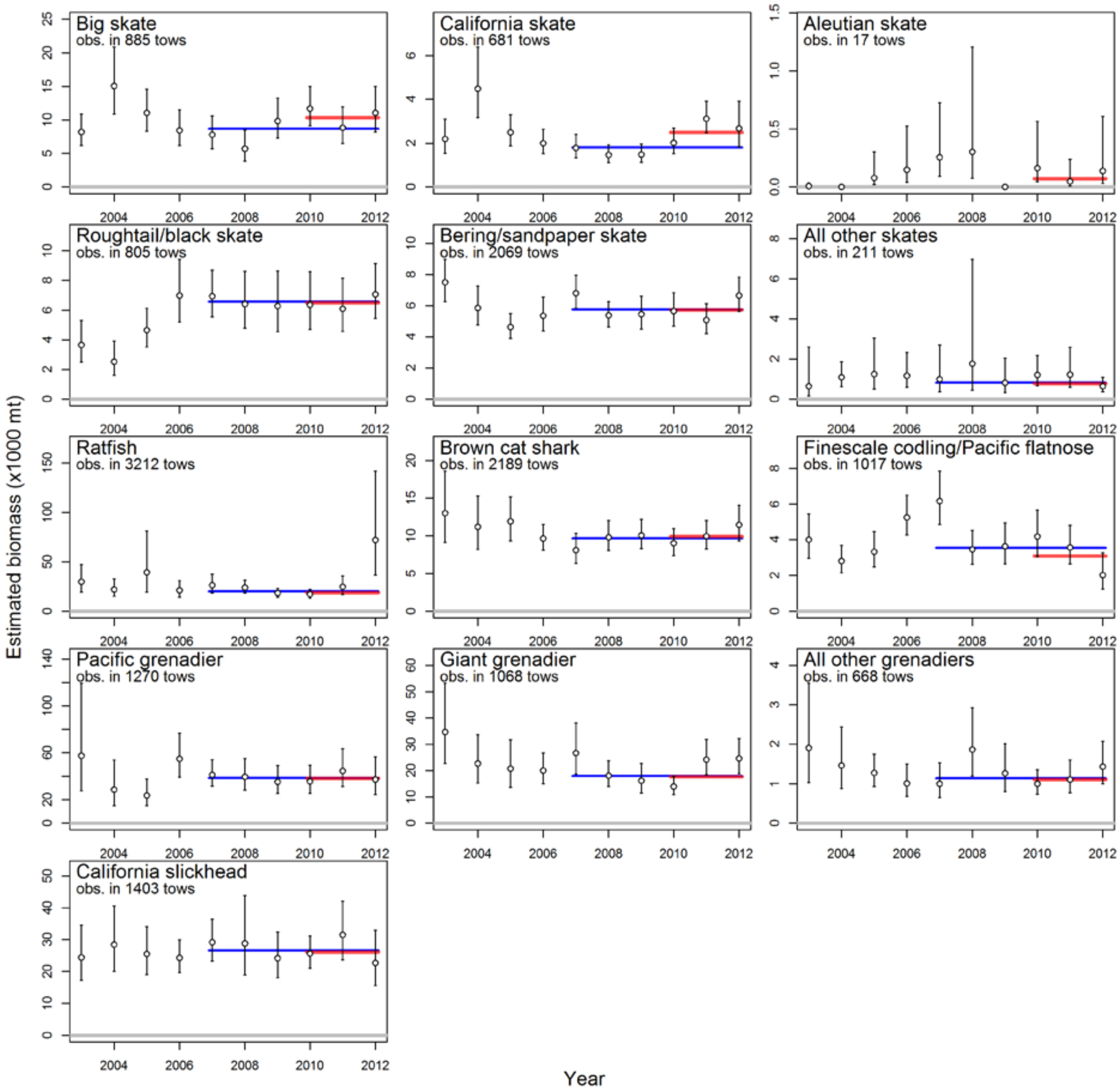


Figure 4-15. Time series of estimated survey biomass for species included in Agenda Item H.6.a, Supplemental Attachment 6, November 2013. The time period covers 2003–2012, with estimated 95% confidence intervals. Horizontal lines indicate weighted average value over the most recent 6-year and 3-year periods. No 6-year average for Aleutian skate is reported because they were not encountered in the 2009 survey. Number of observations refers to total number of tows that included the species out of a total of 6,453 tows for this 10-year period.

4.2 Impacts of 2015-2016 Management Measures to Groundfish Stocks

This section describes how management measures function so that groundfish catch may achieve, but not exceed, ACLs. This constitutes the impact mechanism linking harvest specifications to the direct and indirect biological impacts on groundfish stocks. The principal impact is the level of fishing mortality and secondarily changes in stock structure due to age-specific mortality patterns. Harvest specifications are determined based on the Groundfish FMP framework to achieve optimum yield.

The section is organized by alternative and within each alternative by fishery sector. The first management measure step is to determine set asides deducted from ACLs to account for various fishing activities and allocate the resulting fishery HGs. Management measures are then developed based on catch projections so that fishing mortality does not exceed allocations and the overall ACLs. Subsequent sections evaluate how management measures applied to groundfish fishery sectors are projected to prevent allocations and the overall ACLs from being exceeded.

4.2.1 No Action

4.2.1.1 Deductions from the ACL and Allocations

Deductions from most groundfish ACLs, called off-the-top deductions, are made to account for groundfish mortality in the Pacific Coast treaty Indian tribal fisheries, scientific research, nongroundfish target fisheries (hereinafter incidental open access fisheries), and, as necessary, EFPs. Off-the-top deductions from the sablefish north of 36° N. latitude ACL are slightly different due to the sablefish allocation framework and include groundfish mortality in tribal fisheries, research, recreational fisheries, and EFPs. Sufficient yield set-aside must be available to accommodate the anticipated groundfish mortality from the aforementioned activities. Deductions from the ACL to account for these activities are important accountability measures that increase the probability that catches will remain at or below the ACLs.

Amounts deducted that are from the ACL to accommodate groundfish mortality from scientific research, incidental open access fisheries, and EFPs can be modified based on inseason projections. For activities that are completed before a Council meeting, the best available information would be used to estimate the amount deducted from the ACL that would not be used in the calendar year and that amount would be reapportioned back to the groundfish fishery. The process to reapportion is structured to be done through an inseason action published in the Federal Register following a Council meeting. At a Council meeting, the Council would review set-asides and recommend full reapportionment, partial reappointment, or no reapportionment. The specified amount of groundfish would be reapportioned back to the “fishery harvest guideline” and out to the sectors in proportion to the original allocations for the calendar year. Because the fishery activity must be completed before reapportionment occurs, reapportionment would likely only occur later in the year after the September or November Council meetings. For sectors that are already closed for the year, or in the case of the Shorebased IFQ Program, after September 1 where QS accounts are no longer open or able to transfer QP, the Council must determine whether to reopen those sectors or, for the Shorebased IFQ Program, whether to reactivate those accounts.

Table 4-20 and Table 4-22 details the deductions from the ACLs for No Action and the following paragraphs describe how off-the-top deductions were calculated under No Action. Table 4-21 details the allocations analyzed under the No Action alternative.

Tribal Fishery: Tribal fisheries consist of trawl (bottom, mid-water, and whiting), fixed gear, and troll. The requested tribal amounts are based on those in the April 17, 2014 regulations.

Research: Research activities include the NMFS trawl survey, International Pacific Halibut Commission longline survey, and other Federal and state research. The Council approach is that off-the-top deductions should be equal to the maximum historical scientific research catch from 2005-2012, except for canary rockfish and yelloweye rockfish. The Council policy for canary and yelloweye rockfish was not based on the maximum historical value. The Council considered the high canary rockfish catch of 7.2 mt in 2006 from the NMFS trawl survey a rare event since surveys in later years encountered substantially less canary. The Council adopted a 4.5 mt canary rockfish set-aside, which is higher than the average research catch from 2005-2012. For yelloweye rockfish, the Council adopted a 3.3 mt research set-aside based on anticipated research needs of the International Pacific Halibut Commission (1.1 mt), Washington Department of Fish and Wildlife (1 mt), Oregon Department of Fish & Wildlife (1 mt), and other projects (0.2 mt).

Incidental Open Access: Deductions from ACLs are made to account for groundfish mortality in the incidental open access fisheries. The off-the-top deductions for all species, except longnose skate, were derived from the maximum historical values in the 2007-2011 WCGOP Groundfish Mortality reports (see http://tinyurl.com/nv3pddm). The recommended set-aside for longnose skate was based on data from the 2009-2011 Total Mortality reports, the years in which longnose skate were reported separately from the Other Fish category.

Exempted Fishing Permits: The Council recommended three EFPs and associated off-the-top deductions for 2013-2014 cycle which would remain under No Action. The first EFP seeks to test the effectiveness of trolled longline gear to selectively harvest chilipepper rockfish in waters off central California (Agenda Item E.3.a, Attachment 1, November 2011). The second EFP seeks to test the effectiveness of vertical hook-and-line gear to selectively harvest midwater species such as yellowtail rockfish (Agenda Item E.3.a, Attachment 2, November 2011). The third EFP seeks to survey the distribution and size of overfished species in the Rockfish Conservation Area (RCA) off the central coast of California using hook-and-line and trap gear (Agenda Item E.3.a, Attachment 3, November 2011). No total catch limits or off-the-top deductions are required for the third EFP since those catches will be covered using QP allocated in the shorebased IFQ fishery or trip limits for non-IFQ species.

Recreational (Sablefish north of 36° N. latitude only): The allocation framework for sablefish north of 36° N. latitude specifies that anticipated recreational catches of sablefish be deducted from the ACL prior to the commercial limited entry and open access allocations. The set-aside is the maximum historical value from recreational fisheries from 2004-2011 (Table 4-22).

Table 4-20. No Action. Estimates of tribal, EFP, research (Res.), and incidental open access (OA) groundfish mortality in metric tons, used to calculate the fishery harvest guideline under the No Action Alternative.

Stock	Area	ACL	Tribal	EFP	Res.	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	337	0.0	6.0	1.7	0.7	328.6
CANARY	Coastwide	119	9.5	1.5	4.5	2.0	101.5
COWCOD	S of 40º10' N. lat.	3	0.0	0.0	0.1	0.0	2.9
DARKBLOTCHED	Coastwide	330	0.1	0.2	2.1	18.4	309.2
PETRALE SOLE	Coastwide	2,652	220.0	0.0	11.6	2.4	2,418.0
POP	N of 40º10' N. lat.	153	10.9	0.0	5.2	0.4	136.5
YELLOWEYE	Coastwide	18	2.3	0.0	3.3	0.2	12.2
Arrowtooth flounder	Coastwide	5,758	2,041.0	0.0	16.4	30.0	3,670.6
Black rockfish	N of 46º16' N. lat.	409	14.0	0.0	0.0	0.0	395.0
Black rockfish	S of 46º16' N. lat.	1,000	0.0	0.0	0.0	0.0	1,000.0
Cabezon	46º16' to 42º N. lat.	47	0.0	0.0	0.0	0.0	47.0
Cabezon	S of 42º N. lat.	158	0.0	0.0	0.0	0.0	158.0
California scorpionfish	S of 34°27' N. lat.	117	0.0	0.0	0.0	2.0	115.0
Chilipepper	S of 40º10' N. lat.	1,647	0.0	210.0	9.0	5.0	1,423.0
Dover sole	Coastwide	25,000	1497.0	0.0	38.0	55.0	23,410.0
English sole	Coastwide	5,646	91.0	0.0	5.0	7.0	5,543.0
Lingcod	N of 40º10’ N. lat.	2,878	250.0	0.0	11.7	16.0	2,600.3
Lingcod	S of 40º10’ N. lat.	1,063	0.0	2.0	0.0	7.0	1,054.0
Longnose skate	Coastwide	2,000	56.0	0.0	13.2	3.0	1,927.8
Longspine thornyhead	N of 34º27' N. lat.	1,958	30.0	0.0	13.0	3.0	1,912.0
Longspine thornyhead	S of 34º27' N. lat.	347	0.0	0.0	1.0	2.0	344.0
Pacific cod	Coastwide	1,600	400.0	0.0	7.0	2.0	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205	0.0	2,500		204,040
Sablefish	N of 36º N. lat.	4,349	See Table 4-22				
Sablefish	S of 36º N. lat.	1,560	0.0	0.0	3.0	2.0	1,555.0
Shortbelly	Coastwide	50	0.0	0.0	2.0	0.0	48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,525	50.0	0.0	7.2	2.0	1,465.8
Shortspine thornyhead	S of 34º27' N. lat.	393	0.0	0.0	1.0	41.0	351.0
Splitnose	S of 40º10' N. lat.	1,670	0.0	3.0	9.0	0.0	1,658.0
Starry flounder	Coastwide	1,528	2.0	0.0	0.0	5.0	1,521.0
Widow	Coastwide	1,500	60.0	18.0	7.9	3.3	1,410.8
Yellowtail	N of 40º10' N. lat.	4,382	677.0	10.0	11.5	3.0	3,680.5
Nearshore rockfish north	N of 40º10' N. lat.	94	0.0	0.0	0.0	0.0	94.0
Nearshore rockfish south	S of 40º10' N. lat.	990	0.0	0.0	0.0	0.0	990.0
Shelf rockfish north	N of 40º10' N. lat.	968	30.0	3.0	6.2	26.0	902.8
Shelf rockfish south	S of 40º10' N. lat.	714	0.0	31.0	6.0	9.0	668.0
Slope rockfish north	N of 40º10' N. lat.	1,160	36.0	1.0	6.0	19.0	1098.0
Slope rockfish south	S of 40º10' N. lat.	622	0.0	2.0	2.0	17.0	601.0
Other fish	Coastwide	4,697	111.8	3.0	12.5	49.5	4,520.2
Other flatfish	Coastwide	4,884	60.0	0.0	17.0	125.0	4,682.0

a/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-21. No Action. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2015-2016 (in mt).

				Trawl		Non-trawl	
Stock	**Area**	**Fishery HG**	**Allocation Type**	**%**	**Mt**	**%**	**Mt**
BOCACCIO	S of 40º10' N. lat.	328.6	Biennial	N/A	79.0	N/A	249.6
CANARY	Coastwide	101.5	Biennial	N/A	54.1	N/A	47.4
COWCOD	S of 40º10' N. lat.	2.9	Biennial	N/A	1.0	N/A	1.9
DARKBLOTCHED	Coastwide	309.2	Amendment 21	95%	293.7	5%	15.5
PETRALE	Coastwide	2,418.0	Biennial	N/A	2383.0	N/A	35.0
POP	N of 40º10' N. lat.	136.5	Amendment 21	95%	129.7	5%	6.8
YELLOWEYE	Coastwide	12.2	Biennial	N/A	1.0	N/A	11.2
Arrowtooth flounder	Coastwide	3,670.6	Amendment 21	95%	3,487.1	5%	183.5
Black	N of 46º16' N. lat.	395.0	None				
Black	S of 46º16' N. lat.	1,000.0	None				
Cabezon	46º16' to 42º N. lat.	47.0	None				
Cabezon	S of 42º N. lat.	158.0	None				
California scorpionfish	S of 34°27' N. lat.	115.0	None				
Chilipepper	S of 40º10' N. lat.	1,423.0	Amendment 21	75%	1,067.3	25%	355.8
Dover sole	Coastwide	23,410.0	Amendment 21	95%	22,239.5	5%	1,170.5
English sole	Coastwide	5,543.0	Amendment 21	95%	5,265.9	5%	277.2
Lingcod	N of 40º10' N. lat.	2,600.3	Amendment 21	45%	1,170.1	55%	1,430.2
Lingcod	S of 40º10' N. lat.	1,054.0	Amendment 21	45%	474.3	55%	579.7
Longnose skate	Coastwide	1,927.8	Biennial	90%	1,735.0	10%	192.8
Longspine thornyhead	N of 34º27' N. lat.	1,912.0	Amendment 21	95%	1,816.4	5%	95.6
Longspine thornyhead	S of 34º27' N. lat.	344.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting a/	Coastwide	204,040	Amendment 21	100%	204,040	0%	
Sablefish	N of 36º N. lat.		See Table 4-22				
Sablefish	S of 36º N. lat.	1,555.0	Amendment 21	42%	653.1	58%	901.9
Shortbelly	Coastwide	48.0	None				
Shortspine thornyhead	N of 34º27' N. lat.	1,465.8	Amendment 21	95%	1,392.5	5%	73.3
Shortspine thornyhead	S of 34º27' N. lat.	351.0	Amendment 21	N/A	50.0	N/A	301.0
Splitnose	S of 40º10' N. lat.	1,658.0	Amendment 21	95%	1,575.1	5%	82.9
Starry flounder	Coastwide	1,521.0	Amendment 21	50%	760.5	50%	760.5
Widow	Coastwide	1,410.8	Amendment 21	91%	1,283.8	9%	127.0
Yellowtail	N of 40º10' N. lat.	3,680.5	Amendment 21	88%	3,238.8	12%	441.7
Nearshore rockfish north	N of 40º10' N. lat.	94.0	None				
Nearshore rockfish south	S of 40º10' N. lat.	990.0	None				
Shelf rockfish north	N of 40º10' N. lat.	902.8	Biennial	60.2%	543.5	39.8%	359.3
Shelf rockfish south	S of 40º10' N. lat.	668.0	Biennial	12.2%	81.5	87.8%	586.5
Slope rockfish north	N of 40º10' N. lat.	1,098.0	Amendment 21	81%	889.4	19%	208.6
Slope rockfish south	S of 40º10' N. lat.	601.0	Amendment 21	63%	378.6	37%	222.4
Other fish	Coastwide	4,520.2	None				
Other flatfish	Coastwide	4,682.0	Amendment 21	90%	4,213.8	10%	468.2

a/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-22. No Action. Estimates of tribal, research, recreational (Rec) and EFP mortality (in mt), used to calculate the fishery sablefish commercial harvest guideline north of 36° N. latitude under No Action.

Stock	ACL (mt)	Tribal Share (mt) a/	Research (mt)	Rec. (mt)	EFP (mt)	Commercial HG (mt)
Sablefish N. of 36° N. lat.	4,349	435	26	6.1	4	3,878

a/ The sablefish allocation to Pacific coast treaty Indian Tribes is 10 percent of the sablefish ACL for the area north of 36° N. lat. This allocation represents the total amount available to the treaty Indian fisheries before deductions for discard mortality.

4.2.1.2 Shorebased IFQ – No Action

The shorebased IFQ fishery is described in Section 3.xxx. Principle management measures for the shorebased IFQ fishery include:

- Catch Controls: IFQ and individual bycatch quota (IBQ) for Pacific halibut north of 40°10' N. latitude are the primary catch control tools in the shorebased IFQ fishery. South of 40°10' N. latitude, Pacific halibut is managed with a set-aside. The 2014 IFQ and IBQ used in the analysis of No Action can be found in Table 4-23. Additionally, cumulative monthly landing limits (hereinafter trip limits) for non-IFQ species and Pacific whiting outside the primary season dates apply to each vessel (see regulations Table 1 North and South to Part 660, Subpart D). Once a vessel reaches a limit, the species or species complex can no longer be retained and sold.
- Accumulation limits: The maximum number of QS and QP an entity may control in the shorebased IFQ fishery is limited by accumulation limits (defined in regulation at 50 CFR 660.111). These limits vary according to the management unit for the stock or stock complex and are intended to prevent the consolidation of quota holdings by just a few entities.
- Carry-over provision: The carry-over provision allows a limited amount of surplus QP or IBQ pounds in a vessel account to be carried over from one year to the next or allows a deficit in a vessel account in one year to be covered with QP or IBQ pounds from a subsequent year, up to a carryover limit. The carry-over provision is anticipated to increase individual flexibility for harvesters, improve economic efficiency, and achieve OY while preserving the conservation of stocks. The eligible percentages used for the carry-over provision may be modified during the biennial specifications and management measures process, based on a Council inseason recommendation and as approved by NMFS.
- Monitoring and Reporting: All trips in the shorebased IFQ fishery are monitored at sea by the West Coast Groundfish Observer Program (WCGOP) and landings are tracked by electronic fish tickets, verified by catch monitors. Together, these two programs provide robust, near-real time tracking and reporting of IFQ species and Pacific halibut IBQ.
- Gear Restrictions: IFQ species may be harvested with groundfish trawl or legal groundfish nontrawl gear. Trawl gear restrictions prohibit certain types of gear that may be used in rocky habitat, reducing habitat impacts and also limiting overfished species bycatch for those species that inhabit rocky substrate. Further, gear restrictions minimize catch of overfished species while allowing sufficient access to target species. For example, the selective flatfish trawl net, which is required shoreward of the trawl RCA north of 40°10' N. latitude, reduces rockfish bycatch while efficiently catching flatfish. Scottish seine gear is exempted from trawl RCA closures in the area between 38° N. latitude and 36° N. latitude and depths less than 100 fm because the gear has demonstrated low bycatch rates of overfished species. IFQ species can also be harvested with legal nontrawl gears.
- RCAs: Vessels harvesting IFQ must abide by RCA closures, which are specified by gear type

(Table 4-25 and Table 4-26). For example, vessels fishing with legal groundfish nontrawl gear must abide by the non-trawl RCA while vessels fishing with bottom trawl gear must abide by the trawl RCA. These RCA features were designed to provide sufficient access to target species while minimizing bycatch of overfished species.

- Bycatch Reduction Areas: Bycatch on Pacific whiting trips can be mitigated by implementing bycatch reduction areas. These areas restrictions apply to vessels on Pacific whiting trips using mid-water gear during the primary whiting season and limit fishing to depths greater than any of the specified management lines between 75 fm and 150 fm (see regulations at 660.131(c)(4) Subpart D).
- Ocean Conservation Zones: Chinook salmon bycatch on Pacific whiting trips can be mitigated by implementing the ocean salmon conservation zones. These zones apply to vessels on Pacific whiting trips using mid-water gear during the primary whiting season and restrict fishing to depths seaward of 100 fm.
- Other Groundfish Conservation Areas (GCA) – Several other GCAs exist and provide overfished species and habitat protection. Though limited bottom trawling occurs south of Point Conception at 34°27' N. latitude in the Southern California Bight, bottom trawling and other bottom fishing activities are prohibited in two discrete areas called the CCAs (Figure 4-16.a). Closed EFH areas are used to protect bottom habitat from the adverse effects of trawl gear (see regulations at 660.75). Three areas off the Washington coast are designed to reduce bycatch of yelloweye rockfish. North Coast Area B and South Coast Area B are closed to commercial fishing (Figure 4-16.a and b). South Coast Area A is a voluntary “area to be avoided” for commercial groundfish fisheries.

Impact (Groundfish Mortality)

The projected groundfish mortality for IFQ species under No Action, as a result of implementing the above mentioned management measures, can be found in Table 4-23. Additionally, Table 4-23 includes mortality estimates for 2011 and 2012 for comparison. Groundfish mortality of non-IFQ species is not projected using a model; however historical data from 2011 and 2012 are provided for comparison (Table 4-24).

Table 4-23. No Action – Shorebased IFQ. Projected mortality for IFQ species and Pacific halibut compared to the allocations or set-asides under No Action (2014 values). Year end estimates of mortality for 2011 and 2012 are provided for reference (right panel).

IFQ Species	Area	No Action		Historical Mortality a/	
		Projected Mortality (mt)	SB IFQ Allocation (mt)	2011 SB IFQ mortality (mt)	2012 SB IFQ mortality (mt)
BOCACCIO	South of 40°10' N. lat.	10.9	79.0	5	9
CANARY	Coastwide	9.4	41.1	4	7
COWCOD	South of 40°10' N. lat.	0.1	1.0	0	0
DARKBLOTCHED	Coastwide	108.5	278.4	91	86
PETRALE	Coastwide	2,252.1	2378.0	810	1,033
POP	North of 40°10' N. lat.	48.0	112.3	47	49
YELLOWEYE	Coastwide	0	1	0	0
Arrowtooth flounder	Coastwide	2,436	3,467	2,487	2,389
Chilipepper rockfish	South of 40°10' N. lat.	291	1,067	317	288
Dover sole	Coastwide	7,713	22,235	7,795	7,025
English sole	Coastwide	137	5,261	138	147
Lingcod	North of 40°10' N. lat.	227	1,152	283	365
Lingcod	South of 40°10' N. lat.	84	743	7	16
Longspine thornyheads	North of 34°27' N. lat	936	1,811	943	892
Pacific cod	Coastwide	266	1,126	258	396
Pacific whiting b/	Coastwide	83,946	85,697	90,978	65,666
Pacific halibut c/	North of 40°10 N. lat.	N/A	107	33.08	42.65
Pacific halibut d/	South of 40°10 N. lat.	N/A	10	0.255	0.60
Sablefish	North of 36° N. lat.	1,887	1,988	2,379	2,182
Sablefish	South of 36° N. lat.	307	653	449	223
Shortspine thornyheads	North of 34°27' N.	733	1,372	718	709
Shortspine thornyheads	South of 34°27' N	4	50	8	1
Splitnose rockfish	South of 40°10' N. lat.	53	1,575	40	60
Starry flounder	Coastwide	9	756	12	8
Widow rockfish	Coastwide	426	994	138	153
Yellowtail rockfish	North of 40°10' N. lat.	816	2,939	739	963
Shelf rockfish	North of 40°10' N. lat.	28	508	16	40
Shelf rockfish	South of 40°10' N. lat.	12	81	3	14
Slope rockfish	North of 40°10' N. lat.	182	789	145	217
Slope rockfish	South of 40°10' N. lat.	98	379	52	123
Other flatfish	Coastwide	728	4,194	703	687

a/ Historical estimates of mortality were generated using the WCGOP multi-year data product (January 2014). Pacific whiting values include inseason allocation reapportionments.
b/The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.
c/ Pacific halibut is managed using IBQ, see regulations at §660.140. The 2014 Pacific halibut TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used. Pacific halibut mortality is not projected.
d/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude. (estimated to 5 mt each). Pacific halibut mortality is not projected.

Table 4-24. Groundfish mortality for non-IFQ Stock in the shorebased IFQ fishery (mt).

Stock	2011	2012
Big Skate	32	48
Black rockfish (North of 46°16' N. lat.)	1	1
California Skate	2	2
Grenadier Unidentified	69	70
Groundfish Unidentified	0	1
Longnose skate	811	908
Pacific Flatnose	3	2
Pacific Grenadier	82	56
Shortbelly rockfish	11	6
Skate Unidentified	278	231
Soupfin Shark	1	1
Spiny Dogfish Shark	575	529
Spotted Ratfish	71	79

Table 4-25. Trawl RCA configuration in regulation as of April 17, 2014.

<table>
<tr><th>Area</th><th>JAN-FEB</th><th>MAR-APR</th><th>MAY-JUN</th><th>JUL-AUG</th><th>SEP-OCT</th><th>NOV-DEC</th></tr>
<tr><td>North of 48°10' N. lat.</td><td>shore - modified/ 200 fm line</td><td>shore - 200 fm line</td><td colspan="2">shore - 150 fm line</td><td>shore - 200 fm line</td><td>shore - modified 200 fm line</td></tr>
<tr><td>48°10' N. lat. - 45°46' N. lat.</td><td colspan="6">100 fm line - 150 fm line</td></tr>
<tr><td>45°46' N. lat. - 40°10' N. lat.</td><td>100 fm line - modified 200 fm line</td><td colspan="4">100 fm line - 200 fm line</td><td>100 fm line - modified 200 fm line</td></tr>
<tr><td>South of 40°10' N. lat.</td><td colspan="6">100 fm line - 150 fm line</td></tr>
</table>

Table 4-26. Non-Trawl RCA configuration in regulation as of April 17, 2014.

<table>
<tr><th>Area</th><th>JAN-FEB</th><th>MAR-APR</th><th>MAY-JUN</th><th>JUL-AUG</th><th>SEP-OCT</th><th>NOV-DEC</th></tr>
<tr><td>North of 46°16' N. lat.</td><td colspan="6">shoreline - 100 fm line</td></tr>
<tr><td>46°16' N. lat. - 42°00' N. lat.</td><td colspan="6">30 fm line - 100 fm line</td></tr>
<tr><td>42°00' N. lat. - 40°10' N. lat.</td><td colspan="6">20 fm depth contour - 100 fm line/</td></tr>
<tr><td>40°10' N. lat. - 34°27' N. lat.</td><td colspan="6">30 fm line - 150 fm line</td></tr>
<tr><td>South of 34°27' N. lat.</td><td colspan="6">60 fm line - 150 fm line</td></tr>
</table>

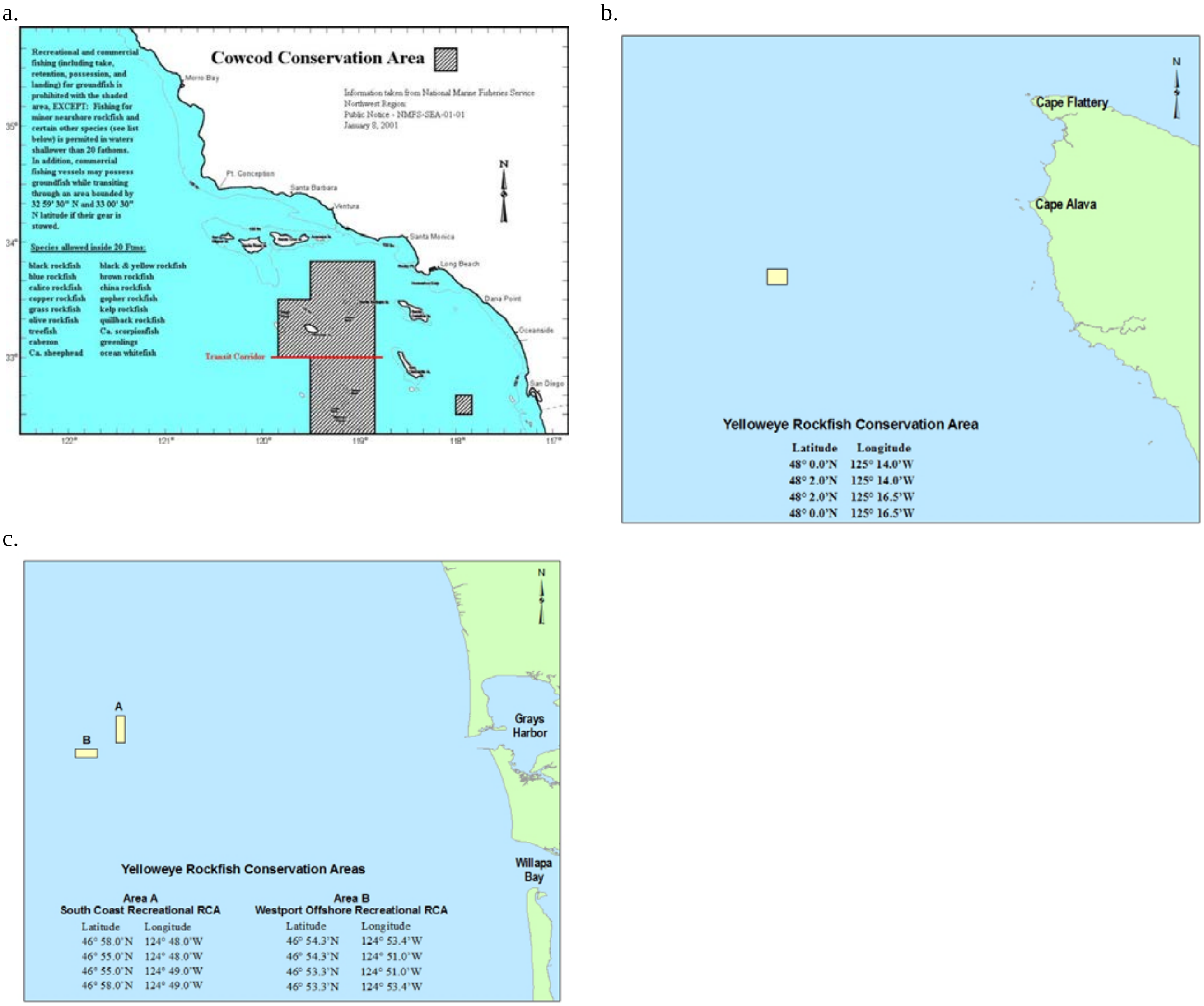


Figure 4-16. No Action – Selected GCAs. a. The current Cowcod Conservation Areas located in the Southern California Bight; b. North Coast Area B, a Yelloweye Rockfish Conservation Area in northern Washington; c. South Coast Area A and B, Yelloweye Rockfish Conservation Areas in southern Washington. South Coast Area A is an area to be voluntarily avoided.

4.2.1.3 At-Sea Whiting Co-ops – No Action

The at-sea sector is composed of catcher-processors and motherships that target Pacific whiting with mid-water trawl gear and process at sea. Management measures include allocations for Pacific whiting, canary rockfish, darkblotched rockfish, POP, and widow rockfish and set-asides for bycatch species. Further, measures are established that restrict the Pacific whiting season dates and provide for bycatch reduction areas and ocean salmon conservation zones, similar to the shorebased IFQ fishery (Section 4.2.1.2).

The at-sea sector is managed under a system of cooperatives (co-ops) that are somewhat like IFQs except that the harvest privilege is assigned to a group, the co-op, instead of an individual. The members of the group then decide how and when the collectively-held harvest privilege would be used. The trawl rationalization program establishes a set of rules for the formation of co-ops in the at-sea mothership sector that provide a strong incentive for catcher vessels to form co-ops associated with a mothership processor (see regulations at 660.150). In the case of the catcher-processor sector, a single, voluntary co-op has been in existence for some time. In that instance the allocation to the sector is essentially an allocation to the co-op. Further, a catcher-processor permit endorsement is required, which essentially closes this sector to new entrants; a move intended to lend greater stability to the functioning of the current, voluntary co-op. Regulations at 660.160 outline the catcher-processor co-op provisions.

Impact (Groundfish Mortality)

Under No Action, allocations for Pacific whiting, canary rockfish, darkblotched rockfish, POP, and widow rockfish and set-asides for bycatch species established in 2014 would remain for 2015-2016 (Table 4-27 and Table 4-28). Groundfish mortality in the at-sea sectors, as a result of the above-mentioned management measures, is not formally estimated. The allocations may be considered the highest estimate of groundfish mortality since the fishery is managed to stay within the allocations.

Table 4-27. No Action – At-Sea. Allocations for the catcher-processor (CP) and mothership sectors (MS) under the No Action alternative for 2015-2016 (values in regulation on April 17, 2014). Historical mortality for 2011 and 2012 by sector is provided (right panel) for reference.

No Action Allocations				Historical Mortality a/			
Stock	**Area**	**CP Allocation (mt)**	**MS Allocation (mt)**	2011 CP (mt)	2012 CP (mt)	2011 MS (mt)	2012 MS (mt)
CANARY	Coastwide	7.6	5.4	0.5	0.3	0.1	0.2
DARKBLOTCHED	Coastwide	9.0	6.3	10.3	1.4	1.7	1.3
POP	N of 40º10' N. lat.	10.2	7.2	6.5	3.1	0.7	1.4
Pacific whiting	Coastwide	69,373	48,970	71,522	55,695	50,050	38,216
Widow	Coastwide	170.0	120.0	24.1	42.4	12.8	37.2

a/ Pacific whiting mortality estimates were derived from the WCGOP GM Reports and include inseason reapportionments of whiting from the tribal sectors. A NORPAC query on January 30, 2014 provided the remaining mortality estimates.

Table 4-28. No Action – At-Sea. At-sea whiting set-asides and allocations under the No Action alternative (values in regulation as of April 17, 2014). Historical mortality for the catcher-processor (CP) and mothership sectors (MS) is provided for reference.

No Action Set-Asides			Historical Mortality for CPs and MS a/		
Stock	**Area**	**Total Set-Asides (mt)**	**2011 (mt)**	**2012 (mt)**	**Average 2008-2012 (mt)**
PETRALE SOLE	Coastwide	5	0	0	0
YELLOWEYE	Coastwide	0	0	0	0
Arrowtooth flounder	Coastwide	20	45	41	21
Dover sole	Coastwide	5	1	0.3	1
English sole	Coastwide	5	0	0	0
Lingcod	N of 40º10' N. lat.	15	0.2	0.2	2
Longnose skate	Coastwide	5	0.4	0.1	0.4
Longspine thornyhead	N of 34º27' N. lat.	5	0.4	0	0.3
Pacific cod	Coastwide	5	0	0	0
Pacific halibut b/	Coastwide	10	0.6	0.6	2
Sablefish	N of 36º N. lat.	50	5	5.1	8
Shortspine thornyhead	N of 34º27' N. lat.	20	13	1.7	8
Starry flounder	Coastwide	5	0	0	0
Yellowtail	N of 40º10' N. lat.	300	81	43	167
Shelf rockfish north	N of 40º10' N. lat.	35	1	1	1
Slope rockfish north	N of 40º10' N. lat.	100	91	75	63
Other Fish	Coastwide	520	726	178	322
Other flatfish	Coastwide	20	6	3	4

a/ NORPAC query on January 30, 2014.
b/As stated in §660.55 (m), the Pacific halibut set-aside is 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10’ N. latitude (estimated to 5 mt each).

4.2.1.4 Limited Entry and Open Access Fixed Gear Management – No Action

Limited entry and open access fixed gear sectors are described in Section 3.XXX. Catch controls for both the incidental and directed open access fishery include trip limits and the nontrawl RCA (Table 4-26). Table 4-29 and Table 4-30 summarizes the principle management measures for the limited entry and open access fixed gear vessels. The sablefish stock is the primary target (in volume) for both the limited entry and open access fixed gear sectors. A variety of nearshore species (e.g., black rockfish, nearshore rockfish complex, cabezon, lingcod, and kelp greenling) are targeted by a large number of vessels, but in relatively low volume.

Table 4-31 and Table 4-32 summarize the FMP allocations of sablefish for limited entry and open access north of 36° N. latitude under No Action. South of 36° N. latitude, the FMP allocation of sablefish is 42 percent to the trawl sector and 58 percent to the non-trawl sector. A short-term allocation between the limited entry and open access fixed gear sectors of 55 percent and 45 percent, respectively, is established (Table 4-33). Trip limits intended to attain the allocations under No Action can be found in Table 4-34 and Table 4-35.

One non-trawl RCA is implemented for the limited entry and open access fixed gear fisheries (Table 4-26). Routine RCA adjustments can be made for four northern subareas bounded by Cape Mendocino at 40°10' N. latitude, 43° N. latitude, Cascade Head, Point Chehalis at 46.888° N. latitude, and the U.S.-Canada border. These adjustments may be necessary inseason to reduce projected catches of non-target species, typically yelloweye and canary rockfish, while providing access to target species. Changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm).

The nontrawl RCA seaward boundary south of 40°10' N. latitude under the No Action Alternative is defined by management lines specified with waypoints at roughly 150 fathoms (fm) to avoid areas where bocaccio, canary and yelloweye rockfish are most abundant.

Other GCAs include the North Coast Area B Yelloweye Rockfish Conservation Area (YRCA) in Washington, which has been closed to limited entry and open access fixed gears since 2007 (Figure 4-16.b). Additionally, the South Coast Areas A and B YRCAs and the “C-shaped” YRCA in waters off northern Washington are voluntary “areas to be avoided” (Figure 4-16.c and Figure 4-17). Fishing is not allowed in the CCAs (Figure 4-16.a) under the No Action Alternative, except for some nearshore commercial fishing opportunities described in the nearshore section.

The models used project overfished species catches in the limited entry and directed open access fisheries and inform management measures are stratified by area of fishing shoreward (nearshore) or seaward (non-nearshore) of the nontrawl RCA (see Appendix A). Therefore, the estimates of groundfish mortality under No Action and the action alternatives are presented using the same strata.

Table 4-29. No Action – Limited Entry Fixed Gear. Summary of limited entry fixed gear fishery management measures under the No Action Alternative based on regulations as of April 17, 2014.

Cumulative limits	• Cumulative trip limits for most species, specific to geographic area (See regulations Table 2 North and South to Part 660, Subpart E) Sablefish trip limits are presented in Table 4-34. • Primary sablefish fishery managed with tier limits in Table 4-31. • Canary and yelloweye landings prohibited coastwide • South of 40°10' N. latitude landings of cowcod and bronzespotted rockfish prohibited
Size limits	Lingcod • North of 42° N. lat. minimum size limit 22 inches total length • South of 42° N. lat. minimum size limit 24 inches total length
Gear restrictions	• Longline, trap or pot marked at the surface, at each terminal end, with a pole, flag, light, radar reflector, and a buoy • Must be attended at least once every 7 days • Traps must have biodegradable escape panels
Seasons	• Primary sablefish fishery from 4/1 to 10/31 • Permit stacking of up to 3 permits is allowed in primary sablefish fishery • Additional seasonal restrictions may be implemented via routine action or the fishery may "close" for some species or some areas during the year through inseason action
GCAs	YRCA • North Coast Commercial YRCA (WA) closed to commercial fixed gears • North Coast Recreational YRCA (WA) is a voluntary area to be avoided • Westport Offshore Recreational YRCA (WA) is a voluntary area to be avoided
	CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller • Fishing for rockfish and lingcod shoreward of 20 fm
	• Farallon Islands commercial fishing for groundfish is prohibited shoreward of 10 fm with the following exceptions: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller • Cordell Banks Commercial fishing for groundfish is prohibited in depths less than 100 fm
	EFH Fishing with all bottom contact gear, including longline and pot/trap gear, is prohibited within the following EFH conservation areas: Thompson Seamount, President Jackson Seamount, Cordell Bank (50 fm (91 m) isobath), Harris Point, Richardson Rock, Scorpion, Painted Cave, Anacapa Island, Carrington Point, Judith Rock, Skunk Point, Footprint, Gull Island, South Point, and Santa Barbara. Fishing with bottom contact gear is also prohibited within the Davidson Seamount
Nontrawl RCAs	• North of 46°16' N. lat. Shoreline to 100 fm • 46°16'- 42° N. lat. 30 to 100 fm • 42°-40°10' N. lat. 20 fm depth contour to 100 fm • 40°10'-34°27' N. lat. – 30 to 150 fm • South of 34°27' N. lat. – 60 to 150 fm Fishing is prohibited in nontrawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• VMS required • WCGOP observer coverage when requested
Reporting	• VMS declarations

Table 4-30. No Action – Open Access. Summary of open access fishery management measures under the No Action Alternative based on regulations as of April 17, 2014.

Cumulative	• Cumulative trip limits for most species, specific to trawl type and geographic area (See

limits	regulations Table 2 North and South to Part 660, Subpart E) • Canary and yelloweye landings prohibited coastwide • South of 40°10' N. latitude landings of cowcod and bronzespotted rockfish prohibited
Gear restrictions	• Longline, trap, pot, hook-and-line (fixed or mobile), setnet (anchored gillnet or trammel net (south of 38° N. lat. only), spear, and non-groundfish trawl gear for: pink shrimp, ridgeback prawn, and California halibut or sea cucumbers (south of Pt. 38°57.50' N. lat.) Non-groundfish trawl gear: • Is exempt from the limited entry trawl gear restrictions • Footrope (>19") prohibited in EFH Fixed gear: • Must be marked at the surface, at each terminal end, with a pole, flag, light, radar reflector, and a buoy; vertical hook-and-line gear that is closely tended may be marked only with a single buoy of sufficient size to float the gear • Must be attended at least once every 7 days • Fishing for groundfish with set nets is prohibited in the fishery management area north of 38°00.00' N. lat. • Traps must have biodegradable escape panels • Spears may be propelled by hand or by mechanical means
Seasons	Seasonal restrictions may be implemented via routine action or the fishery may "close" for some species or some areas during the year through inseason action
GCAs	YRCA • North Coast Commercial YRCA (WA) closed to commercial fixed gears • North Coast Recreational YRCA (WA) is a voluntary area to be avoided • Westport Offshore Recreational YRCA (WA) is a voluntary area to be avoided • Salmon Troll YRCA. Fishing for salmon is prohibited
	CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller • Fishing for rockfish and lingcod shoreward of the 20 fm
Open Access nontrawl RCAs	• North of 46°16' N. lat. Shoreline to 100 fm • 46°16'- 42° N. lat. 30 to 100 fm • 42°-40°10' N. lat. 20 fm depth contour to 100 fm • 40°10'-34°27' N. lat. – 30 to 150 fm • South of 34°27' N. lat. – 60 to 150 fm Fishing is prohibited in nontrawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• VMS required • WCGOP observer coverage when requested
Reporting	• VMS declarations

Table 4-31. No Action: Limited entry sablefish FMP allocations north of 36 N. latitude, based on values in regulation on April 17, 2014.

Sablefish Com. HG	Limited Entry Share	LEFG Share (mt)				Estimated Tier Limits (lbs) a/		
		LE FG Total Catch Share	Landed Catch Share a/	Primary Season Share	LEFG DTL Share	Tier 1	Tier 2	Tier 3
3,878	3,513	1,476	1,429	1,214	214	37,442	17,019	9,725

a/ The limited entry fixed gear total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2010. In 2015-2016, 15.9 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-32. No Action: Open access FMP allocations north of 36 N. latitude, based on values in regulation on April 17, 2014.

OA Total Catch Share	Directed OA Landed Catch Share a/
365	353

a/ The open access total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2010. In 2015-2016, 15.9 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-33. No Action: Short-term sablefish allocations south of 36 N. latitude for the non-trawl sector, limited entry and open access.

Year	Commercial HG	Non-Trawl Allocation	LE FG Total Catch Share	Directed OA Total Catch Share	LE FG Landed Catch Share a/	Directed OA Landed Catch Share
2014	1,555	902	496	406	480	393

a/ The limited entry and open access fixed gear total catch shares are reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2010. In 2015-2016, 15.9 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-34. No Action. Sablefish trip limits north of 36° N. latitude for limited entry and open access fixed gears based on regulations as of April 17, 2014.

Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
Limited Entry	950 lb/week, not to exceed 2,850 lb/ 2 months					
Open Access	300 lb/ day, or 1 landing per week of up to 800 lb, not to exceed 1,600 lb/ 2 months					

Table 4-35. No Action. Sablefish trip limits south of 36° N. latitude for limited entry and open access fixed gears based on regulations as of April 17, 2014.

Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
Limited Entry	2000 lb/ week					
Open Access	300 lb/day, or 1 landing per week of up to 1,600 lb, not to exceed 3,200 lb/2 months					

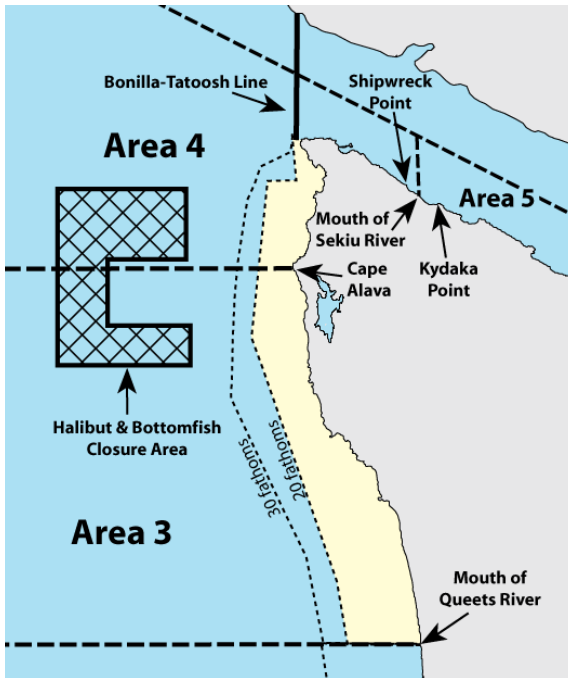


Figure 4-17. No Action. The current "C-shaped" Yelloweye Rockfish Conservation Area in waters off northern Washington where recreational groundfish and Pacific halibut fishing is prohibited.

Impact (Groundfish Mortality) – Non-Nearshore North of 36° N. latitude

The non-nearshore model projects mortality of overfished and non-overfished species for the limited entry fixed gear and the open access sectors north of 36° N. latitude and seaward of the nontrawl RCA based on the northern sablefish ACL. The sablefish north stock is the primary target and provides the main source of revenue in both sectors. The bycatch projections are based on the assumption that the limited entry and open access allocations for sablefish, less any discard mortality, are completely harvested.

Interactions with overfished species, primarily yelloweye rockfish and canary rockfish, require adjustments to management measures in the non-nearshore fisheries. Seaward adjustments of the nontrawl RCA boundary are the main management measure for reducing catches of these two stocks. Changes to the shoreward boundary (e.g., changing from 150 to 100 fm) can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation.

Management measures and projected mortality for the non-nearshore fishery north of 36° N. latitude under No Action is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.40

(Table 4-20), and the resulting sablefish allocations (Table 4-31 and Table 4-32). Current trip limits (Table 4-34) would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-31 and Table 4-32). Trip limits for other species (e.g., slope rockfish, shelf rockfish, etc.) may also be adjusted to attain the ACL or achieve other conservation goals.

The overfished species mortality, as a result of harvesting the sablefish allocations, were evaluated using 2002-2011 WCGOP data in the non-nearshore model. Under No Action, trawl and non-trawl allocations were established for overfished species. Further, the non-nearshore fishery was also allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-36). Routine adjustments of the seaward non-trawl RCA (Table 4-26) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (Table 4-36). RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm). Table 4-37 contains the projected mortality groundfish for the non-nearshore fishery.

Table 4-36. No Action – Non-Nearshore fishery: Overfished species shares for the non-nearshore fixed gear fishery under No Action (mt), based on the Preferred Alternative for 2014 in the 2013-2014 FEIS.

Stock	Area	Total Projected OFS Mortality 2015-2016 (mt)	Shares 2015/2016 (mt)	Non-Trawl Allocation (mt)
Bocaccio	S. 40°10 N. lat.	0.0	76.2/76.2	249.6
Canary	Coastwide	1.0	3.7/3.7	47.4
Cowcod	S. 40°10 N. lat.	0.0		1.9
Darkblotched	Coastwide	4.3		15.5
POP	N. 40°10 N.N. lat.	0.2		6.8
Petrale	Coastwide	0.3		35.0
Yelloweye	Coastwide	0.4	1.1/1.1	11.2

Table 4-37. No Action. Projected groundfish mortality for the limited entry and open access fixed gear fisheries north of 36° N. latitude (in mt).

Stock	Limited Entry (mt)	Open Access (mt)	Total (mt)
Arrowtooth flounder	40	6	46
Bank rockfish (South of 40°10' N. lat.)	0	0	0
Big skate	5	1	6
Black rockfish (Oregon/California)	0	0	0
Blackgill rockfish (South of 40°10' N. lat.)	11	5	16
Blue rockfish	0	0	0
Cabezon - (California)	0	0	0
Cabezon - (Oregon)	0	0	0
California skate	0	0	0
Chilipepper rockfish	0	0	0
Dover sole	6	1	7
English sole	0	0	0
Greenspotted rockfish	0	0	0
Greenstriped rockfish	1	0	1

Stock	Limited Entry (mt)	Open Access (mt)	Total (mt)
Grenadiers	42	14	56
Kelp greenling	0	0	0
Lingcod - (California)	11	3	14
Lingcod - (Washington/Oregon)	3	0	3
Longnose skate	58	11	69
Longspine thornyhead (North Pt. Conception)	2	1	3
Mixed thornyheads	2	1	2
Pacific cod	2	0	2
Pacific hake	0	0	1
Redstripe rockfish (North of 40°10' N. lat.)	0	0	0
Sharpchin rockfish	0	0	0
Shortbelly rockfish	0	0	0
Shortspine thornyhead (North Pt. Conception)	18	5	22
Silvergrey rockfish (North of 40°10' N. lat.)	0	0	0
Spiny dogfish	135	22	157
Splitnose rockfish	0	0	0
Starry flounder	0	0	0
Unspecified skate	15	3	17
Widow rockfish	0	0	0
Yellowmouth (North of 40°10' N. lat.)	0	0	0
Yellowtail rockfish	0	0	1
Other flatfish	0	0	0
Other groundfish	3	1	4
Other nearshore rockfish	0	0	0
Other shelf rockfish	2	0	3
Other slope rockfish	92	17	108

Impact (Groundfish Mortality) – Non-Nearshore South of 36° N. latitude

Management measures and projected groundfish mortality for the non-nearshore fishery south of 36° N. latitude under No Action is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.40 (Table 4-20). Anticipated catch of sablefish south of 36º N latitude under No Action would be approximately equal to the 2015-2016 sablefish allocations and resulting landed catch shares for limited entry and open access fixed gears (Table 4-33). The current trip limits (Table 4-35) would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-33). Trip limits for other species (e.g., slope rockfish, shelf rockfish, etc.) may also be adjusted to attain the ACL or achieve other conservation goals.

Under No Action, trawl and non-trawl allocations would be established for overfished species. Further, the non-nearshore fishery would be allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-36). Routine adjustments of the non-trawl RCA (Table 4-26) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (Table 4-36). Changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm).

Impact (Groundfish Mortality) – Nearshore – No Action

The nearshore model projects mortality of overfished species based on the expected landings of nearshore species by the limited entry and opens access sectors shoreward of the nontrawl RCA coastwide. The majority of vessels participating in nearshore commercial fisheries do not hold Federal limited entry permits. The most common gear used is jig gear; however, some vessels use longline gear to target nearshore species and, in fewer instances, pots or traps are used in the nearshore fishery.

California and Oregon limit entry to the nearshore groundfish fishery by requiring a state limited entry permit to take nearshore groundfish species. Washington does not allow a nearshore commercial fishery. More conservative state quotas than those specified in Federal regulations exist for most nearshore species, and state trip limits apply in these cases. State trip limits are designed to stay within nearshore species quotas while providing a year-round opportunity, if possible. Federal management measures for west coast nearshore commercial groundfish fisheries are typically stratified north and south of 40°10' N. latitude, with some measures stratified north and south of 42° N. latitude and others stratified south of 34°27’ N. latitude.

In Oregon, two types of state limited entry permits are issued – black and blue rockfish permits with a nearshore endorsement and black and blue rockfish permits without a nearshore endorsement. Limited entry permit holders without a nearshore endorsement may land commercial quantities of black and blue rockfish under state cumulative trip limits (currently two-month periods), with an additional total of 15 lbs per day of any combination of other nearshore groundfish species and two rockfish species with Federal designation as shelf rockfish (tiger and vermilion). Vessels that also have a nearshore endorsement permit, in addition to the black/blue limited entry permit, may land commercial quantities of other nearshore groundfish species up to the state’s cumulative trip limits and the Federal limits for tiger and vermilion rockfish. For vessels that do not hold a state permit or endorsement, an incidental landing limit of no more than 15 pounds per day of any combination of black rockfish, blue rockfish, and/or other nearshore fish is allowed, with a few exceptions. Salmon trollers with a valid troll permit may land 100 pounds of black rockfish, blue rockfish, or a combination thereof in the same landing in which a salmon is landed. These rockfish may only be landed dead. If the cumulative landing of black and blue rockfish combined in the salmon troll fishery reaches 3,000 pounds in any calendar year, then each salmon troll vessel is limited to 15 pounds of black rockfish, blue rockfish, or a combination thereof per troll landing for the remaining calendar year. Trawlers may land up to 1,000 pounds of black rockfish, blue rockfish, or a combination thereof per calendar year, and these fish must be 25 percent or less of the total poundage of each landing and be landed dead.

In California, limited entry permit holders, as well as open access fishermen, who have either a shallow nearshore fishery or deeper nearshore fishery permit administered by the California Department of Fish and Wildlife (CDFW) may land minor nearshore rockfish from either the shallow nearshore or deeper nearshore complexes, respectively. Trip limits for shallow nearshore rockfish, deeper nearshore rockfish, cabezon, greenlings, and California scorpionfish vary by period. There is some nearshore commercial fishing allowed in the CCAs (Figure 4-16) in depths shallower than 20 fm under the No Action Alternative. Only southern minor nearshore rockfish, (both shallow and deeper nearshore rockfish), California scorpionfish, cabezon, greenlings, California sheephead, and ocean whitefish are allowed to be retained in depths less than 20 fm in the CCAs.

There are Federal limits and state quotas (or harvest guidelines) for nearshore species that limit target species landings in the commercial nearshore fishery (Table 4-38). State harvest guidelines between recreational and commercial fisheries may be adjusted by each state between or within years, so are not displayed herein. State harvest guidelines for each sector are established to ensure that the non-trawl allocation provided to each state is not exceeded while providing fishing opportunities for both sectors. The nearshore fishery is also managed to stay within the nearshore share for overfished species (Table 4-41) or the overall non-trawl overfished species allocations. Trawl, non-trawl, and within non-trawl allocations for overfished species, which were established in the 2013-2014 biennium, would be implemented under No Action. Under the No Action alternative, catch of canary rockfish in California exceeds the catch sharing agreement with Oregon (Table 4-38) as well as the nearshore share of the non-trawl allocation. However, total catch of canary from both commercial and recreational fisheries is within the non-trawl allocation. In the event the projected overfished species mortality is expected to exceed the non-trawl allocation, routine adjustments of the shoreward non-trawl RCA (Table 4-26) or reduced trip limits for nearshore species could occur. RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the nearshore share or non-trawl allocation (e.g., changing from 20 to 30 fm).

The No Action alternative is based on the expectation that landings in the nearshore fishery will be similar to recent historical average landings from 2008-2012 (Table 4-39 and Table 4-40), which is lower than most of the state quotas. Nearshore fishery landings are influenced by a variety of factors, including weather and market, and can vary annually (Table 4-40). As such, there is substantial uncertainty surrounding the estimated landings under No Action and the action alternatives, which in turn may influence the projected overfished species mortality and socioeconomic analysis. In the event fishery performance is better than the five year average, mortality of groundfish species will be higher; however the fishery will still be managed to ensure combined commercial and recreational catches stay within the non-trawl allocation.

Table 4-38. No Action. Nearshore species quotas between state and sector under No Action.

Stock	Area	Type	Allocation	
CANARY	OR and CA	Catch sharing	26.7% Oregon	73.3% California
YELLOWEYE	OR and CA	Catch sharing	72.7% Oregon	27.3% California
Black rockfish	OR and CA	Federal HG	58% Oregon	42% California
	OR	State	Commercial	Recreational
	CA	State	Commercial	Recreational
Blue rockfish	OR a/	State	Commercial	Recreational
	CA	Federal HG b/		
	CA	State	Commercial	Recreational
Cabezon	OR	State	Commercial	Recreational
	CA	State	Commercial	Recreational
Kelp greenling	OR	State	Commercial	Recreational
	CA	State	Commercial	Recreational

a/ Oregon implements a black and blue rockfish landing cap through state regulation.
b/ The blue rockfish Federal HG was set equal to the 40:10 adjusted ABC for blue rockfish. The trawl and non-trawl fisheries are managed to the HG, there is no allocation between the trawl and non-trawl sectors.

Table 4-39. No Action. Expected landings under the No Action alternative, which are the average landings for the commercial nearshore fishery from 2008-2012. Target species landings by area are also shown in the far right panel. The 2013 quotas (or harvest guidelines) for Oregon and California are provided in parenthesis.

Stock	Area	Total Target Species Landings 2015-2016 (mt)	Target Species Landings by Area for 2015-2016			
			OR Total (mt)	CA Total (mt)	40°10' – 42° N. lat. (mt)	S. of 40°10' N. lat. (mt)
Black rockfish	S. 46°16 N. lat.	161	105 (137.9)	56	52 (134.8)	4 (34)
Cabezon	OR	27	27 (30)			
Cabezon	CA	24		24	2 (7)	22 (63)
Kelp greenling	OR	20	20 (23.4)			
Kelp greenling	CA	2.3		2.3	0.3 (0.2)	2 (21)
Lingcod	N. 40°10 N. lat.	34	29	5	5	
Lingcod	S. 40°10 N. lat.	16		16		16
Nearshore rockfish N. a/	N. 40°10 N. lat.	27				
--Blue rockfish		*13*	*5*	*8*	*8 (12.3)*	
--Other Nearshore Rockfish		*14*	*10*	*4*	*4 (5.7)*	
Nearshore rockfish S.	S. 40°10 N. lat.	85				
--Blue rockfish		*2*		*2*		*2 (0.04)*
--Shallow nearshore rockfish b/		*52*	*N/A*	*52*	*N/A*	*52 (95.8)*
--Deeper nearshore rockfish c/		*31*	*N/A*	*31*	*N/A*	*31 (62)*

a/ Nearshore rockfish totals consists of black-and-yellow, blue rockfish, China, gopher, grass, kelp, brown, olive, copper, treefish, calico, quillback. These species are part of the nearshore rockfish complex north and south of 40°10’ N. latitude.
b/Shallow nearshore rockfish consists of black and yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.
c/ Deeper nearshore consists of black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, and treefish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.

Table 4-40. Annual landings and averages for nearshore species from 2008-2012.

Stock	Area	2008	2009	2010	2011	2012	Average
Black rockfish	S. 46°16 N. lat.	181.3	224.5	151.6	123.1	119.5	160.0
--OR		*98.4*	*133.4*	*100.1*	*96.7*	*95.5*	*104.8*
--CA		*83.0*	*91.1*	*51.5*	*26.4*	*24.0*	*55.2*
Calif scorpionfish	CA	2.3	2.7	2.8	3.1	3.0	2.8
Cabezon	OR	24.6	29.8	23.5	29.4	28.9	27.2
Cabezon	CA	22.1	17.4	21.5	30.6	28.4	24.0
Kelp greenling	OR	21.9	20.6	18.3	20.8	19.0	20.1
Kelp greenling	CA	1.3	1.4	1.6	2.0	5.0	2.3
Lingcod	N. 40°10 N. lat.	40.1	30.9	24.1	33.6	38.4	33.5
--OR		*30.8*	*26.6*	*20.2*	*30.1*	*35.1*	*28.6*
--CA		*9.3*	*4.3*	*3.9*	*3.5*	*3.3*	*4.9*
Lingcod	S. 40°10 N. lat.	16.6	14.0	13.8	17.0	18.2	15.9
Nearshore rockfish N. a/	N. 40°10 N. lat.	31.6	22.5	15.6	25.0	24.4	23.8
--Blue rockfish (OR)		*2.7*	*2.8*	*4.0*	*6.6*	*6.8*	*4.6*
--Blue rockfish (CA)		*7.8*	*5.5*	*3.4*	*5.1*	*2.8*	*4.9*
--Other Nearshore Rockfish (OR)		*10.7*	*11.3*	*6.5*	*11.4*	*12.0*	*10.4*
--Other Nearshore Rockfish (CA)		*10.4*	*2.9*	*1.8*	*1.9*	*2.8*	*3.9*
Nearshore rockfish S. a/	S. 40°10 N. lat.	88.7	85.2	84.8	91.0	79.7	85.9
--Blue rockfish		*5.3*	*2.5*	*1.4*	*2.0*	*1.3*	*2.5*
--Shallow nearshore rockfish b/		*54.4*	*51.3*	*52.8*	*55.8*	*46.5*	*52.2*
--Deeper nearshore rockfish c/		*29.0*	*31.4*	*30.7*	*33.3*	*32.0*	*31.3*

a/ Nearshore rockfish totals consists of black-and-yellow, blue rockfish, China, gopher, grass, kelp, brown, olive, copper, treefish, calico, quillback. These species are part of the nearshore rockfish complex north and south of 40°10’ N. latitude.
b/ Shallow nearshore rockfish consists of black and yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.
c/ Deeper nearshore consists of black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, and treefish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.

Table 4-41. No Action - Nearshore. Projected overfished species (OFS) mortality (mt) compared to the overfished species shares for 2015-2016 (mt). Projected overfished species mortality by area is also shown in the right panel and compared to the state specific shares, where applicable (in parenthesis). Bold values indicate values greater than the shares.

Stock	Area	Total Projected OFS Mortality 2015-2016	Shares 2015/ 2016	Projected OFS Mortality by Area for 2015-2016			
				Oregon Total (Share)	CA Total (Share)	40°10' – 42° N. lat.	S. of 40°10' N. lat.
BOCACCIO	S. 40°10 N. lat.	0.4	0.9/0.9	N/A	0.4	N/A	0.4
COWCOD	S. 40°10 N. lat.	0		N/A	0	N/A	0
CANARY	Coastwide	**6.8**	6.2/6.2	0.9 (1.7)	**5.9** (4.5)	0.5	5.4
DARKBLOTCHED	Coastwide	0.2		0.1	0.1	0	0.1
POP	N. 40°10 N. lat.	0		0	0	0	0
PETRALE	Coastwide	0		0	0	0	0
YELLOWEYE	Coastwide	1.1	1.2/1.2	0.8 (0.9)	0.3 (0.3)	0.2	0.1

4.2.1.5 Tribal Fisheries – No Action

Tribal fisheries consist of trawl (bottom, mid-water, and whiting), fixed gear, and troll. Principle management controls in the tribal fisheries include set-asides, HGs, and trip limits. Tribal set-asides are outlined in Table 4-20, which represent the values in the April 17, 2014 regulations. The Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) conducted their groundfish fisheries in 2014 with the trip limits shown in Table 4-42 and the following allocations:

- The sablefish allocation was 10 percent of the sablefish ACL north of 36° N. latitude (4,349 mt). The allocation of 435 mt was further reduced by 1.5 percent for discard mortality, to produce landed catch allocations of 428 mt.
- Black rockfish was managed with a HG of 30,000 pounds north of Cape Alava, Washington at 48°09'30" N. latitude, and 10,000 pounds between Destruction Island, Washington at 47°40' N. latitude and Leadbetter Point, Washington at 46°38'10" N. latitude. There were no harvest restrictions on black rockfish between Cape Alava and Destruction Island.
- Lingcod had a 250 mt HG.
- Pacific cod had a 400 mt tribal HG.
- Longspine and shortspine thornyheads were managed to the cumulative limits with those limits accumulated across vessels into a cumulative fleetwide harvest target for the year.
- The Makah Tribe would manage the midwater trawl fisheries as follows: Yellowtail rockfish taken in the directed tribal mid-water trawl fisheries are subject to a catch limit of 677 mt for the entire fleet. Landings of widow rockfish must not exceed 10 percent of the weight of yellowtail rockfish landed, for a given vessel, throughout the year. These limits may be adjusted by the tribe inseason to minimize the incidental catch of canary rockfish and widow rockfish, provided the catch of yellowtail rockfish does not exceed 677 mt for the fleet.
- The 2014 Pacific whiting TAC had not been adopted at the time of the analysis, therefore the 2013 harvest level and allocations are used under No Action. In 2013 the U.S. TAC of 269,745 mt for Pacific whiting resulted in a start of the year tribal allocation of 63,205 mt that NMFS

based on the percentage requested by Makah (17.5 percent of the U.S. TAC) and an additional amount to accommodate the Quileute's developing fishery (78FR26526).

Impact (Groundfish Mortality)

All mid-water landing limits were subject to inseason adjustments to minimize the take of both canary and widow rockfish. Full rockfish retention programs, where all overfished and marketable rockfish are retained, as well as a Makah trawl observer program, were in place to provide catch accountability.

Table 4-42. The No Action: Tribal fishery based on regulations as of April 17, 2014.

Cumulative limits	Full retention of rockfish Rockfish taken during open competition tribal commercial fisheries for Pacific halibut would not be subject to trip limits. Thornyheads • Shortspine thornyhead cumulative trip limits are 17,000-lb per 2 months • Longspine thornyhead cumulative trip limits are 22,000-lb per 2 months Canary rockfish 300 lb per trip Yelloweye rockfish 100 lb per trip Makah Tribe midwater trawl fisheries: Yellowtail rockfish taken in the directed tribal mid-water trawl fisheries are subject to a catch limit of 677 mt for the entire fleet. Landings of widow rockfish must not exceed 10 percent of the weight of yellowtail rockfish landed, for a given vessel, throughout the year. These limits may be adjusted by the tribe inseason to minimize the incidental catch of canary rockfish and widow rockfish, provided the catch of yellowtail rockfish does not exceed 677 mt for the fleet. Minor shelf rockfish and minor slope rockfish. Redstripe rockfish are subject to an 800 lb (363 kg) trip limit. Minor shelf (excluding redstripe rockfish), and minor slope rockfish groups are subject to a 300 lb (136 kg) trip limit per species or species group, or to the non-tribal limited entry fixed gear trip limit for those species if those limits are less restrictive than 300 lb (136 kg) per trip. Limited entry fixed gear trip limits are specified in Table 2 (North) to subpart E of this part. Other rockfish, including minor nearshore, minor shelf, and minor slope rockfish 300 lb per trip limit per species or species group, or to the nontribal limited entry trip limit for those species if those limits are less restrictive than 300 lb (136 kg) per trip. Lingcod are subject to an overall catch of 250 mt for all treaty fishing. Flatfish and other fish (bottom trawl). • For Dover sole, English sole, other flatfish 110,000 lbs (49,895 kg) per 2 months; and for arrowtooth flounder 150,000 lbs (68,039 kg) per 2 months. The Dover sole and arrowtooth limits in place at the beginning of the season would be combined across periods and the fleet to create a cumulative harvest target. The limits available to individual vessels would then be adjusted inseason to stay within the overall harvest targets and overfished species limits. • Petrale sole – are subject to a fleetwide harvest target of 220 mt. Trawl vessels are restricted to small footrope trawl gear. Pacific whiting -The tribal allocation for 2011 is 63,205 mt. Pacific cod - Managed to the tribal HG of 400 mt. Spiny dogfish - limited entry trip limits for the non-tribal fisheries apply
Monitoring	• The Makah Tribe shoreside observer program to monitor and enforce Makah limits.
Reporting	• VMS declarations for trawl only

4.2.1.6 Washington Recreational – No Action

Primary catch controls for the Washington recreational fishery are season dates, depth closures, bag limits, and GCAs, including YRCAs. Yelloweye rockfish and canary rockfish are the two overfished stocks primarily caught in the Washington recreational fishery and seaward adjustments of the recreational RCAs are the main management measure for reducing catches of these two stocks. Under the No Action Alternative, Washington recreational fisheries would operate under the 2014 ACLs (Table 4-20) including an 18 mt for yelloweye rockfish ACL and 119 mt canary rockfish ACLs, and the associated Washington recreational HGs of 2.9 mt for yelloweye rockfish and 3.1 for canary rockfish (Table 4-43).

Table 4-43. No Action – Washington Recreational. Harvest guidelines (HG) for the Washington recreational fisheries under the No Action Alternative.

Species	HG (mt)
CANARY	2.9
YELLOWEYE	3.1

Groundfish Seasons and Area Restrictions

Season Structure

Under the No Action Alternative, the Washington recreational fishery would be open year-round for groundfish, except lingcod. Retention of canary and yelloweye rockfish in all areas would continue to be prohibited under No Action.

Depth restrictions are the primary tool used to keep recreational mortality of yelloweye and canary rockfish within specified HGs. Restrictions limiting the depth where groundfish fisheries are permitted are more severe in the area north of the Queets River (Marine Areas 3 and 4) where yelloweye and canary rockfish abundance is higher and therefore caught incidentally at a higher rate. Depth restrictions are fewer in the south coast where incidental catch of yelloweye and canary becomes progressively less. Table 4-44 summarizes key features of the Washington recreational regulations under the No Action Alternative.

Table 4-44. No Action. Washington Recreational Seasons and Groundfish Retention Restrictions.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths				Open <20 fm May 1-Sep 30 a/					Open all depths		
2 (S. Coast)	Open all depths g/		Open <30 fm Mar 15 - June 15 b/, c/, d/, g/			Open all depths except lingcod prohibited on Fri. and Sat. >30 fm e/,g			Open all depths g/			
1 (Col. R.)	Open all depths g/				Open all depths f/, g/					Open all depths g/		

a/ Groundfish retention prohibited >20 fm except, retention of lingcod, Pacific cod and sablefish is allowed seaward of 20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.
g/ Retention of lingcod prohibited in deepwater areas at all times.

North Coast (Marine Areas 3 and 4): The retention of bottomfish is prohibited seaward of a line approximating 20 fm from May 1- September 30, except lingcod, Pacific cod and sablefish can be retained seaward of 20 fm on days that Pacific halibut fishing is open. Fishing for, retention, or possession of groundfish and Pacific halibut is prohibited in the C-shaped YRCA (Figure 4-18).

South Coast (Marine Area 2): The retention of bottomfish, except rockfish, is prohibited seaward of 30 fm from March 15 through June 15, except sablefish and Pacific cod retention is allowed May 1 through June 15. Retention of lingcod is allowed seaward of 30 fm on days open to the primary Pacific halibut season. The retention of lingcod is prohibited south of 46°58' N. latitude and seaward of 30 fm on Fridays and Saturdays from July 1 through August 31. Fishing for, retention, or possession of lingcod is prohibited in deepwater areas seaward of a line extending from 47°31.70' N. latitude, 124°45.00' W. longitude to 46°38.17' N. latitude, 124°30.00' W. longitude year-round, except as allowed on days open to the Pacific halibut fishery (Figure 4-18). Fishing for, retention or possession of bottomfish or Pacific halibut is prohibited in the South Coast YRCA and Westport Offshore YRCA (Figure 4-18).

Columbia River (Marine Area 1): Retention of bottomfish, except sablefish and Pacific cod, is prohibited with halibut onboard from May 1 through September 30, and fishing for, retention, or possession of lingcod in deepwater areas seaward of a line extending from 46°38.17 N. latitude, 124°21.00' W. longitude to 46°25.00' N. latitude, 124°21.00' W. longitude year-round (Figure 4-18).

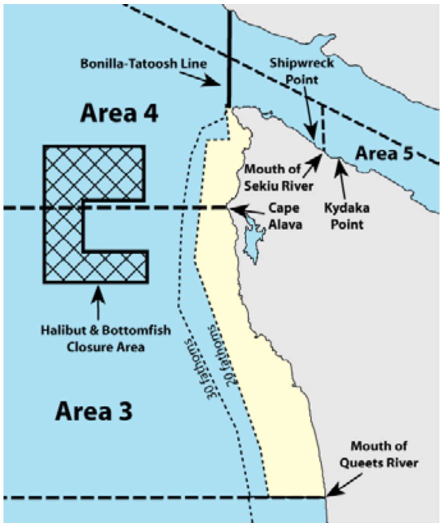
Area Restrictions

Under the No Action Alternative, fishing for, retention, or possession of groundfish and halibut during the Washington recreational groundfish and Pacific halibut fisheries would be prohibited in the C-shaped YRCA in the north coast and the South Coast and Westport YRCAs in the south coast (Figure 4-18.a and .b).

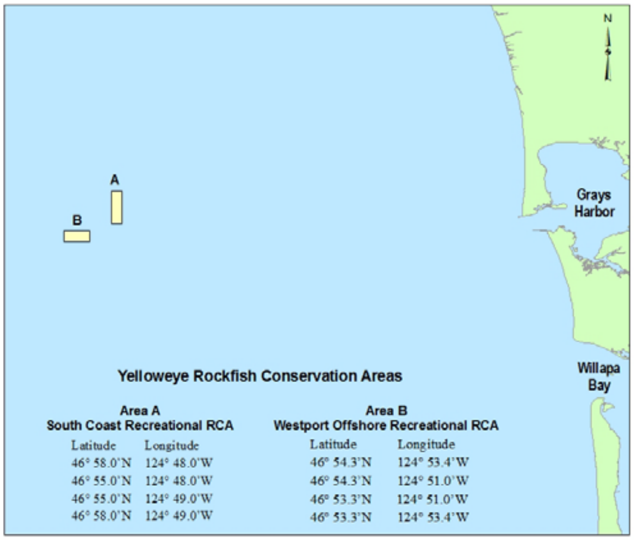
Fishing for, retention, or possession of lingcod would be prohibited seaward of a line connecting the following coordinates from the Queets River (47°31.70' N. latitude, 124° 45.00' W. longitude) to

46°25.00’ N. latitude, 124°21.00’ W. longitude, year round except as allowed in Washington Marine Area 2 on days open to the primary Pacific halibut fishery (Figure 4-18.c).

a.



b.



c.

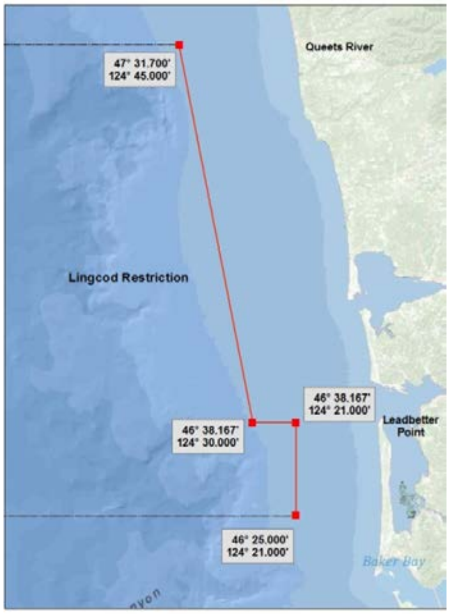


Figure 4-18. No Action Washington recreational area restrictions. a. C-Shaped YRCA; b. Washington South Coast and Westport YRCAs; c. Lingcod Restricted Area.

Groundfish Bag Limits

Under the No Action Alternative the recreational groundfish bag limit, including rockfish and lingcod, would be 12 fish per day. Of the 12 recreational groundfish allowed to be landed per day, sub-limits of 10 rockfish and, two lingcod apply. The recreational bag limit would also include a sub-limit of two cabezon in Marine Areas 1-3 and one cabezon in Marine Area 4.

Lingcod Seasons and Size Limits

The lingcod season in Marine Areas 1 through 3 (Washington-Oregon border at 46°16’ N. latitude to Cape Alava at 48°10’ N. latitude) would be open from the Saturday closest to March 15 through the Saturday closest to October 15, which was March 15 through October 18 in 2014. Marine Area 4 (Cape Alava to the U.S. Canadian border) would be open from April 16 through October 15, or the Saturday closest to October 15; whichever is earlier, which was April 16 through October 15 in 2014.

Under the No Action Alternative the lingcod seasons and size limits by area would be as follows:

- Marine Areas 1-3: March 14 through October 17 in 2015 and March 12 through October 15 in 2016. Minimum size, 22 inches.
- Marine Area 4: April 16 through October 15 in 2015 and April 16 to October 15 in 2016. Minimum size, 22 inches.

Cabezon Size Limit

Under the No Action Alternative, there is an 18 inch minimum size limit for cabezon in Marine Area 4 (Cape Alava to the U.S. Canadian border).

Pacific Halibut Seasons

It is expected that the Pacific halibut seasons in 2015 and 2016 would be similar to the halibut seasons in 2013 and 2014. There are no changes to the restrictions on groundfish retention during the Pacific halibut season proposed under the No Action Alternative.

Additional Management Measures Analyzed

No additional management measures were analyzed for the No Action Alternative. Status quo management measures would be used to keep recreational harvests of overfished species within specified HGs.

Inseason Management Response

Projected mortality for Washington’s recreational fishery is based upon the previous season’s harvest estimated by the Ocean Sampling Program (OSP) and incorporated in Recreational Fishery Information Network (RecFIN). It should be noted that the precision of recreational groundfish catch estimates based upon previous seasons would continue to be influenced by factors such as the length and success of salmon and halibut seasons, weather and unforeseen factors.

Washington’s Ocean Sampling Program is able to produce estimates of groundfish catch with a one month lag time. Management measures such as more restrictive depth closures, area closures, groundfish retention restrictions, or changes to seasons can be considered and implemented through emergency changes to state regulations if inseason catch reports indicate that recreational harvests of overfished species or non-overfished species are exceeding pre-season projections to the point where HGs are at risk of being exceeded.

Impact (Groundfish Mortality)

Projected mortality for overfished and non-overfished species under the No Action Alternative is summarized in Table 4-45.

Table 4-45. No Action – Washington Recreational. Projected mortality for overfished species under the No Action Alternative.

Stock	2015	2016
CANARY ROCKFISH	0.63	0.63
YELLOWEYE ROCKFISH	2.65	2.65

4.2.1.7 Oregon Recreational – No Action

Primary catch controls for the Oregon recreational fishery are season dates, depth closures, bag limits, and GCAs, including YRCAs. The No Action Alternative analyzes the Oregon recreational fishery under the 2014 ACLs (Table 4-20) and Oregon recreational HGs or state quotas (Table 4-46).

Table 4-46. No Action. Oregon recreational Federal harvest guidelines (HG) or state quotas under the No Action Alternative (mt).

Stock	HG a/
CANARY ROCKFISH	11.1
YELLOWEYE ROCKFISH	2.6
Black Rockfish OR	440.8
Greenlings b/	5.2
Nearshore Rockfish North of 40°10 N. Lat.c/	54.6
--Blue Rockfish	*41.0*
--Other Nearshore Rockfish	*13.6*

a/ Federal HG are established for canary and yelloweye rockfish only. The state process in Oregon establishes quotas for black rockfish, blue rockfish, other nearshore rockfish, and greenlings (all species). Black and blue rockfish are managed to a combined state quota, the estimated quotas by species are represented in this table. The state quotas are not intended to be implemented in Federal regulation, they are only provided as information.
b/ Includes kelp and other greenlings
c/ Includes blue rockfish

Groundfish Seasons and Area Restrictions

<u>Season structure</u>

Under the No Action Alternative, the Oregon recreational groundfish fishery would be open offshore year-round, except from April 1 to September 30 when fishing is only allowed shoreward of 40 fathoms, as defined by waypoints (Figure 4-19). Closing the fishery outside of 40 fathoms from April 1 to September 30, months when angler effort and yelloweye rockfish encounters are greatest, mitigates mortality of yelloweye rockfish. Projected mortality of yelloweye and canary rockfish are within the Federal HGs, therefore the shore-based fishery would be open year-round.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bottomfish Season	Open all depths			Open < 40 fm						Open all depths		
Marine Bag Limit [1]	Ten (10)			1 Fish Cabezon Sub-Bag [2]						Ten (10)		
Lingcod Bag Limit	Three (3)											
Flatfish Bag Limit [3]	Twenty Five (25)											

1 Marine bag limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine, and smelt

2 From April 1 through September 30, the marine bag limit is Ten (10) fish per day, of which no more than one (1) may be cabezon.

3 Flounders, soles, sanddabs, turbots and halibuts except Pacific halibut

Figure 4-19. No Action. Oregon recreational groundfish season structure and bag limits under the No Action Alternative.

Area Closures

The Stonewall Bank YRCA has been in place since 2006 and would also remain under the No Action alterative (Figure 4-20). The YRCA is located approximately 15 miles west of the Port of Newport and consists of the high-relief area of Stonewall Bank, an area of high yelloweye rockfish encounters. No recreational fishing for groundfish and Pacific halibut can occur within this YRCA, which is bounded by the waypoints contained in Figure 4-20.

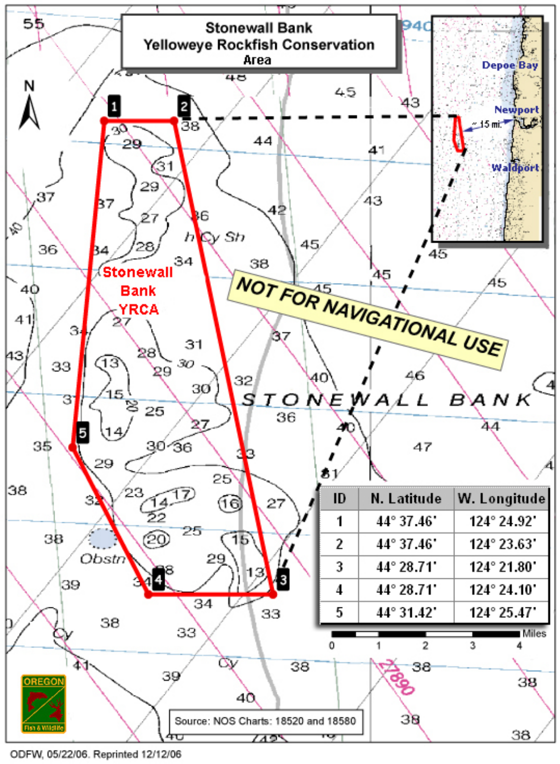


Figure 4-20. No Action. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited.

Groundfish Bag Limits and Size Limits

Under the No Action Alternative, the marine fish daily bag limit of 10 fish in aggregate that was allowed in 2013-2014 Oregon recreational fisheries would carry forward for 2015-2016 (Figure 4-19). The marine bag includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine and smelt. During April through September, there was a one fish sub-bag limit for cabezon (of the 10 fish marine bag limit no more than one could be cabezon). This cabezon sub-bag limit would also carry forward for 2015-2016. A flatfish daily bag limit of 25, which includes all soles and flounders except Pacific halibut, was allowed in addition to the marine fish daily bag limit. Additionally a three-fish bag limit was allowed for lingcod. Retention of canary and yelloweye rockfish was prohibited in 2013-2014 and would continue to be prohibited under the No Action Alternative.

The following minimum size limits applied to 2013-2014 Oregon recreational fisheries and would be carried forward under the No Action Alternative:

- Lingcod – 22 in.
- Cabezon – 16 in.
- Kelp greenling – 10 in.

Pacific Halibut

Under the No Action Alternative, the recreational Pacific halibut fisheries should be able to proceed as in 2013 and 2014, in regards to days and areas open, etc., depending on the halibut quota. Since 2009, only sablefish and Pacific cod may be retained in the Pacific halibut fishery at any depth in the area north of Humbug Mountain, Oregon. South of Humbug Mountain, groundfish may be retained in areas open to groundfish (e.g., less than 30 fm) when halibut are onboard the vessel. It is expected that groundfish retention in the all-depth Pacific halibut fishery would be similarly limited in 2015 and 2016, under the No Action Alternative.

Additional Management Measures Analyzed

Adjustments to routine and currently available management measures would be used to keep recreational harvests of overfished species within specified Federal HGs under No Action.

Inseason Management Tools

Oregon has a responsive port-based monitoring program through ORBS, and regulatory processes in place to track mortality and take actions inseason if necessary. The following are suggested management measures that could be implemented inseason if the fishery does not proceed as expected.

Inseason management tools, designed to mitigate mortality, include bag limit adjustments (including non-retention), length limit adjustments, gear restrictions, and season, days per week, depth, and area closures.

Season, depth, days open per week, and area closures are the primary inseason tools for limiting yelloweye rockfish and canary rockfish mortality, since retention of these species is prohibited. If catch rates indicate that the bycatch harvest targets for yelloweye rockfish would be reached prematurely, offshore depth closures may be implemented inseason at 30, 25, or 20 fathoms as these two species are less abundant nearshore and release survival rates are higher in shallow waters. Additionally, days per week may also be closed to reduce mortality. ODFW would monitor inseason progress toward recreational harvest targets for canary rockfish and yelloweye rockfish. Regulations would depend upon the timing of the determination for their need.

Adjustments to the marine fish daily bag limit to no more than 10 fish may be implemented to achieve season duration goals in the event of accelerated or decelerated black rockfish or other nearshore rockfish harvest. The lingcod daily bag limits may be adjusted to no more than 3 fish in the event the marine bag limit changes or the halibut catch limit is reduced from 2013 levels. Season and/or area closures may also be considered if harvest targets are projected to be attained. Closing one or more days per week is an inseason tool that could be used to limit mortality. Closing certain days each week would help lengthen the duration of a fishery approaching an HG.

Non-retention and length restrictions are the likely inseason tools to use for cabezon and greenling, as release survival is very high. They may also be used to reduce mortality of nearshore species, such as black rockfish and other nearshore rockfish species.

Gear restrictions and/or release technique requirements may be implemented to reduce the impact of overfished rockfish since a variety of descending devices are available. SSC recommended and Council-approved mortality rates for canary and yelloweye rockfish when descending devices are used will be implemented in 2014 (see Appendix A for documentation).

Directed yellowtail rockfish and/or flatfish fisheries may be implemented inseason, as were implemented in 2004, in the event of a closure of the recreational groundfish fishery due to attainment Federal or state HGs or targets. Specific gear restrictions may be implemented in the event that yellowtail rockfish and/or flatfish fisheries remain open during a groundfish closure. Additionally, the fishery may be expanded to waters seaward of the RCA, promoting directed yellowtail rockfish opportunity. Directed flatfish fisheries would be legal year round and open shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions (i.e. 40, 30, 25, and 20 fathom lines). The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions. Fisheries would be monitored to ensure that mortality of yelloweye and canary rockfish are within the harvest targets/guidelines.

In the event that the duration of total season is reduced from 12 months; the nearshore waters are closed to groundfish fishing due to management of nearshore species; or the Pacific halibut catch limit is reduced from 2013 levels, the fishery may be expanded to waters seaward of the RCA that is in effect at the time, promoting directed yellowtail rockfish and offshore lingcod opportunity. Fisheries would be monitored to ensure that mortality of yelloweye rockfish and canary rockfish is not in excess of the HGs.

Impact (Projected Mortality)

The annual projected mortality presented in Table 4-47 is anticipated, given the season structure and bag limits detailed above. Table 4-48 shows the recent mortality of the ten most landed species in the Oregon recreational fishery, including black rockfish. Species in Table 4-48, other than black rockfish, have not been modeled in the past. This table represents recent mortality under similar season structure and bag limits to what will be in place under the No Action Alternative.

Table 4-47. No Action – Oregon Recreational. Projected Mortality (mt) of species with Oregon recreational specific allocations under the No-Action Alternative.

Stock	Projected Mortality
CANARY	3.2
YELLOWEYE	2.2
Black Rockfish	322.2
Lingcod	132.0
Greenlings [a/]	6.4
Nearshore Rockfish North of 40°10 N. lat. [b/]	30.5
--Blue Rockfish	*17.5*
--Other Nearshore	*13.0*

[a/] Includes kelp and other greenlings
[b/] Includes blue rockfish

Table 4-48. No Action – Oregon Recreational. Recent mortality (mt) of the ten most landed species in the Oregon recreational fishery under the season structure, bag limits, area restrictions, etc. in the No-Action Alternative.

Stock	2008	2009	2010	2011	2012	Average
Black Rockfish	240.0	294.6	302.4	206.1	217.4	252.1
Lingcod	80.3	68.0	82.8	105.9	148.9	97.2
Nearshore Rockfish	26.9	24.9	32.8	36.6	45.9	33.4
Blue Rockfish*	16.2	15.9	22.0	21.4	26.1	20.3
Quillback Rockfish	4.1	3.7	4.2	5.7	8.8	5.3
Copper Rockfish	3.7	2.8	3.8	5.9	7.2	4.7
China Rockfish	2.9	2.3	2.6	3.4	3.7	3.0
Brown Rockfish	0.1	0.0	0.1	0.1	0.0	0.1
Grass Rockfish	0.0	0.0	0.1	0.0	0.0	0.0
Cabezon	16.6	16.2	16.5	17.5	15.5	16.5
Yellowtail Rockfish	5.3	9.3	7.5	11.6	13.9	9.5
Kelp Greenling	3.6	4.2	6.8	7.4	7.0	5.8
Vermillion Rockfish	5.8	3.8	4.6	6.0	9.2	5.9
Canary Rockfish	2.2	2.7	3.2	3.2	2.7	2.8
Yelloweye Rockfish	2.0	1.8	2.1	2.1	3.3	2.2
Sablefish	1.6	0.5	0.1	0.5	0.3	0.6

* Blue Rockfish is managed separately from the rest of the nearshore rockfish complex under Oregon state regulations

4.2.1.8 California Recreational – No Action

Season structures and projected mortality under the No Action Alternative is based on CDFW's updated RecFISH model. Model projections were calculated for the five recreational groundfish management areas using updated 2011 and 2012 RecFIN estimates and overfished species mortality are reported statewide. Under No Action, trawl and non-trawl allocations for overfished species were established (Table 4-49). The California recreational fishery was allocated a share of the non-trawl allocation, through use of a HG, for bocaccio, canary, and yelloweye to ensure that total non-trawl catches remained within the non-trawl allocations for these overfished speices. Under the No Action Alternative, depth restrictions and season length remain unchanged statewide (PFMC and NMFS 2011).

Table 4-49. No Action – California Recreational: Overfished species allocations (mt) to the non-trawl sector and shares (mt) for the California recreational fisheries under No Action, which is based on the Preferred Alternative for 2014 in the 2013-2014 FEIS.

Stock	Non-Trawl Allocation	California Recreational HG
Bocaccio	249.6	172.5
Canary	47.4	23
Cowcod	1.9	
Darkblotched	15.5	
POP	35	
Petrale Sole	6.8	
Yelloweye	11.2	3.4

Groundfish Seasons and Area Restrictions

The following recreational season applied in 2014 would remain in place under the No Action Alternative (Figure 4-21). All divers and shore-based anglers are exempt from the seasonal closures for rockfish, cabezon, greenlings, lingcod, and California scorpionfish.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May 15–Oct 31 <20fm						Closed	
Mendocino	Closed				May 15–Sept 1 <20fm				Closed			
San Francisco	Closed					Jun 1 – Dec 31 <30fm						
Central	Closed				May 1 – Dec 31 <40fm							
Southern	Closed		Mar 1 – Dec 31 <50fm									

Figure 4-21. No Action: California recreational groundfish season structure based on regulations as of April 17, 2014.

Groundfish Bag Limits and Size Limits

Under the No Action Alternative, a statewide 10 fish rockfish, cabezon, and greenling (RCG) complex bag limit with a sub-bag limit of 3 fish for bocaccio and cabezon would remain in place. Retention of bronzespotted rockfish, canary rockfish, cowcod, and yelloweye rockfish would continue to be prohibited under the No Action Alternative. The following bag limits would also apply:

- California scorpionfish – 5 fish
- Leopard shark – 3 fish (state regulations only)
- Lingcod – 2 fish
- Soupfin shark – 1 fish (state regulations only)

There is no bag limit for Pacific sanddab, petrale sole and starry flounder. A bag limit of 10 fish of any one species within the 20 finfish maximum bag limit would apply to the remaining species in the Groundfish FMP.

The following minimum size limits for the California recreational fisheries would remain under the No Action Alternative:

- California scorpionfish – 10 inches
- Cabezon – 15 inches
- Kelp greenling – 12 inches
- Leopard shark – 36 inches (state regulations only)
- Lingcod – 22 inches

Based on the ReFISH model, updated with 2011 and 2012 data from RecFIN, all overfished species are projected to be within allowable limits under the No Action Alternative (Table 4-50). These values are pre-season projections and actual mortality may differ.

Impact (Groundfish Mortality)

CDFW closely monitors yelloweye rockfish and cowcod – performing weekly tracking using preliminary CRFS field reports. These preliminary CFRS reports are converted into an anticipated catch value in metric tons using catch and effort data from previous years. This weekly "proxy" value is then used to approximate catch during the five to eight week lag time in CRFS catch estimates. If angler effort or bycatch of overfished groundfish species changes dramatically from prior years, actual mortality can be higher or lower than projected. Based on the inseason tracking, if any of the overfished species harvest guidelines are projected to be attained inseason, CDFW could enact emergency management actions to slow and/or reduce catches; management measures include closing one or more recreational groundfish management areas, restricting recreational fishery seasons, and/or modifying depth restrictions.

Projections for non-overfished species are provided in Table 4-50. In 2009, four yelloweye rockfish conservation areas (YRCA) were adopted in the Northern and Mendocino Management Areas for use in management. The YRCAs include habitat in both state and federal waters and can be implemented inseason (if needed) to reduce yelloweye rockfish mortality. To date, these YRCAs have not been implemented and would remain available under all alternatives.

Table 4-50. No Action – California Recreational: Projected mortality (mt) under No Action (using 2014 data) for the California Recreational fisheries.

Stock	Projected Mortality	California Recreational HG
BOCACCIO	100.1	172.5
CANARY	16.3	23
COWCOD	1.0	
YELLOWEYE	1.7	3.4
Black Rockfish	181.9	
Blue Rockfish	54.6	
Cabezon	35.1	
California Scorpionfish	78.3	
Greenlings	15.5	
Lingcod	244.4	
Widow Rockfish	2.8	
Nearshore Rockfish N. of 40°10 N. lat.	11.7	
Nearshore Rockfish S. of 40°10 N. lat.	332.5	

4.2.2 Preferred Alternative

Table 4-51 through Table 4-56 contains the harvest specifications and allocations analyzed under the Preferred Alternative. A description of the harvest control rules used to calculate the ACLs can be found in Chapter 2, Section XXX.

4.2.2.1 Deductions from the ACL and Allocations

Under all action alternatives, off-the-top deductions from the ACL were updated based on the most recent information on fishery performance and need. The deductions from the ACL are held constant across all action alternatives. Amounts deducted that are from the ACL to accommodate groundfish mortality from scientific research, incidental open access fisheries, and EFPs can be modified based on inseason projections (see Section 4.2.1.1). A description of the calculations are provided below.

Tribal Fishery: Tribal fisheries consist of trawl (bottom, mid-water, and whiting), fixed gear, and troll. The tribal amounts in the April 17, 2014 regulations were updated with the most recent tribal requests (see Agenda Item H.10.b, Supplemental Tribal Report, November 2013 and Agenda Item H.10.b, Supplemental Tribal Report 2, November 2013).

Research: Research activities include the NMFS trawl survey, International Pacific Halibut Commission longline survey, and other Federal and state research. The Council approach is that off-the-top deductions from the ACL should be equal to the maximum historical scientific research catch from 2005-2012, except for canary rockfish and yelloweye rockfish. The Council policy for canary and yelloweye rockfish was not based on the maximum historical value. The Council considered the high canary rockfish catch of 7.2 mt in 2006 from the NMFS trawl survey a rare event since surveys in later years encountered substantially less canary. The Council adopted a 4.5 mt canary rockfish set-aside, which is higher than the average research catch from 2005-2012. For yelloweye rockfish, the Council adopted a 3.3 mt research set-aside based on anticipated research needs of the International Pacific Halibut Commission (1.1 mt), Washington Department of Fish and Wildlife (1 mt), Oregon Department of Fish & Wildlife (1 mt), and other projects (0.2 mt).

Incidental Open Access: Deductions from ACLs are made to account for groundfish mortality in the incidental open access fisheries. The off-the-top deductions from the ACL for all species, except longnose skate, were derived from the maximum historical values in the 2007-2012 WCGOP Groundfish Mortality reports (see http://tinyurl.com/nv3pddm). The recommended set-aside for longnose skate was based on data from the 2009-2012 Total Mortality reports, the years in which longnose skate were reported separately from the Other Fish category.

Exempted Fishing Permits: The Council adopted one EFP and associated off-the-top deductions from the ACL for 2015-2016 for public review. The EFP seeks to test the effectiveness of vertical hook-and-line gear to selectively harvest midwater species such as yellowtail rockfish (Agenda Item H.2.a, Attachment 4, November 2013).[49]

Recreational (Sablefish north of 36° N. latitude only): The allocation framework for sablefish north of 36° N. latitude specifies that the anticipated recreational catches of sablefish be deducted from the ACL prior to the commercial limited entry and open access allocations. The set-aside is the maximum historical value from recreational fisheries from 2004-2012 (Table 4-55).

[49] The Council is considering EFPs for participants in the catch share program. See Section XXX (Cumm affects) for more details.

Table 4-51. Preferred Alternative. 2015 ACLs and estimates of tribal, EFP, research, and incidental open access (OA) mortality (in mt), used to calculate the fishery harvest guideline (HG).

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	349		3	4.6	0.7	340.7
CANARY	Coastwide	122	7.7	1	4.5	2	106.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	338	0.2	0.1	2.1	18.4	317.2
POP	N of 40º10' N. lat.	158	9.2		5.2	0.6	143.0
PETRALE SOLE	Coastwide	2,816	220		14.2	2.4	2,579.4
YELLOWEYE	Coastwide	18	2.3	0.03	3.3	0.2	12.2
Arrowtooth flounder	Coastwide	5,497	2,041		16.39	30	3,409.6
Black	WA	402	14				388.0
Black	OR and CA	1,000		1			999.0
Cabezon	OR	47					47.0
Cabezon	CA	154					154.0
California scorpionfish	S of 34°27' N. lat.	114				2	112.0
Chilipepper	S of 40º10' N. lat.	1,628		10	9	5	1,604.0
Dover sole	Coastwide	50,000	1,497		41.9	55	48,406.1
English sole	Coastwide	11,040	91		5.8	7	10,936.2
Lingcod	N of 40º10’ N. lat.	2,830	250	0.5	11.67	16	2,551.8
Lingcod	S of 40º10’ N. lat.	1,004		1.0	1.1	7	994.9
Longnose skate	Coastwide	2,000	56		13.18	3.8	1,927.0
Longspine thornyhead	N of 34º27' N. lat.	3,170	30		13.5	3	3,123.5
Longspine thornyhead	S of 34º27' N. lat.	1,001			1	2	998.0
Pacific cod	Coastwide	1,600	400		7.04	2	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205	1	2,500		204,040
Sablefish	N of 36º N. lat.	4,793		See Table 4-55			
Sablefish	S of 36º N. lat.	1,719			3	2	1,714.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,745	50		7.22	2	1,685.8
Shortspine thornyhead	S of 34º27' N. lat.	923			1	41	881.0
Spiny Dogfish	Coastwide	2,101	111.8	1	12.5	49.53	1926.2
Splitnose	S of 40º10' N. lat.	1,715		1.5	9		1,704.5
Starry flounder	Coastwide	1,534	2			8.3	1,523.7
Widow	Coastwide	2,000	60	9	7.9	3.3	1,919.8
Yellowtail	N of 40º10' N. lat.	11,213	677	10	16.6	3	10,506.4
Nearshore rockfish N.	N of 40º10' N. lat.	69					69.0
Nearshore rockfish S.	S of 40º10' N. lat.	1,114			2.6	1.4	1,110.0
Shelf rockfish N.	N of 40º10' N. lat.	1,944	30	3	13.4	26	1,871.6
Shelf rockfish S.	S of 40º10' N. lat.	1,624		30	9.6	9	1,575.4
Slope rockfish N.	N of 40º10' N. lat.	1,669	36	1	8.1	19	1,604.9
Slope rockfish S.	S of 40º10' N. lat.	687		1	2	17	667.0
Other Flatfish	Coastwide	8,620	60		19	125	8,416.0
Other Fish	Coastwide	242					242.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-52. Preferred Alternative. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2015 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	340.7	Biennial	N/A	81.9	N/A	258.8
CANARY	Coastwide	106.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	317.2	Amendment 21	95%	301.3	5%	15.9
POP	N of 40º10' N. lat.	143.0	Amendment 21	95%	135.9	5%	7.2
PETRALE SOLE	Coastwide	2,579.4	Biennial	N/A	2,544.4	N/A	35.0
YELLOWEYE	Coastwide	12.2	Biennial	N/A	1.0	N/A	11.2
Arrowtooth flounder	Coastwide	3,409.6	Amendment 21	95%	3,239.1	5%	170.5
Black	WA	388.0	None				
Black	OR and CA	999.0	None				
Cabezon	OR	47.0	None				
Cabezon	CA	154.0	None				
California scorpionfish	S of 34°27' N. lat.	112.0	None				
Chilipepper	S of 40º10' N. lat.	1,604.0	Amendment 21	75%	1,203.0	25%	401.0
Dover sole	Coastwide	48,406.1	Amendment 21	95%	45,985.8	5%	2,420.3
English sole	Coastwide	10,936.2	Amendment 21	95%	10,389.4	5%	546.8
Lingcod	N of 40º10’ N. lat.	2,551.8	Amendment 21	45%	1,148.3	55%	1,403.5
Lingcod	S of 40º10’ N. lat.	994.9	Amendment 21	45%	447.7	55%	547.2
Longnose skate	Coastwide	1,927.0	Biennial	90%	1,734.3	10%	192.7
Longspine thornyhead	N of 34º27' N. lat.	3,123.5	Amendment 21	95%	2,967.3	5%	156.2
Longspine thornyhead	S of 34º27' N. lat.	998.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting b/	Coastwide	0.0	Amendment 21	100%	0.0	0%	0.0
Sablefish	N of 36º N. lat.		See Table 1 c				
Sablefish	S of 36º N. lat.	1,714.0	Amendment 21	42%	719.9	58%	994.1
Shortbelly	Coastwide	48.0	None				0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,685.8	Amendment 21	95%	1,601.5	5%	84.3
Shortspine thornyhead	S of 34º27' N. lat.	881.0	Amendment 21	NA	50.0	NA	831.0
Spiny Dogfish	Coastwide	1,926.2	None				
Splitnose	S of 40º10' N. lat.	1,704.5	Amendment 21	95%	1,619.3	5%	85.2
Starry flounder	Coastwide	1,523.7	Amendment 21	50%	761.9	50%	761.9
Widow	Coastwide	1,919.8	Amendment 21	91%	1,747.0	9%	172.8
Yellowtail	N of 40º10' N. lat.	10,506.4	Amendment 21	88%	9,245.6	12%	1,260.8
Nearshore rockfish N.	N of 40º10' N. lat.	69.0	None				
Nearshore rockfish S.	S of 40º10' N. lat.	1,110.0	None				
Shelf rockfish N.	N of 40º10' N. lat.	1,871.6	Biennial	60.2%	1,126.7	39.8%	744.9
Shelf rockfish S.	S of 40º10' N. lat.	1,575.4	Biennial	12.2%	192.2	87.8%	1,383.2
Slope rockfish N.	N of 40º10' N. lat.	1,604.9	Amendment 21	81%	1,300.0	19%	304.9
Slope rockfish S.	S of 40º10' N. lat.	678.0	Amendment 21	63%	427.1	37%	250.9
Other flatfish	Coastwide	8,416.0	Amendment 21	90%	7,574.4	10%	841.6
Other Fish	Coastwide	242.0	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-53. Preferred Alternative. 2016 ACLs and estimates of tribal, EFP, research, and incidental open access (OA) mortality (in mt), used to calculate the fishery harvest guideline (HG).

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	362		3	4.6	0.7	353.7
CANARY	Coastwide	125	7.7	1	4.5	2	109.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	346	0.2	0.1	2.1	18.4	325.2
POP	N of 40º10' N. lat.	164	9.2		5.2	0.6	149.0
PETRALE SOLE	Coastwide	2,910	220		14.2	2.4	2,673.4
YELLOWEYE	Coastwide	19	2.3	0.03	3.3	0.2	13.2
Arrowtooth flounder	Coastwide	5,328	2,041		16.39	30	3,240.6
Black	WA	404	14				390.0
Black	OR and CA	1,000		1			999.0
Cabezon	OR	47					47.0
Cabezon	CA	151					151.0
California scorpionfish	S of 34°27' N. lat.	111				2	109.0
Chilipepper	S of 40º10' N. lat.	1,619		10	9	5	1,595.0
Dover sole	Coastwide	50,000	1,497		41.9	55	48,406.1
English sole	Coastwide	7,754	91		5.8	7	7,650.2
Lingcod	N of 40º10' N. lat.	2,719	250	0.5	11.67	16	2,440.8
Lingcod	S of 40º10' N. lat.	946		1.0	1.1	7	936.9
Longnose skate	Coastwide	2,000	56		13.18	3.8	1,927.0
Longspine thornyhead	N of 34º27' N. lat.	3,015	30		13.5	3	2,968.5
Longspine thornyhead	S of 34º27' N. lat.	952			1	2	949.0
Pacific cod	Coastwide	1,600	400		7.04	2	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205		2,500		204,040
Sablefish	N of 36º N. lat.	5,241		See Table 4-55			
Sablefish	S of 36º N. lat.	1,880			3	2	1,875.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,726	50		7.22	2	1,666.8
Shortspine thornyhead	S of 34º27' N. lat.	913			1	41	871.0
Spiny Dogfish	Coastwide	2,085	111.8	1	12.5	49.53	1,910.2
Splitnose	S of 40º10' N. lat.	1,746		1.5	9		1,735.5
Starry flounder	Coastwide	1,539	2			8.3	1,528.7
Widow	Coastwide	2,000	60	9	7.9	3.3	1,919.8
Yellowtail	N of 40º10' N. lat.	10,634	677	10	16.6	3	9,927.4
Nearshore rockfish N.	N of 40º10' N. lat.	69					69.0
Nearshore rockfish S.	S of 40º10' N. lat.	1,006			2.6	1.4	1,002.0
Shelf rockfish N.	N of 40º10' N. lat.	1,952	30	3	13.4	26	1,879.6
Shelf rockfish S.	S of 40º10' N. lat.	1,625		30	9.6	9	1,576.4
Slope rockfish N.	N of 40º10' N. lat.	1,683	36	1	8.1	19	1,618.9
Slope rockfish S.	S of 40º10' N. lat.	689		1	2	17	669.0
Other Flatfish	Coastwide	7,496	60		19	125	7,292.0
Other Fish	Coastwide	243					243.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-54. Preferred Alternative. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2016 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	353.7	Biennial	N/A	85.0	N/A	268.7
CANARY	Coastwide	109.8	Biennial	N/A	58.5	N/A	51.3
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	325.2	Amendment 21	95%	308.9	5%	16.3
POP	N of 40º10' N. lat.	149.0	Amendment 21	95%	141.6	5%	7.5
PETRALE SOLE	Coastwide	2,673.4	Biennial	N/A	2,638.4	N/A	35.0
YELLOWEYE	Coastwide	13.2	Biennial	N/A	1.1	N/A	12.1
Arrowtooth flounder	Coastwide	3,240.6	Amendment 21	95%	3,078.6	5%	162.0
Black	WA	390.0	None				
Black	OR and CA	999.0	None				
Cabezon	OR	47.0	None				
Cabezon	CA	151.0	None				
California scorpionfish	S of 34°27' N. lat.	109.0	None				
Chilipepper	S of 40º10' N. lat.	1,595.0	Amendment 21	75%	1,196.3	25%	398.8
Dover sole	Coastwide	48,406.1	Amendment 21	95%	45,985.8	5%	2,420.3
English sole	Coastwide	7,650.2	Amendment 21	95%	7,267.7	5%	382.5
Lingcod	N of 40º10’ N. lat.	2,440.8	Amendment 21	45%	1,098.4	55%	1,342.5
Lingcod	S of 40º10’ N. lat.	936.9	Amendment 21	45%	421.6	55%	515.3
Longnose skate	Coastwide	1,927.0	Biennial	90%	1,734.3	10%	192.7
Longspine thornyhead	N of 34º27' N. lat.	2,968.5	Amendment 21	95%	2,820.1	5%	148.4
Longspine thornyhead	S of 34º27' N. lat.	949.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting b/	Coastwide	0.0	Amendment 21	100%	0.0	0%	0.0
Sablefish	N of 36º N. lat.	0.0	See Table 1 c				
Sablefish	S of 36º N. lat.	1,875.0	Amendment 21	42%	787.5	58%	1,087.5
Shortbelly	Coastwide	48.0	None				0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,666.8	Amendment 21	95%	1,583.4	5%	83.3
Shortspine thornyhead	S of 34º27' N. lat.	871.0	Amendment 21	NA	50.0	NA	821.0
Spiny Dogfish	Coastwide	1,910.0	None				
Splitnose	S of 40º10' N. lat.	1,735.5	Amendment 21	95%	1,648.7	5%	86.8
Starry flounder	Coastwide	1,528.7	Amendment 21	50%	764.4	50%	764.4
Widow	Coastwide	1,919.8	Amendment 21	91%	1,747.0	9%	172.8
Yellowtail	N of 40º10' N. lat.	9,927.4	Amendment 21	88%	8,736.1	12%	1,191.3
Nearshore rockfish N.	N of 40º10' N. lat.	69.0	None				
Nearshore rockfish S.	S of 40º10' N. lat.	1,002	None				
Shelf rockfish N.	N of 40º10' N. lat.	1,879.6	Biennial	60.2%	1,131.5	39.8%	748.1
Shelf rockfish S.	S of 40º10' N. lat.	1,576.4	Biennial	12.2%	192.3	87.8%	1,384.1
Slope rockfish N.	N of 40º10' N. lat.	1,618.9	Amendment 21	81%	1,311.3	19%	307.6
Slope rockfish S.	S of 40º10' N. lat.	669.0	Amendment 21	63%	421.5	37%	247.5
Other Flatfish	Coastwide	7,292.0	Amendment 21	90%	6,562.8	10%	729.2
Other Fish	Coastwide	243.0	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-55. Preferred Alternative. Sablefish north of 36° N. latitude ACLs, off-the-top deductions from the ACL used to calculate the commercial harvest guideline (mt) for 2015-2016 under the Preferred Alternative.

Year	ACL	Tribal Share a/	Res.	Rec	EFP	Non-Tribal Comm. Share
2015	4,793	479	26	6.1	1	4,281
2016	5,241	524	26	6.1	1	4,684

a/ The sablefish allocation to Pacific coast treaty Indian Tribes is 10 percent of the sablefish ACL for the area north of 36° N. lat. This allocation represents the total amount available to the treaty Indian fisheries before deductions for discard mortality.

Table 4-56. Preferred Alternative: Allocations and projected mortality impacts (mt) of overfished groundfish species for 2015 and 2016 under the Preferred Alternative.

2015

Fishery	Bocaccio b/		Canary		Cowcod b/		Dkbl		Petrale		POP		Yelloweye	
Date: 5-23-14	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/
Off the Top Deductions	8.3	8.3	15.2	15.2	2.0	2.0	20.8	20.8	236.6	236.6	15.0	15.0	5.8	5.8
EFPc/	3.0	3.0	1.0	1.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Research d/	4.6	4.6	4.5	4.5	2.0	2.0	2.1	2.1	14.2	14.2	5.2	5.2	3.3	3.3
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	18.4	18.4	2.4	2.4	0.6	0.6	0.2	0.2
Tribal f/			7.7	7.7			0.2	0.2	220.0	220.0	9.2	9.2	2.3	2.3
Trawl Allocations	81.9	11.3	56.9	23.6	1.4	0.1	301.3	127.0	2,544.4	2,410.0	135.9	68.1	1.0	0.0
-SB Trawl	81.9	11.3	43.3	9.9	1.4	0.1	285.6	111.3	2,539.4	2,405.0	118.5	50.7	1.0	0.0
-At-Sea Trawl			13.7	13.7			15.7	15.7	5.0	5.0	17.4	17.4		
a) At-sea whiting MS			5.6	5.6			6.5	6.5			7.2	7.2		
b) At-sea whiting CP			8.0	8.0			9.2	9.2			10.2	10.2		
Non-Trawl Allocation	258.8	118.0	49.9	30.9	2.6	1.2	15.9	4.9	35.0	0.3	7.2	0.3	11.2	9.7
Non-Nearshore	79.1	0.0	3.8	1.1				4.7		0.3		0.3	1.1	0.5
LE FG														
OA FG														
Directed OA: Nearshore	1.0	0.4	6.7	6.0				0.2		0.0		0.0	1.2	1.3
Recreational Groundfish														
WA			3.4	0.8				--		--		--	2.9	2.8
OR			11.7	3.2				--		--		--	2.6	2.2
CA (based on Option 2)	178.8	117.6	24.3	19.8		1.2		--		--		--	3.4	2.9
TOTAL	349.0	137.6	122.0	69.7	6.0	3.3	338.0	152.7	2,816.0	2,646.9	158.1	83.4	18.0	15.6
2015 Harvest Specification	349	359	122	122	10.0	10.0	338	338	2,816	2,816	158	158	18	18
Difference	0.0	221.4	0.0	52.4	4.0	6.7	0.0	185.3	0.0	169.1	-0.1	74.6	0.0	2.4
Percent of ACL	100.0%	38.3%	100.0%	57.1%	60.2%	33.2%	100.0%	45.2%	100.0%	94.0%	100.1%	52.8%	100.0%	86.4%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(light blue)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and would be specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended under the action Alternatives, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 15-16 biennial cycle.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2015-2016 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

g/ Projected impacts are derrived from GMT projection models.

2016

Date: 5 April 2014	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/	Allocation a/	Projected Impacts g/
Off the Top Deductions	8.3	8.3	15.2	15.2	2.0	2.0	20.8	20.8	236.6	236.6	15.0	15.0	5.8	5.8
EFPc/	3.0	3.0	1.0	1.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Research d/	4.6	4.6	4.5	4.5	2.0	2.0	2.1	2.1	14.2	14.2	5.2	5.2	3.3	3.3
Incidental OA e/	0.7	0.7	2.0	2.0	--	--	18.4	18.4	2.4	2.4	0.6	0.6	0.2	0.2
Tribal f/			7.7	7.7			0.2	0.2	220.0	220.0	9.2	9.2	2.3	2.3
Trawl Allocations	85.0	85.0	58.5	58.5	1.4	1.4	308.9	308.9	2,638.4	2,499.0	141.6	141.6	1.1	1.1
-SB Trawl	85.0	11.8	44.5	10.2	1.4	0.1	292.8	114.1	2,633.4	2,494.0	124.0	53.1	1.1	0.0
-At-Sea Trawl			14.0	14.0			16.2	16.2	5.0	5.0	17.4	17.4		
a) At-sea whiting MS			5.8	5.8			6.7	6.7			7.2	7.2		
b) At-sea whiting CP			8.2	8.2			9.5	9.5			10.2	10.2		
Non-Trawl Allocation	268.7	118.0	51.3	31.0	2.6	1.2	16.3	5.4	35.0		7.5	0.3	12.1	9.6
Non-Nearshore	82.1	0.0	3.9	1.2		0.0		5.2		0.3		0.3	1.2	0.5
LE FG														
OA FG														
Directed OA: Nearshore	1.0	0.4	6.9	6.0				0.2		0.0		0.0	1.3	1.2
Recreational Groundfish														
WA			3.5	0.8				--		--		--	3.1	2.8
OR			12.0	3.2				--		--		--	2.8	2.2
CA (based on Option 2)	185.6	117.6	25.0	19.8		1.2		--		--		--	3.7	2.9
TOTAL	362.0	211.3	125.0	104.7	6.0	4.6	346.0	335.1	2,910.0	2,735.6	164.1	156.9	19.0	16.6
2015 Harvest Specification	362	362	125	125	10.0	10.0	346	346	2,910	2,910	164	164	19	19
Difference	0.0	150.7	0.0	20.4	4.0	5.4	0.0	10.9	0.0	174.4	-0.1	7.1	0.0	2.4
Percent of ACL	100.0%	58.4%	100.0%	83.7%	60.2%	46.2%	100.0%	96.8%	100.0%	94.0%	100.1%	95.7%	100.0%	87.2%

Key		
	(hatched)	= not applicable
	--	= trace, less than 0.1 mt
	(black)	= Fixed Values
	(light blue)	= off the top deductions

a/ Formal allocations are represented in the black shaded cells and are specified in regulation in Tables 1b and 1e. The other values in the allocation columns are 1) off the top deductions, 2) set asides from the trawl allocation (at-sea petrale only) 3) ad-hoc allocations recommended in the 2013-14 EIS process, 4) HG for the recreational fisheries for canary and YE.

b/ South of 40°10' N. lat.

c/ EFPs are amounts set aside to accommodate anticipated applications. Values in this table represent the estimates from the 13-14 biennial cycle, which are currently specified in regulation.

d/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

e/ The GMT's best estimate of impacts as analyzed in the 2013-2014 Environmental Impact Statement (Appendix B), which are currently specified in regulation.

f/ Tribal values in the allocation column represent the the values in regulation. Projected impacts are the tribes best estimate of catch.

g/ Projected impacts are derrived from GMT projection models.

4.2.2.2 Overview of Management Measures

The following bullet points summarize management measure changes by sector under the Preferred Alternative. A more detailed discussion of management measures by sector follows. New measures, discussed under Chapter 2, Section XXX and analyzed in Appendix B, would be implemented. New management measures that are specific to a sector are described below.

The Council is also considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the commercial nearshore (OR and CA) and recreational fisheries (WA, OR, and CA) that are necessary to stay within the range of state-specific HGs adopted by the Council at their April meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude, which would be implemented under the action alternatives, at the June Council meeting.

- The shorebased IFQ fishery would operate under the same management measures as No Action, with a few modifications. The No Action trawl RCA configuration (see Table 4-25) would be modified to 100 fm shoreward and 150 fm seaward in the area 40°10 to 48°10' N. latitude, year-round. The IFQ would be issued based the 2015-2016 ACLs and resulting trawl allocations under the Preferred Alternative. Underutilized off-the-top deductions from the ACL (tribal, research, incidental open access, and EFPs) may be taken into consideration when considering the projections for surplus carryover. Legal-sized Pacific halibut IBQ would be limited to 15 percent of the Area 2A total constant exploitation yield (TCEY) for legal size halibut (net weight), not to exceed 100,000 pounds (45 mt) annually for legal size halibut (net weight), which is a 30,000 pound (14 mt) reduction from status quo. A scientific sorting requirement for rougheye/blackspotted would be implemented which would improve the data used in management. Further, deeper RCA boundary lines and/or bycatch reduction areas for midwater gears would be defined in regulation and would be available to reduce rougheye/blackspotted rockfish mortality inseason, if needed (e.g., boundary lines that approximate the 300 and 350 fm depth contours).
- The at-sea whiting co-ops would operate under the same management measures described under No Action with a few modifications. Allocations would be issued based the 2015-2016 ACLs and resulting at-sea trawl allocations under the Preferred Alternative. Adjustments to the at-sea whiting set-asides would be necessary to accommodate the restructuring of the Other Fish complex, which removed spiny dogfish from the complex. A scientific sorting requirement for rougheye/blackspotted could be implemented which could improve the data used in management. Further, bycatch reduction areas for midwater gears would be defined in regulation and would be available to reduce rougheye/blackspotted rockfish mortality inseason, if needed (e.g., boundary lines that approximate the 300 and 350 fm depth contours).
- The non-nearshore fixed gear fishery would operate under the same management measures as No Action, except trip limits increases for several species, including sablefish, bocaccio and shelf rockfish south of 34°27' N. latitude, are proposed to attain the ACLs under the Preferred Alternative. The prohibition on lingcod retention in Periods 1, 2, and 6 would be removed and trip limits increased for both limited entry and open access. Trip limit decreases for slope rockfish north of 40°10' N. latitude are proposed to reduce mortality of rougheye/blackspotted rockfish. A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.
- The nearshore fixed gear fishery would operate under the same management measures as No Action with a few modifications. Trip limit decreases or non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or the state-specific nearshore

rockfish HGs. The prohibition on lingcod retention in Periods 1, 2, and 6 may be removed and trip limits increased for both limited entry and open access.

- Tribal fisheries would operate under the harvest guidelines and allocations under the Preferred Alternative. Tribal fisheries would be managed using the same measures described under No Action. Additionally, a scientific sorting requirement for rougheye/blackspotted would be implemented which would improve the data used in management.
- Washington recreational fisheries would operate under the same management measures as No Action, except the season dates for the depth closure in the North Coast (Marine Areas 3 and 4) would be shorter than under No Action. In the South Coast (Marine Area 2), the prohibition on lingcod retention seaward of 30 fathoms in the area south of 46°58’ N. latitude on Fridays and Saturdays from July to August 31 would be removed. Lastly, in the Columbia River Area (Marine Area 1), the southern boundary for the year-round lingcod closure would be moved three miles north. Changes to groundfish retention in Pacific halibut fisheries could also be proposed. Bag limit decreases or non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or state-specific nearshore rockfish HGs.
- Oregon recreational fisheries would operate under the same management measures as under the No Action Alternative except that the cabezon sub-bag limit would be removed, a one fish canary sub-bag limit would be implemented, and changes to groundfish retention in Pacific halibut fisheries could be proposed. Bag limit decreases or non-retention may also be required for nearshore rockfish to keep mortality at or within the complex ACL or state-specific nearshore rockfish HGs.
- Season lengths and depth restrictions were explored for the California recreational fisheries. The lingcod bag limit would be increased from two to three fish. Bag limit decreases, season length reduction, or non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or state-specific nearshore rockfish HGs. All other management measures would be the same as under No Action.

4.2.2.3 Impact (Groundfish Mortality) Shorebased IFQ – Preferred Alternative

The No Action trawl RCA configuration (see Table 4-25) would be modified to 100 fm shoreward and 150 fm seaward in the area 40°10 to 48°10’ N. latitude, year-round. The shorebased IFQ would be issued based the preferred 2015-2016 ACLs and resulting trawl allocations (Table 4-57 and Table 4-58). Notable IFQ increases from No Action include Dover sole, petrale, longspine thornyheads north, sablefish, shortpine thornyhead, widow rockfish, yellowtail, and Other Flatfish. Underutilized off-the-top deductions from the ACL (tribal, research, incidental open access, and EFPs) may be taken into consideration when considering the projections for surplus carryover (see Appendix B, Section XXX).

The shoreside trawl rationalization program keeps the trawl sector bycatch of halibut within expectations by requiring that trawlers account for their total mortality of all halibut in round weight (legal and sublegal sized). Therefore, to determine a trawl bycatch mortality limit the amount of halibut pounds available to the trawl fleet will be determined by expanding the expected legal sized halibut mortality (net weight) into a round weight legal+sublegal sized amount. To achieve this, the following conversions will be applied.

- Net weight to round weight conversion: multiply by the IPHC net weight to round weight conversion factor in use at the time of each year’s the calculation.
- Legal to legal+sublegal sized conversion factor: multiply by the ratio of legal sized halibut to legal+sublegal sized halibut from the most up-to-date NMFS analysis of trawl fishery bycatch available at the time of each year’s calculation.

After these conversions, 10 mt will be subtracted to cover bycatch mortality in the at-sea whiting fishery and trawl fishery south of 40°10’ N. lat, and the remainder will be issued as IBQ, to be used to cover Pacific halibut mortality by vessels operating in the shoreside trawl IFQ program. Under all action alternatives, legal-sized Pacific halibut IBQ would be limited to 15 percent of the Area 2A total constant exploitation yield (TCEY) for legal size halibut (net weight), not to exceed 100,000 pounds annually for legal size halibut (net weight), which is a 30,000 pound reduction from status quo.

A risk analysis was conducted to evaluate the risk of exceeding the spiny dogfish ACL (see Section XXX, Appendix B). The effectiveness of GCAs to reduce spiny dogfish mortality in the shorebased IFQ sector was also explored in Appendix B. Given the low risk of exceeding the spiny dogfish ACL, the Council recommended continuing with trip limit management of spiny dogfish in the shorebased IFQ sector and they did not recommend spiny dogfish GCAs.

Management measures to reduce rougheye/blackspotted rockfish catch, including rougheye/blackspotted GCAs and/or rockfish excluders for the at-sea whiting vessels were considered but rejected (see Chapter 2, Section XXX and Appendix B). Instead, the Council recommended that a scientific sorting requirement for rougheye/blackspotted could be implemented which could improve the data used in management. Further, management measures to reduce rougheye/blackspotted rockfish catch could be implemented, including 300 and 350 seaward trawl RCA boundaries and bycatch reduction areas for vessels using midwater gears, if necessary.

Table 4-57. Preferred Alternative – Shorebased IFQ. Projected mortality for IFQ species compared to the allocations or set-asides under the Preferred Alternative for 2015. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Preferred Alternative		No Action	
		2015 Projected Mortality (mt)	2015 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.3	81.9	10.9	79.0
CANARY	Coastwide	9.9	43.3	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	111.3	285.6	108.5	278.4
PETRALE	Coastwide	2,405.0	2539.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	50.7	118.5	48.0	112.3
YELLOWEYE	Coastwide	0	1.0	0	1.0
Arrowtooth flounder	Coastwide	2,436	3,194	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	308	1,203	291	1,067
Dover sole	Coastwide	15,935	45,981	7,713	22,235
English sole	Coastwide	152	10,384	137	5,261
Lingcod	North of 40°10' N. lat.	222	1,133	227	1,152
Lingcod	South of 40°10' N. lat.	79	448	84	743
Longspine thornyheads	North of 34°27' N. lat	1,531	2,962	936	1,811
Pacific cod	Coastwide	266	1,126	266	1,126
Pacific halibut a/	North of 40°10' N. lat.	N/A	45 max	N/A	45 max
Pacific halibut b/	South of 40°10' N. lat.	N/A	10	N/A	10
Pacific whiting	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	2,088	2,199	1,887	1,988
Sablefish	South of 36° N. lat.	339	720	307	653
Shortspine thornyheads	North of 34°27' N.	845	1,581	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	54	1,619	53	1,575
Starry flounder	Coastwide	9	757	9	756
Widow rockfish	Coastwide	673	1,457	426	994
Yellowtail rockfish	North of 40°10' N. lat.	2,484	8,946	816	2,939
Shelf rockfish	North of 40°10' N. lat.	60	1,127	28	508
Shelf rockfish	South of 40°10' N. lat.	27	192	12	81
Slope rockfish	North of 40°10' N. lat.	276	1,200	182	789
Slope rockfish	South of 40°10' N. lat.	110	420	98	379
Other flatfish	Coastwide	1,311	7,554	728	379

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)). There is no projection model for Pacific halibut bycatch.
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10’ N. latitude. (estimated to 5 mt each). There is no projection model for Pacific halibut bycatch.
c/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-58. Preferred Alternative – Shorebased IFQ. Projected mortality for IFQ species compared to the allocations or set-asides under the Preferred Alternative for 2016. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Preferred Alternative		No Action	
		2016 Projected Mortality (mt)	2016 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.8	85.0	10.9	79.0
CANARY	Coastwide	10.2	44.5	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	114.1	292.8	108.5	278.4
PETRALE	Coastwide	2,494.0	2633.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	53.1	124.2	48.0	112.3
YELLOWEYE	Coastwide	0	1.1	0	1.0
Arrowtooth flounder	Coastwide	2,436	3,033	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	306	1,196	291	1,067
Dover sole	Coastwide	15,935	45,981	7,713	22,235
English sole	Coastwide	137	7,263	137	5,261
Lingcod	North of 40°10' N. lat.	215	1,083	227	1,152
Lingcod	South of 40°10' N. lat.	75	422	84	743
Longspine thornyheads	North of 34°27' N. lat	1,455	2,815	936	1,811
Pacific cod	Coastwide	266	1,126	266	1,126
Pacific halibut a/	North of 40°10' N. lat.	N/A	45 max	N/A	45 max
Pacific halibut b/	South of 40°10' N. lat.	N/A	10	N/A	10
Pacific whiting c/	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	2,289	2,411	1,887	1,988
Sablefish	South of 36° N. lat.	371	788	307	653
Shortspine thornyheads	North of 34°27' N.	835	1,563	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	55	1,649	53	1,575
Starry flounder	Coastwide	9	759	9	756
Widow rockfish	Coastwide	673	1,457	426	994
Yellowtail rockfish	North of 40°10' N. lat.	2,343	8,436	816	2,939
Shelf rockfish	North of 40°10' N. lat.	60	1,131	28	508
Shelf rockfish	South of 40°10' N. lat.	27	192	12	81
Slope rockfish	North of 40°10' N. lat.	279	1,211	182	789
Slope rockfish	South of 40°10' N. lat.	110	421	98	379
Other flatfish	Coastwide	1,136	6,543	728	379

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)). There is no projection model for Pacific halibut bycatch.
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude. (estimated to 5 mt each). There is no projection model for Pacific halibut bycatch.
c/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

4.2.2.4 Impact (Groundfish Mortality) At-Sea Whiting Co-ops – Preferred Alternative

The at-sea whiting co-ops would operate under the same management measures described under No Action with a few modifications. The 2015-2016 allocations for the catcher-processor and mothership sectors under the Preferred Alternative for 2015-2016 are provided in Table 4-59 and compared to No Action.

At-sea whiting set-asides for some species would be increased compared to No Action (Table 4-60), based on recent fishery data. Further, adjustments would be necessary to accommodate the restructuring of the Other Fish complex, which removed spiny dogfish from the complex (Chapter 2, Section). The proposed Other Fish complex contains nearshore species which are not typically encountered in the at-sea whiting sectors. As such, the Council determined it was not necessary to specify an Other Fish complex set-aside. A range of spiny dogfish set-asides from 163 mt to 725 mt was analyzed along with a risk analysis for all sectors of exceeding the spiny dogfish ACL (see Section XXX, Appendix B). The effectiveness of GCAs to reduce spiny dogfish mortality was also explored in Appendix B. Given the low risk of exceeding the spiny dogfish ACL, the Council did not recommend spiny dogfish set-asides nor did they recommend spiny dogfish GCAs for the at-sea sectors.

Management measures to reduce rougheye/blackspotted rockfish catch, including rougheye/blackspotted GCAs and/or rockfish excluders for the at-sea whiting vessels were considered but rejected (see Chapter 2, Section XXX and Appendix B). Instead, the Council recommended a scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management. Further, management measures to reduce rougheye/blackspotted rockfish catch could be implemented, including bycatch reduction areas for vessels using midwater gears, if necessary.

Table 4-59. Preferred Alternative – At-Sea. Allocations for the catcher-processor (CP) and mothership sectors (MS) under the Preferred Alternative for 2015-2016. The No Action allocations are provided (right panel) for reference.

		Preferred Alternative				No Action Allocations	
		2015		2016			
Stock	**Area**	**CP All. (mt)**	**MS All. (mt)**	**CP All. (mt)**	**MS All. (mt)**	**CP All. (mt)**	**MS All. (mt)**
CANARY	Coastwide	8.0	5.6	8.2	5.8	7.6	5.4
DARKBLOTCHED	Coastwide	9.2	6.5	9.5	6.7	9.0	6.3
POP	N of 40º10' N. lat.	10.2	7.2	10.2	7.2	10.2	7.2
Pacific whiting a/	Coastwide	69,373	48,970	69,373	48,970	69,373	48,970
Widow	Coastwide	170.0	120.0	170.0	120.0	170.0	120.0

a/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-60. Preferred Alternative – At-Sea. At-sea whiting set-asides under the Preferred Alternative. The No Action set-aside values are provided for reference.

Stock	Area	Preferred Alternative Total Set-Asides (mt)	No Action Set-Asides Total Set-Asides (mt)
PETRALE SOLE	Coastwide	5	5
YELLOWEYE	Coastwide	0	0
Arrowtooth flounder	Coastwide	45	20
Dover sole	Coastwide	5	5
English sole	Coastwide	5	5
Lingcod	N of 40°10' N. lat.	15	15
Longnose skate	Coastwide	5	5
Longspine thornyhead	N of 34°27' N. lat.	5	5
Pacific cod	Coastwide	5	5
Pacific halibut a/	Coastwide	10	10
Sablefish	N of 36° N. lat.	50	50
Shortspine thornyhead	N of 34°27' N. lat.	20	20
Starry flounder	Coastwide	5	5
Yellowtail	N of 40°10' N. lat.	300	300
Shelf rockfish north	N of 40°10' N. lat.	35	35
Slope rockfish north	N of 40°10' N. lat.	100	100
Other Fish b/	Coastwide	N/A	520
Spiny Dogfish	Coastwide	N/A	N/A
Other flatfish	Coastwide	20	20

a/As stated in §660.55 (m), the Pacific halibut set-aside is 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude (estimated to 5 mt each).
b/ In 2014, spiny dogfish was managed as part of the Other Fish complex. Starting in 2015-2016, spiny dogfish will be managed separately.

4.2.2.5 Limited Entry and Open Access Fixed Gear– Preferred Alternative

Impact (Groundfish Mortality) – Non-Nearshore North of 36° N. latitude

Management measures and projected mortality for the non-nearshore fishery north of 36° N. latitude under the Preferred Alternative is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.40 (Table 4-55), and the resulting sablefish allocations (Table 4-61 and Table 4-62). Trip limit increases for sablefish would be proposed (Table 4-63) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-61 and Table 4-62). The prohibition on lingcod retention in Periods 1, 2, and 6 would be removed and trip limits increased for both limited entry and open access fixed gears (see Appendix B, Section XXX). Trip limits for other species may also be adjusted to attain the ACL or achieve other conservation goals.

Trip limit decreases for slope rockfish north of 40°10' N. latitude are proposed to reduce rougheye/blackspotted rockfish mortality (Table XXX and Appendix B, Section XXX). A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.

The overfished species mortality, as a result of harvesting the sablefish allocations, was evaluated using 2002-2012 WCGOP data in the non-nearshore model. Under the Preferred Alternative, trawl and non-trawl allocations were established for overfished species. Further, the non-nearshore fishery was also allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-64). Routine adjustments of the non-trawl RCA (same as No Action, Table 4-26) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (e.g., changing from 100 to 125 fm). RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm). Table 4-65 contains the projected mortality groundfish for the non-nearshore fishery.

Table 4-61. Preferred Alternative: Limited entry sablefish FMP allocations north of 36 N. latitude for 2015-2016.

Year	ACL	Sablefish Com. HG	Limited Entry Share	LEFG Share (mt)				Estimated Tier Limits (lbs) a/		
				Total Catch Share	Landed Catch Share a/	Primary Season Share	DTL Share	Tier 1	Tier 2	Tier 3
2015	4,793	4,281	3,878	1,629	1,571	1,336	236	41,175	18,716	10,695
2016	5,241	4,684	4,244	1,782	1,719	1,461	258	45,053	20,479	11,702

a/ The limited entry fixed gear total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-62. Preferred Alternative: Open access FMP allocations north of north of 36 N. latitude for 2015-2016.

Year	Open Access Total Catch Share (mt)	Open Access Landed Catch Share (mt) a/
2015	402	388
2016	440	425

a/ The open access total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-63. Preferred Alternative. Sablefish trip limits north of 36° N. latitude for limited entry and open access fixed gears for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	1,025 lb/week, not to exceed 3,075 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 1,800 lb/ 2 months					
2016	Limited Entry	1,275 lb/week, not to exceed 3,375 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 1,000 lb, not to exceed 2,000 lb/ 2 months					

Table 4-64. Preferred Alternative – Non-Nearshore. Overfished species projected mortality(mt)**, compared to the shares for the non-nearshore fixed gear fishery and the non-trawl allocations**(mt)**, for 2015-2016.**

	2015			2016		
Stock	**Projected Mortality**	**Non-Nearshore Share**	**Non-Trawl Allocation**	**Projected Mortality**	**Non-Nearshore Share**	**Non-Trawl Allocation**
BOCACCIO	0.0	79.1	258.8	0.0	82.1	268.7
CANARY	1.1	3.8	49.9	1.2	3.9	51.3
COWCOD	0.0		2.6	0.0		2.6
DARKBLOTCHED	4.7			5.2		
POP	0.3			0.3		
PETRALE SOLE	0.3			0.3		
YELLOWEYE	0.5	1.1	11.2	0.5	1.2	12.1

Table 4-65. Preferred Alternative. Projected groundfish mortality for the limited entry (LE) and open access (OA) fixed gear fisheries (in mt).

	2015			2016		
Stock	**LE**	**OA**	**Total**	**LE**	**OA**	**Total**
Arrowtooth flounder	44	7	51	48	7	55
Bank rockfish (South of 40°10' N. lat.)	0	0	0	0	0	0
Big skate	6	1	7	6	1	7
Black rockfish (Oregon/California)	0	0	0	0	0	0
Blackgill rockfish (South of 40°10' N. lat.)	12	5	17	13	5	19
Blue rockfish	0	0	0	0	0	0
Cabezon - (California)	0	0	0	0	0	0
Cabezon - (Oregon)	0	0	0	0	0	0
California skate	0	0	0	0	0	0
Chilipepper rockfish	0	0	0	0	0	0
Dover sole	6	1	7	7	1	8
English sole	0	0	0	0	0	0
Greenspotted rockfish	0	0	0	0	0	0
Greenstriped rockfish	1	0	1	1	0	2
Grenadiers	47	15	62	51	17	68
Kelp greenling	0	0	0	0	0	0

	2015			2016		
Stock	**LE**	**OA**	**Total**	**LE**	**OA**	**Total**
Lingcod - (California)	12	4	16	13	4	17
Lingcod - (Washington/Oregon)	3	0	3	3	0	4
Longnose skate	63	12	76	69	14	83
Longspine thornyhead (North Pt. Conception)	3	1	3	3	1	4
Mixed thornyheads	2	1	2	2	1	2
Pacific cod	2	0	2	2	0	2
Pacific hake	0	0	1	1	0	1
Redstripe rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Sharpchin rockfish	0	0	0	0	0	0
Shortbelly rockfish	0	0	0	0	0	0
Shortspine thornyhead (North Pt. Conception)	20	5	25	22	5	27
Silvergrey rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Spiny dogfish	149	24	173	163	26	189
Splitnose rockfish	0	0	0	0	0	0
Starry flounder	0	0	0	0	0	0
Unspecified skate	16	3	19	18	3	21
Widow rockfish	0	0	0	0	0	0
Yellowmouth (North of 40°10' N. lat.)	0	0	0	0	0	0
Yellowtail rockfish	1	0	1	1	0	1
Other flatfish	0	0	0	0	0	0
Other groundfish	3	1	4	4	1	4
Other nearshore rockfish	0	0	0	0	0	0
Other shelf rockfish	3	0	3	3	0	3
Other slope rockfish	101	18	119	110	20	130

Impact (Groundfish Mortality) Non-Nearshore South of 36° N. latitude

Management measures and projected groundfish mortality for the non-nearshore fishery south of 36° N. latitude under the Preferred Alternative is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.40 (Table 4-55). Anticipated catch of sablefish south of 36º N latitude under the Preferred Alternative would be approximately equal to the 2015-2016 sablefish allocations and resulting landed catch shares for limited entry and open access fixed gears (Table 4-66). Increases to the sablefish trip limits would be proposed (Table 4-67) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-66). Additionally, trip limit increases are proposed for bocaccio and shelf rockfish south of 34°27’ N. latitude to increase attainment of the non-trawl allocations (Table 4-68, See Appendix B Section XXX for historical attainment). Trip limits for other species may also be adjusted to attain the ACL or achieve other conservation goals.

Under the Preferred Alternative, trawl and non-trawl allocations would be established for overfished species. Further, the non-nearshore fishery would be allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye to ensure that total non-trawl catches remained within the non-trawl allocations for these overfished species (Table 4-64). Routine adjustments of the non-trawl RCA (same as No Action, Table 4-26) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (Table 4-64). RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm).

A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.

Table 4-66 Preferred Alternative: Short-term sablefish allocations south of 36 N. latitude for the non-trawl sector, limited entry and open access for 2015-2016.

Year	Commercial HG	Non-Trawl Allocation	LE FG Total Catch Share	Directed OA Total Catch Share	LE FG Landed Catch Share a/	Directed OA Landed Catch Share a/
2015	1,714	994	547	447	531	432
2016	1,875	1,088	598	489	581	472

a/ The limited entry and open access fixed gear total catch shares are reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-67. Preferred Alternative. Sablefish trip limits south of 36° N. latitude for limited entry and open access fixed for 2015-2016.

<table>
<tr><th>Year</th><th>Fishery</th><th>Jan-Feb</th><th>Mar-Apr</th><th>May-Jun</th><th>July-Aug</th><th>Sept-Oct</th><th>Nov-Dec</th></tr>
<tr><td rowspan="2">2015</td><td>Limited Entry</td><td colspan="6">2,100 lb/week</td></tr>
<tr><td>Open Access</td><td colspan="6">315 lb/ day, or 1 landing per week of up to 1,575 lb,
not to exceed 3,200 lb/ 2 months</td></tr>
<tr><td rowspan="2">2016</td><td>Limited Entry</td><td colspan="6">2,175 lb/week</td></tr>
<tr><td>Open Access</td><td colspan="6">325 lb/ day, or 1 landing per week of up to 1,625 lb,
not to exceed 3,250 lb/ 2 months</td></tr>
</table>

Table 4-68. Preferred Alternative. Proposed trip limit increases for bocaccio and shelf rockfish south of 34°27' N. latitude.

Fishery Sector	Fleet	Alternative	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Bocaccio south 34°27'	LE	No Action	300	closed	300	500 lbs/2 months		
		Preferred	1,000	closed	1,000 lbs/2 months			
	OA	No Action	100	closed	100	200 lbs/2 months		
		Preferred	500	closed	500 lbs/2 months			
Shelf Rockfish Complex south 34°27'	LE	No Action	3,000	closed	3,000	4,000 lbs/2 months		
		Preferred	4,000	closed	4,000 lbs/2 months			
	OA	No Action	750	closed	750	1,000 lbs/2 months		
		Preferred	1,500	closed	1,500 lbs/2 months			

Impact (Groundfish Mortality) Nearshore – Preferred Alternative

There are Federal limits and state quotas (or harvest guideline) for nearshore species that constrain target species landings in the commercial nearshore fishery (Table 4-38). State harvest guidelines between recreational and commercial fisheries may be adjusted by each state between or within years, so are not displayed herein. State harvest guidelines for each sector are established to ensure that the non-trawl allocation provided to each state is not exceeded while providing fishing opportunities for both sectors. The Preferred Alternative is based on the expectation that landings in the Oregon nearshore fishery (Table 4-69) will be equal to their allocations, except for lingcod where the historical average landings are assumed and except for black rockfish for which the state landing cap would have to be reduced from 137.9 mt to 120.0 mt to remain under the yelloweye rockfish catch share shown in Table 4-70. In California, nearshore fishery allocations are unable to be achieved given the current overfished species shares allocated to the nearshore fishery and state. As such, landings are reduced to stay within the nearshore fishery overfished species shares of the non-trawl allocation. Nearshore fishery landings are influenced by a variety of factors, including weather and market, and can vary annually (Table 4-40). As such, there is substantial uncertainty surrounding the estimated landings under the action alternatives, which in turn influence the projected overfished species mortality and socioeconomic analysis. In the event fishery performance is lower than the allocations, mortality of groundfish species will be lower.

Trawl and non-trawl allocations for overfished species, would be implemented under the Preferred Alternative. Specifically, the nearshore fishery would be managed to stay within its share of the non-trawl allocation for bocaccio, canary, and yelloweye or the overall non-trawl allocations (Table 4-70). In the event the projected overfished species mortality is expected to exceed the nearshore share or non-trawl allocation, routine adjustments of the shoreward non-trawl RCA (Table 4-26) or reduced trip limits for nearshore species could occur. RCA changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the nearshore share or non-trawl allocation (e.g., changing from 20 to 30 fm).

Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the nearshore fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

The Council is also considering removing the prohibition on lingcod retention in Periods 1, 2, and 6 and increasing trip limits for both limited entry and open access fixed gears (see Appendix B, Section XXX). In the event this option is selected for implementation, the estimated lingcod landings (Table 4-69) and the projected overfished species mortality would be updated (Table 4-70).

Table 4-69. Preferred Alternative. Expected landings under the Preferred Alternative (mt) in 2015-2016. Target species landings by area are also shown (far right panel).

Stock	Area	Total Landings	Landings by Area			
			OR Total	CA Total	40°10' – 42° N. lat.	S. of 40°10' N. lat.
Black rockfish	S. 46°16 N. lat.	179	120	59	55	4
Cabezon	OR	30	30			
Cabezon	CA	57		57	3	54
Kelp greenling	OR	23	23			
Kelp greenling	CA	21.2		21.2	0.2	21
Lingcod	N. 40°10 N. lat.	33	29	4	4	
Lingcod	S. 40°10 N. lat.	15		15		15
Nearshore rockfish N. a/	N. 40°10 N. lat.	25	18	7		
--Blue rockfish		*9*	*4*	*5*	*5*	
--Other nearshore rockfish		*16*	*14*	*2*	*2*	
Nearshore rockfish S.	S. 40°10 N. lat.	79		79		
--Blue rockfish		*2*		*2*		*2*
--Shallow nearshore rockfish b/		*53*		*53*		*53*
--Deeper nearshore rockfish c/		*24*		*24*		*24*

a/ Nearshore rockfish totals consists of black-and-yellow, blue rockfish, China, gopher, grass, kelp, brown, olive, copper, treefish, calico, and quillback. These species are part of the nearshore rockfish complex north and south of 40°10' N. latitude.
b/Shallow nearshore rockfish consists of black and yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish south of 40°10' N. latitude. These species are part of the nearshore rockfish complex south of 40°10' N. latitude.
c/ Deeper nearshore consists of black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, and treefish south of 40°10' N. latitude. These species are part of the nearshore rockfish complex south of 40°10' N. latitude.

Table 4-70. Preferred Alternative. Total projected overfished species (OFS) mortality compared to the nearshore fishery share of the non-trawl allocation for 2015-2016 (mt). Projected overfished species mortality by area is also shown in the right panel and compared to the state specific shares, where applicable (in parenthesis). Overages of the allocations are indicated in bold.

Stock	Area	Total Projected OFS Mortality 2015-2016	Nearshore Fishery Share 2015/2016	Projected OFS Mortality by Area for 2015-2016			
				Oregon Total (Share 2015/2016)	CA Total (Share 2015/2016)	40°10' – 42° N. lat.	S. of 40°10' N. lat.
Bocaccio	S. 40°10	0.4	1.0/1.0	N/A	0.4	N/A	0.4
Cowcod	S. 40°10	0		N/A	0	N/A	0
Canary	Coastwide	6.0	6.7/6.9	1.1 (1.8/1.9)	4.9 (4.9/5.0)	0.5	4.4
Darkblotched	Coastwide	0.2		0.1	0.1	0	0.1
POP	N. 40°10	0		0	0	0	0
Petrale	Coastwide	0		0	0	0	0
Yelloweye	Coastwide	1.2	1.2/1.3	0.9 (0.9/0.9)	0.3 (0.3/0.35)	0.2	0.1

4.2.2.6 Impact (Groundfish Mortality) Tribal Fisheries – Preferred Alternative

Tribal fisheries would operate under the harvest guidelines and allocations displayed in Table 4-51, Table 4-53, and Table 4-55. Tribal fisheries would be managed using the same measures described under No Action.

4.2.2.7 Washington Recreational – Preferred Alternative

Primary catch controls for the Washington recreational fishery are season dates, depth closures, bag limits, and GCAs, including YRCAs. Under the Preferred Alternative, Washington recreational fisheries would operate under the 2015 and 2016 ACLs (Table 4-51 and Table 4-53) and Washington recreational harvest guidelines (HGs) for overfished species (Table 4-71).

Table 4-71. Preferred Alternative: Washington recreational harvest guidelines for 2015 and 2016.

Stock	2015	2016
CANARY ROCKFISH	3.4	3.5
YELLOWEYE ROCKFISH	2.9	3.1

Groundfish Season Structure

Under the Preferred Alternative, the Washington recreational fishery would be open year-round for groundfish, except lingcod. Washington would continue to prohibit the retention of canary and yelloweye rockfish in all areas.

Depth restrictions are the primary tool used to keep recreational mortality of yelloweye and canary rockfish within specified HGs. Restrictions limiting the depth where groundfish fisheries are permitted are more severe in the area north of the Queets River (Marine Areas 3 and 4) where yelloweye and canary rockfish abundance is higher and therefore caught incidentally at a higher rate. Depth restrictions are less restrictive moving south where incidental catch of yelloweye and canary becomes progressively less.

Management measures under the Preferred Alternative differ only slightly from the No Action Alternative. Under the Preferred Alternative, the depth closure in the North Coast (Marine Areas 3 and 4) would be in place from May 9th through Labor Day rather than from May 1 through September 30. In the South Coast (Marine Area 2), the prohibition on lingcod retention seaward of 30 fathoms in the area south of 46°58 on Fridays and Saturdays from July to August 31 would be removed and in the Columbia River Area (Marine Area 1), the southern boundary for the year round lingcod closure would be moved three miles north. The primary intent of these changes is to simplify management measures for recreational anglers while maintaining total mortality projections that stay within Washington's HGs for overfished species. Management measures, in addition to those analyzed in the 2013-14 EIS were implemented in 2013 through inseason action to respond to higher than anticipated encounters with yelloweye rockfish. These additional management measures reduced the potential for encounters with overfished species and provide some leeway to refine and streamline management measures described under the No Action Alternative. Table 4-72 summarizes key features of the Washington recreational regulations under the Preferred Alternative.

Table 4-72. Preferred Alternative. Washington Recreational Seasons and Groundfish Retention Restrictions.

<table>
<tr><th>Marine Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>3 & 4 (N. Coast)</td><td colspan="4">Open all depths</td><td colspan="5">Open <20 fm May 9-Labor Day a/</td><td colspan="3">Open all depths</td></tr>
<tr><td>2 (S. Coast)</td><td colspan="2">Open all depths e/</td><td colspan="4">Open <30 fm Mar 15 - June 15 b/, c/, d/, e/</td><td colspan="6">Open all depths e/</td></tr>
<tr><td>1 (Col. R.)</td><td colspan="4">Open all depths e/</td><td colspan="5">Open all depths e/, f/</td><td colspan="3">Open all depths e/</td></tr>
<tr><td colspan="13">a/ Groundfish retention prohibited >20 fm except, retention of lingcod, Pacific cod and sablefish is allowed seaward of 20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited in deepwater areas at all times.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board on days open to the all depth Pacific halibut fishery.</td></tr>
</table>

North Coast (Marine Areas 3 and 4)

The retention of bottomfish is prohibited seaward of a line approximating 20 fm from May 9th through the first Monday in September, except, lingcod, Pacific cod and sablefish can be retained seaward of 20 fm on days open to recreational fishing for Pacific halibut. Fishing for, retention, or possession of groundfish and Pacific halibut is prohibited in the C-shaped YRCA (Figure 4-18).

<u>South Coast (Marine Area 2)</u>

The retention of bottomfish, except rockfish, is prohibited seaward of 30 fm from March 15 through June 15, except sablefish and Pacific cod retention is allowed May 1 through June 15. Retention of lingcod is allowed seaward of 30 fm on days open to the primary Pacific halibut season. Fishing for, retention, or possession of lingcod is prohibited in deepwater areas seaward of a line extending from 47°31.70' N. latitude, 124°45.00' W. longitude to 46°38.17' N. latitude, 124°30.00' W. longitude year-round, except as allowed on days open to the Pacific halibut fishery (Figure 4-22). Fishing for, retention or possession of bottomfish or Pacific halibut is prohibited in the South Coast YRCA and Westport Offshore YRCA (Figure 4-18).

<u>Columbia River (Marine Area 1)</u>

Retention of bottomfish, except sablefish and Pacific cod, is prohibited with Pacific halibut onboard during the all-depth recreational halibut fishery from May 1 through September 30. Fishing for, retention, or possession of lingcod in deepwater areas seaward of a line extending 46°38.17 N. latitude, 124°21.00' W. longitude to 46°28.00' N. latitude, 124°21.00' W. longitude is prohibited year-round (Figure 4-22).

Area Restrictions

Under the Preferred Alternative, fishing for, retention, or possession of groundfish and halibut during the Washington recreational groundfish and Pacific halibut fisheries would be prohibited in the C-shaped YRCA in the north coast and the South Coast and Westport YRCAs in the south coast (Figure 4-18).

Fishing for, retention, or possession of lingcod would be prohibited seaward of a line connecting the following coordinates from the Queets River (47°31.70' N. latitude, 124° 45.00' W. longitude) to 46°28.00' N. latitude, 124°21.00' W. longitude, year round except as allowed in Washington Marine Area 2 on days open to the primary Pacific halibut fishery (Figure 4-22).

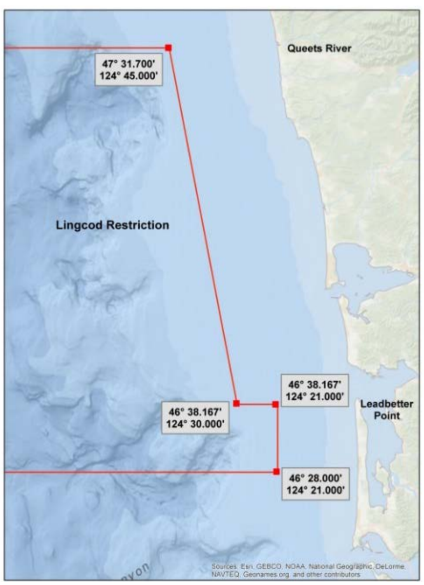


Figure 4-22. Preferred Alternative. Washington Lingcod Restricted Area.

Other Measures

Nearshore Rockfish HGs: Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the Washington recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

Groundfish Bag Limits: Groundfish bag limits would be the same under the Preferred Alternative as they are under the No Action alternative. The recreational groundfish bag limit, including rockfish and lingcod, would be 12 fish per day. Of the 12 recreational groundfish allowed to be landed per day, sub-limits of 10 rockfish and, two lingcod apply. The recreational bag limit also includes a sub-limit of two cabezon in Marine Areas 1-3 and one cabezon in Marine Area 4.

Lingcod Seasons and Size Limits: Under the Preferred Alternative, the lingcod seasons would be the same as they are under the No Action Alternative. In Marine Areas 1 through 3 (Washington-Oregon border at 46°16' N. latitude to Cape Alava at 48°10' N. latitude) the lingcod season would be open from the Saturday closest to March 15 through the Saturday closest to October 15. In Marine Area 4, (Cape Alava to the U.S. Canadian border) the lingcod season would be open from April 16 through October 15, or the Saturday closest to October 15 if that Saturday comes before October 15, whichever is earlier. Lingcod seasons under the Preferred Alternative would be structured the same as they were under the No Action Alternative. Under the Preferred Alternative the lingcod seasons and size limits by area are as follows:

- Marine Areas 1-3: March 14 through October 17 in 2015 and March 12 through October 15 in 2016. Minimum size, 22 inches.
- Marine Area 4: April 16 through October 15 in 2015 and April 16 to October 15 in 2016. Minimum size, 22 inches.

Cabezon Size Limit: Under the Preferred Alternative, there is an 18 inch minimum size limit for cabezon in Marine Area 4 (Cape Alava to the U.S. Canadian border).

Pacific Halibut Seasons: It is expected that the Pacific halibut seasons in 2015 and 2016 would be similar to the halibut seasons in 2013 and 2014. There are no changes to the restrictions on groundfish retention during the Pacific halibut season proposed under the Preferred Alternative. However, modifications to the groundfish retention rules during the all-depth Pacific halibut openings may be proposed under the Pacific halibut Catch Sharing Plan process (see Appendix B, Section XXX).

Additional Management Measures Analyzed: No additional management measures were analyzed for the Preferred Alternative. Currently available management measures will be used to keep recreational harvests of overfished species within specified HGs for 2015-2016.

Impact (Groundfish Mortality)

Projected mortality for Washington's recreational fishery is based upon the previous season's harvest estimated by the Ocean Sampling Program (OSP) and incorporated in Recreational Fishery Information Network (RecFIN). Table 4-73 summarizes the projected mortality for overfished and non-overfished species under the Preferred Alternative.

It should be noted that the precision of recreational groundfish catch estimates based upon previous seasons will continue to be influenced by factors such as the length and success of salmon and halibut seasons, weather and unforeseen factors.

Washington's Ocean Sampling Program is able to produce estimates of groundfish catch with a one month lag time. Management measures such as more restrictive depth closures, area closures, groundfish retention restrictions, or changes to seasons can be considered and implemented through emergency changes to state regulations if inseason catch reports indicate that recreational harvests of overfished or non-overfished species are exceeding pre-season projections to the point where HGs are at risk of being exceeded.

Table 4-73. Preferred Alternative: Washington recreational projected groundfish mortality in 2015 and 2016 (in mt).

Stock	2015/2016
CANARY ROCKFISH	0.75
YELLOWEYE ROCKFISH	2.83
Black Rockfish	251.54
Lingcod	125.61
Nearshore Rockfish	10.54
Blue Rockfish	2.58
Quillback Rockfish	2.23
Copper Rockfish	2.24
China Rockfish	3.49
Brown Rockfish	-
Grass Rockfish	-
Yellowtail Rockfish	28.32
Vermilion Rockfish	0.60
Cabezon	5.56
Kelp Greenling	1.90

4.2.2.8 Oregon Recreational – Preferred Alternative

Primary catch controls for the Oregon recreational fishery are season dates, depth closures, bag limits, and GCAs, including yelloweye rockfish conservation areas (YRCAs). The Preferred Alternative analyzes the Oregon recreational fishery with the 2015 and 2016 ACLs (Table 4-51 and Table 4-53), and Oregon recreational harvest guidelines (HGs) for overfished species (Table 4-74), which directly influence the recommended management measures. Key target species with a state quota or Federal HG are also shown, such as black rockfish which has a HG of 440.4 mt.[50] Projected mortality under the Preferred Alternative for the Oregon recreational fisheries is shown in Table 4-75.

[50] The black rockfish ACL is allocated 58 percent to Oregon and 42 percent to California. Of the Oregon portion, Oregon state rule specifies that 76 percent is allocated to the recreational fishery with 24 percent to the commercial fishery. Similarly for nearshore rockfish species, state regulations allocate 48.7 percent of the Oregon portion to the recreational fishery.

Table 4-74. Oregon recreational Federal harvest guidelines (in mt) and state quotas under the Preferred Alternative for 2015-2016.

Stock	HGs and State Quotas a/	
	2015	**2016**
CANARY ROCKFISH	11.7	12.0
YELLOWEYE ROCKFISH	2.6	2.8
Black Rockfish	440.4	440.4
Greenlings b/	5.2	5.2
Nearshore Rockfish N. of 40°10 N. lat.	TBD	TBD
--*Blue Rockfish*		
--*Other Nearshore Rockfish*		

a/ Federal HG are established for canary and yelloweye rockfish only. The state process in Oregon establishes quotas for black rockfish, blue rockfish, other nearshore rockfish, and greenlings (all species). Black and blue rockfish are managed to a combined state quota, the estimated quotas by species are represented in this table. The state quotas are not intended to be implemented in Federal regulation, they are only provided as information.
b/ Includes kelp and other greenlings

Table 4-75. Projected Mortality in the Oregon recreational fisheries under the action alternatives for 2015-2016.

Stock	Projected Mortality (mt)
CANARY ROCKFISH	3.2
YELLOWEYE ROCKFISH	2.2
Black Rockfish	322.2
Cabezon	35.8
Greenlings [a/]	6.4
Lingcod	132.0
Nearshore Rockfish N. 40°10 N. Lat.	30.5
--*Blue Rockfish*	*17.5*
--*Other Nearshore Rockfish*	*13.0*

[a/] Includes kelp and other greenlings.

Groundfish Season Structure

Under the Preferred Alternative, the Oregon recreational groundfish fishery would be open offshore year-round, except from April 1 to September 30 when fishing is only allowed shoreward of 40 fathoms, as defined by waypoints (Figure 4-23). Closing the fishery outside of 40 fathoms from April 1 to September 30, months when angler effort and yelloweye rockfish encounters are greatest, mitigates mortality of yelloweye rockfish. Projected mortality of yelloweye and canary rockfish are within the HG, therefore the shore-based fishery would be open year-round.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bottomfish Season	Open all depths			Open < 40 fm						Open all depths		
Marine Bag Limit [1]	Ten (10)											
Lingcod Bag Limit	Three (3)											
Flatfish Bag Limit [2]	Twenty Five (25)											

1 Marine bag limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine, and smelt.
2 Flounders, soles, sanddabs, turbots and halibuts except Pacific halibut.

Figure 4-23. Preferred Alternative. Oregon recreational groundfish season structure and bag limits under the Preferred Alternative.

Area Closures

The Stonewall Bank YRCA has been in place since 2006 and would also remain under the Preferred Alternative (Figure 4-24). The YRCA is located approximately 15 miles west of the Port of Newport and consists of the high-relief area of Stonewall Bank, an area of high yelloweye rockfish encounters. No recreational fishing for groundfish and Pacific halibut can occur within this YRCA, which is bounded by the following waypoints specified in Table 4-76.

Two options for extending the status quo Stonewall Bank YRCA for 2015-2016 recreational fisheries, should they become necessary, are also shown in Figure 4-24 and are defined by the coordinates in Table 4-76.

Table 4-76. Preferred Alternative. Coordinates for the Stonewall Bank currently as specified in regulation, Option 2 and Option 3 for the expanding the Stonewall Bank area closure under.

Current		Option 2		Option 3	
Latitude	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**
44°37.458’	124°24.918’	44°41.7594’	124°30.018’	44°38.544’ N	124°27.4122’
44°37.458’	124°23.628’	44°41.7348’	124°21.603’	44°38.544’ N	124°23.8554’
44°28.710’	124°21.798’	44°25.2456’	124°16.944’	44°27.132’ N	124°21.501’
44°28.710’	124°24.102’	44°25.2942’	124°30.1404’	44°27.132’ N	124°26.8944’
44°31.422’	124°25.500’	44°41.7594’	124°30.018’	44°31.302’ N	124°28.3476’

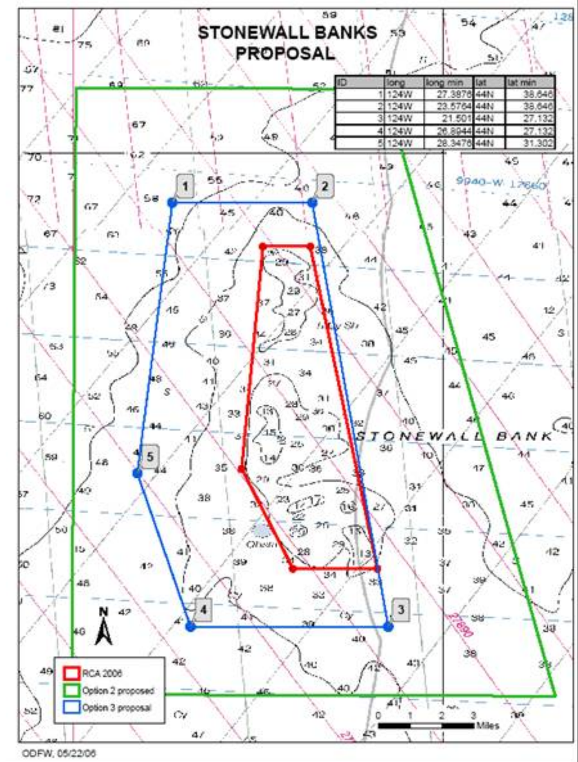


Figure 4-24. Preferred Alternative. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited.

Groundfish Bag Limits and Size Limits

Under the Preferred Alternative, a marine fish daily bag limit of 10 fish in aggregate would be implemented, the same as under No Action, for 2015-2016. The marine bag includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine and smelt. The seasonal one fish sub-bag limit for cabezon which was in place under No Action would be removed under the Preferred Alternative. Cabezon mortality would be limited via state regulations. A flatfish daily bag limit of 25, which includes all soles and flounders except Pacific halibut, would be allowed in addition to the marine fish daily bag limit. Additionally a three-fish bag limit would be allowed for lingcod. Retention of canary and yelloweye rockfish would continue to be prohibited under the Preferred Alternative.

The following minimum size limits applied to 2013-2014 Oregon recreational fisheries and would be carried forward under the Preferred Alternative:

- Lingcod – 22 in.
- Cabezon – 16 in.
- Kelp greenling – 10 in.

Under the Preferred Alternative, the recreational Pacific halibut fisheries should be able to proceed as in 2013 and 2014, in regards to days and areas open, etc., depending on the halibut quota. Since 2009, only sablefish and Pacific cod may be retained in the Pacific halibut fishery at any depth in the area north of Humbug Mountain, Oregon. South of Humbug Mountain, groundfish may be retained in areas open to groundfish (e.g., less than 30 fm) when halibut are onboard the vessel. There are no changes to the restrictions on groundfish retention during the Pacific halibut season proposed under the Preferred Alternative. However, modifications to the groundfish retention rules during the Pacific halibut openings may be proposed under the Pacific halibut Catch Sharing Plan process (see Appendix B, Section XXX).

Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the Oregon recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

Additional Management Measures Analyzed

Under the Preferred Alternative, two additional management measures were analyzed for the Oregon recreational fisheries: allowing limited retention of canary rockfish and modifying the groundfish species allowed to be retained during all-depth Pacific halibut openings. Additionally, a variety of season structure (depths and months) were modeled to determine potential mortality to overfished species.

Inseason Management Tools

Oregon has a responsive port-based monitoring program through the Ocean Recreational Boat Survey (ORBS) and regulatory processes in place to track mortality and take actions inseason, if necessary. The following are suggested management measures that could be implemented inseason if the fishery does not proceed as expected.

Inseason management tools, designed to mitigate mortality, include bag limit adjustments (including non-retention), length limit adjustments, gear restrictions, and season, days per week, depth, and area closures.

Season, depth, days open per week, and area closures are the primary inseason tools for limiting yelloweye rockfish and canary rockfish mortality, since retention of these species is already prohibited. If catch rates indicate that the bycatch harvest targets for yelloweye rockfish would be reached prematurely, offshore depth closures may be implemented inseason at 30, 25, or 20 fathoms as these two species are less abundant nearshore, and release survival rates are higher in shallow waters. Additionally, days per week may also be closed to reduce mortality. ODFW would monitor inseason progress toward recreational harvest targets for canary rockfish and yelloweye rockfish. Regulations would depend upon the timing of the determination for their need.

Adjustments to the marine fish daily bag limit to no more than 10 fish may be implemented to achieve season duration goals in the event of accelerated or decelerated black rockfish or other nearshore rockfish harvest. The lingcod daily bag limits may be adjusted to no more than 3 fish in the event the marine bag limit changes or the halibut catch limit is reduced from 2013 levels. Season and/or area closures may also be considered if harvest targets are projected to be attained. Closing one or more days per week is an inseason tool that could be used to limit mortality. Closing certain days each week would help lengthen the duration of a fishery approaching an HG.

Non-retention and/or length restrictions are the likely inseason tools to use for cabezon and kelp greenling, as release survival is very high. They may also be used to reduce mortality of nearshore species, such as nearshore rockfish species, especially when combined with the use of descending devices.

Gear restrictions and/or release technique requirements may be implemented to reduce the impact of overfished rockfish since a variety of descending devices are available. SSC recommended and Council-approved mortality rates for canary and yelloweye rockfish when descending devices are used will be implemented in 2014 (see Appendix A for documentation).

Directed yellowtail rockfish and/or flatfish fisheries may be implemented inseason, as were implemented in 2004, in the event of a closure of the recreational groundfish fishery due to attainment Federal or state HGs or targets. Specific gear restrictions may be implemented in the event that yellowtail rockfish and/or flatfish fisheries remain open during a groundfish closure. Additionally, the fishery may be expanded to waters seaward of the RCA, promoting directed yellowtail rockfish opportunity. Directed flatfish fisheries would be legal year round and open shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions (e.g., 40, 30, 25, 20, and 50 fathom lines). The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions. Fisheries would be monitored to ensure that mortality of yelloweye and canary rockfish are within the harvest targets/guidelines.

In the event that the duration of total season is reduced from 12 months; the nearshore waters are closed to groundfish fishing due to management of nearshore species; or the Pacific halibut catch limit is reduced from 2013 levels, the fishery may be expanded to waters seaward of the RCA that is in effect at the time, promoting directed yellowtail rockfish and offshore lingcod opportunity. Fisheries would be monitored to ensure that mortality of yelloweye rockfish and canary rockfish is not in excess of the HGs.

4.2.2.9 California Recreational – Preferred Alternative

The 2015-2016 California recreational groundfish projected mortality and season structure under the Preferred Alternative are based on CDFW's updated RecFISH model. Model projections were calculated for the five recreational groundfish management areas using updated 2011 and 2012 RecFIN estimates; overfished species mortality are reported statewide. Table 4-77 depicts the Preferred Alternative overfished species harvest guidelines for the 2015-2016 California recreational groundfish seasons.

Table 4-77. Preferred Alternative: California recreational allocations/harvest guidelines for 2015-2016.

Stock	**2015**	**2016**
BOCACCIO	178.8	185.6
CANARY	24.3	25.0
COWCOD*	2.6	2.6
YELLOWEYE	3.4	3.7

*Non-trawl allocation

Groundfish Seasons and Area Restrictions

Under the Preferred Alternative, tradeoffs between season lengths and depth restrictions were explored (Options 1, 2, and 3). Because the non-trawl allocation for cowcod will increase to 2.6 mt in 2015-2016, all three Options allow depth restrictions to be modified from 50 fm to 60 fm in the Southern Management Area. Under Option 1, longer seasons and status quo (or No Action) depth restrictions were examined. Option 2 explored longer seasons north of Point Conception and limited additional opportunity in deeper depths in the Northern and Mendocino Management Areas; the area where the depths restrictions are the most restrictive under status quo regulations (20 fm). Option 3 examined shorter seasons and deeper depths north of Point Conception. The three fish lingcod bag limit can be accommodated under all Options.

Option 1

Under Option 1, the depth restrictions would be the same as the No Action Alternative and the season lengths would be extended for all areas north of Point Conception from March 1 through December 31 (Figure 4-25). Due to lower yelloweye rockfish mortality in recent years the season lengths in the areas north of Point Conception can be extended. Black rockfish mortality limits the season length at the current depth restrictions. Under this option, the portion of the recreational catch share is exceeded by 1.7 mt, but could be accommodated by the residual from the commercial fishery. The mortality of cowcod and bocaccio in the Southern Management Area are projected to be far below the respective harvest guidelines. Season length in the Southern Management Area would remain the same as status quo, March 1st – December 31st, but the depth restriction would be modified from 50 fm to 60 fm to resume access to deeper depths allowed in 2012 prior to an inseason action.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed		Mar 1 – Dec 31 <20 fm									
Mendocino	Closed		Mar 1 –Dec 31 <20 fm									
San Francisco	Closed		Mar 1 – Dec 31 <30 fm									
Central	Closed		Mar 1 – Dec 31 <40 fm									
Southern	Closed		Mar 1 – Dec 31 <60fm									

Figure 4-25. Preferred Alternative (Option 1): California recreational groundfish season structure and depth restrictions for 2015-2016 with maximized season length.

Option 2

Due to lower yelloweye rockfish encounter rates in recent years, the season length north of Point Conception can be extended to April 1st through December 31st (Figure 4-26). In addition, under Option 2, deeper depth restrictions are analyzed in the Northern and Mendocino Management Areas for part of the year; the depth restriction would be 20 fm from April 1st through September 30th, then increase to 30 fm from October 1st through December 31st. The depth and season in all other areas would be unchanged from Option 1.

When depth restrictions are liberated, it becomes more challenging to predict angler behavior and uncertainty in the yelloweye rockfish projections increases. Further, the RecFISH model assumes proportion of catch by depth and those proportions of catch can change when depth is increased, which results in underestimates of mortality. The relatively low effort during October 1st through December 31st makes it possible to allow access to deeper depths without greatly increasing the risk of exceeding the yelloweye rockfish harvest guideline. Black rockfish mortality remains within the state recreational share under this option.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed			April 1 – Sep 30 <20 fm, Oct 1– Dec 31 <30 fm								
Mendocino	Closed			April 1 – Sep 30 <20 fm, Oct 1– Dec 31 <30 fm								
San Francisco	Closed			April 1 – Dec 31 <30 fm								
Central	Closed			April 1 – Dec 31 <40 fm								
Southern	Closed		Mar 1 – Dec 31 <60 fm									

Figure 4-26. Preferred Alternative (Option 2): California recreational groundfish season structure and depth restrictions for 2015-2016.

<u>Option 3</u>

Under Option 3, tradeoffs between increased depth and season lengths north of Point Conception were explored. By allowing access to deeper depths, encounters with overfished shelf rockfish species are expected to increase. In order to keep mortality of overfished species from exceeding harvest guidelines, season lengths north of Point Conception would be reduced (Figure 4-27). Similar to Option 2, when depth restrictions are modified uncertainty increases, as effort shifts to deeper depths may be greater than projected, resulting in mortality exceeding projected values.

Season length in the Southern Management Area would also be reduced to the May 15th to August 15th to explore reductions in catch savings on cowcod, bocaccio, or other species. In recent years, bocaccio and cowcod encounters have increased, making it more difficult to model projected mortality. Given these concerns, examining a shorter season in the Southern Management Area is prudent in the event inseason action would be necessary to keep catches within allowable levels. California scorpionfish would remain open year round to 60 fm.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May15–Aug15<30fm				Closed			
Mendocino	Closed				May15–Aug15<30fm				Closed			
San Francisco	Closed				May15–Aug15<40fm				Closed			
Central	Closed				May15–Aug15<50fm				Closed			
Southern	Closed				May15–Aug15<60fm				Closed			

Figure 4-27. Preferred Alternative (Option 3): California recreational groundfish season structure and depth restrictions for 2015-2016.

Other Measures

<u>Nearshore Rockfish HGs</u>: Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the California recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

<u>Groundfish Bag Limits and Size Limits</u>: Under The Preferred Alternative, the groundfish bag limits or size limits are the same as under No Action except for the following:

- <u>Lingcod</u>: The No Action bag limit for lingcod is two fish. Under the Preferred Alternative, lingcod bag limit would increase from two fish to three fish. The mortality (in metric tons) as a result of the increase in the bag limit for Options 1, 2, and 3 is provided in Table 4-78. An increase in the lingcod bag limit from two to three fish could be accommodated statewide with the aforementioned season and depth restrictions under all options. The Council is not proposing any changes to the lingcod minimum size restriction. Increases to overfished species mortality as a result of this increase are expected to be minimal (if any).

Additional Management Measures Analyzed: None

Table 4-78. Preferred Alternative: California recreational projected mortality of non-overfished species for 2015-2016 under Option 1, Option 2, and Option 3. Results in parenthesis reflect lingcod mortality with a three fish bag limit.

Stock	Projected Mortality (mt)		
	Option 1	**Option 2**	**Option 3**
Black Rockfish	232.5*	219.7	110.3
Blue Rockfish	65.2	62.2	22.9
Cabezon	42.5	40.2	16.9
California scorpionfish	81.1	81.1	13.3
Greenlings	24.7	22.4	8.7
Lingcod	296.2 (356.4)	280.9 (338.0)	111.0 (134.0)
Minor Nearshore Rockfish North	15.6	15.4	6.7
Minor Nearshore Rockfish South	376.5	365.4	118.6
Widow Rockfish	4.2	3.8	1.5

**Mortality exceeds the recreational portion of the California catch share of 230.8 mt. Further discussion provided under the text describing Option 1.*

Impact (Groundfish Mortality)

Projected mortality for bocaccio, canary rockfish, cowcod, and yelloweye rockfish for all Options under the Preferred Alternative can be found in Table 4-79. Under all the Options contemplated under the Preferred Alternative the projected mortality of cowcod, bocaccio, canary and yelloweye rockfish increases compared to the No Action alternative, due to the increased season lengths or deeper depth restrictions. The number of angler trips is expected to increase under the Options allowing for increased opportunity for both private/rental boats (PR) and commercial passenger fishing vessels (CPFV). Projections for non-overfished species for the Preferred Alternative under each Option are provided in Table 4-78.

Similar to the No Action Alternative, if overfished species encounters are tracking higher or lower than projected, inseason action could be taken, which could include closing one or more recreational groundfish management areas, restricting recreational fishery seasons and/or modifying depth restrictions. As in the No Action Alternative, the YRCAs would be available and could be implemented inseason if catches are projected to exceed harvest guidelines.

Table 4-79. Preferred Alternative: California recreational projected mortality of overfished species for 2015-2016 under Option 1, Option 2 and Option 3.

Stock	California Recreational 2015 HG (mt)	California Recreational 2016 HG (mt)	Projected Mortality (mt)		
			Option 1	Option 2	Option 3
BOCACCIO	178.8	185.6	117.5	117.6	23.5
CANARY	24.3	25.0	19.8	19.8	10.6
COWCOD			1.2	1.2	0.3
YELLOWEYE	3.4	3.7	2.8	2.9	2.7

a/The non-trawl allocation of cowcod is 2.6 mt.

4.2.3 Alternative 1 – P* 0.45

Table 4-80 to Table 4-85 contains the harvest specifications and allocations analyzed under Alternative 1. A description of the harvest control rules used to calculate the ACLs can be found in Section XXX.

Table 4-80. Alternative 1. 2015 ACLs and estimates of tribal (Trib), EFP, research (Res.), and incidental open access (OA) mortality (in mt), used to calculate the fishery harvest guideline (HG).

Stock	Area	ACL	Trib	EFP	Res	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	349		3	4.6	0.7	340.7
CANARY	Coastwide	122	7.7	1	4.5	2	106.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	338	0.2	0.1	2.1	18.4	317.2
POP	N of 40º10' N. lat.	158	9.2		5.2	0.6	143.0
PETRALE SOLE	Coastwide	2,816	220		14.2	2.4	2,579.4
YELLOWEYE	Coastwide	18	2.3	0.03	3.3	0.2	12.2
Arrowtooth flounder	Coastwide	6,025	2,041		16.39	30	3,937.6
Black	WA	402	14				388.0
Black	OR and CA	1,000		1			999.0
Cabezon	OR	47					47.0
Cabezon	CA	154					154.0
California scorpionfish	S of 34°27' N. lat.	114				2	112.0
Chilipepper	S of 40º10' N. lat.	1,628		10	9	5	1,604.0
Dover sole	Coastwide	25,000	1,497		41.9	55	23,406.1
English sole	Coastwide	11,040	91		5.8	7	10,936.2
Lingcod	N of 40º10’ N. lat.	2,830	250	0.5	11.67	16	2,551.8
Lingcod	S of 40º10’ N. lat.	1,100		1.0	1.1	7	1,090.9
Longnose skate	Coastwide	2,000	56		13.18	3.8	1,927.0
Longspine thornyhead	N of 34º27' N. lat.	3,474	30		13.5	3	3,427.5
Longspine thornyhead	S of 34º27' N. lat.	1,097			1	2	1,094.0
Pacific cod	Coastwide	1,600	400		7.04	2	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205		2,500		204,040
Sablefish	N of 36º N. lat.	5,012		See Table 4-84			
Sablefish	S of 36º N. lat.	1,798			3	2	1,793.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,913	50		7.22	2	1,853.8
Shortspine thornyhead	S of 34º27' N. lat.	1,012			1	41	970.0
Spiny Dogfish	Coastwide	2,303	111.8	1	12.5	49.53	2,128.4
Splitnose	S of 40º10' N. lat.	1,715		1.5	9	0	1,704.5
Starry flounder	Coastwide	1,681	2			8.3	1,670.7
Widow	Coastwide	1,500	60	9	7.9	3.3	1,419.8
Yellowtail	N of 40º10' N. lat.	11,213	677	10	16.6	3	10,506.4
Nearshore rockfish north	N of 40º10' N. lat.	69					69.0
Nearshore rockfish south	S of 40º10' N. lat.	1,114			2.6	1.4	1,110
Shelf rockfish north	N of 40º10' N. lat.	1,944	30	3	13.4	26	1,871.6
Shelf rockfish south	S of 40º10' N. lat.	1,624		30	9.6	9	1,575.4
Slope rockfish north	N of 40º10' N. lat.	1,669	36	1	8.1	19	1,604.9
Slope rockfish south	S of 40º10' N. lat.	687		1	2	17	667.0
Other Flatfish	Coastwide	9,865	60		19	125	9,661.0
Other Fish	Coastwide	242					242.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-81. Alternative 1. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2015 (in mt).

Species	Area	Fishery HG or ACT	Allocation Type	Trawl %	Trawl Mt	Non-trawl %	Non-trawl Mt
BOCACCIO	S of 40º10' N. lat.	340.7	Biennial	N/A	81.9	N/A	258.8
CANARY	Coastwide	106.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	317.2	Amendment 21	95%	301.3	5%	15.9
POP	N of 40º10' N. lat.	143.0	Amendment 21	95%	135.9	5%	7.2
PETRALE SOLE	Coastwide	2,579.4	Biennial	N/A	2,544.4	N/A	35.0
YELLOWEYE	Coastwide	12.2	Biennial	N/A	1.0	N/A	11.2
Arrowtooth flounder	Coastwide	3,937.6	Amendment 21	95%	3,740.7	5%	196.9
Black	N of 46º16' N. lat.	388.0	None				
Black	S of 46º16' N. lat.	999.0	None				
Cabezon	OR	154.0	None				
Cabezon	CA	47.0	None				
California scorpionfish	S of 34º27' N. lat.	112.0	None				
Chilipepper	S of 40º10' N. lat.	1,604.0	Amendment 21	75%	1,203.0	25%	401.0
Dover sole	Coastwide	23,406.1	Amendment 21	95%	22,235.8	5%	1,170.3
English sole	Coastwide	10,936.2	Amendment 21	95%	10,389.4	5%	546.8
Lingcod	N of 40º10' N. lat.	2,551.8	Amendment 21	45%	1,148.3	55%	1,403.5
Lingcod	S of 40º10' N. lat.	1,090.9	Amendment 21	45%	490.9	55%	600.0
Longnose skate	Coastwide	1,927.0	Biennial	90%	1,734.3	10%	192.7
Longspine thornyhead	N of 34º27' N. lat.	3,427.5	Amendment 21	95%	3,256.1	5%	171.4
Longspine thornyhead	S of 34º27' N. lat.	1,094.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting b/	Coastwide	TBD	Amendment 21	100%		0%	
Sablefish	N of 36º N. lat.		See Table 4-84				
Sablefish	S of 36º N. lat.	1,793.0	Amendment 21	42%	753.1	58%	1,039.9
Shortbelly	Coastwide	48.0	None				0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,853.8	Amendment 21	95%	1,761.1	5%	92.7
Shortspine thornyhead	S of 34º27' N. lat.	970.0	Amendment 21	NA	50.0	NA	920.0
Spiny Dogfish	Coastwide	2,128.4	None				
Splitnose	S of 40º10' N. lat.	1,704.5	Amendment 21	95%	1,619.3	5%	85.2
Starry flounder	Coastwide	1,670.7	Amendment 21	50%	835.4	50%	835.4
Widow	Coastwide	1,419.8	Amendment 21	91%	1,292.0	9%	127.8
Yellowtail	N of 40º10' N. lat.	10,506.4	Amendment 21	88%	9,245.6	12%	1,260.8
Nearshore rockfish north	N of 40º10' N. lat.	69.0	None				
Nearshore rockfish south	S of 40º10' N. lat.	1,110.0	None				
Shelf rockfish north	N of 40º10' N. lat.	1,871.6	Biennial	60.2%	1,126.7	39.8%	744.9
Shelf rockfish south	S of 40º10' N. lat.	1,575.4	Biennial	12.2%	192.2	87.8%	1,383.2
Slope rockfish north	N of 40º10' N. lat.	1,604.9	Amendment 21	81%	1,300.0	19%	304.9
Slope rockfish south	S of 40º10' N. lat.	667.0	Amendment 21	63%	420.2	37%	246.8
Other Flatfish	Coastwide	9,661.0	Amendment 21	90%	8,694.9	10%	966.1
Other Fish	Coastwide	242.0	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-82. Alternative 1. 2016 ACLs and estimates of tribal, EFP, research, and incidental open access (OA) mortality (in mt), used to calculate the fishery harvest guideline.

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	362		3	4.6	0.7	353.7
CANARY	Coastwide	125	7.7	1	4.5	2	109.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	346	0.2	0.1	2.1	18.4	325.2
POP	N of 40º10' N. lat.	164	9.2		5.2	0.6	149.0
PETRALE SOLE	Coastwide	2,910	220		14.2	2.4	2,673.4
YELLOWEYE	Coastwide	19	2.3	0.03	3.3	0.2	13.2
Arrowtooth flounder	Coastwide	5,840	2,041		16.39	30	3,752.6
Black	WA	404	14				390.0
Black	OR and CA	1,000		1			999.0
Cabezon	OR	47					47.0
Cabezon	CA	151					151.0
California scorpionfish	S of 34°27' N. lat.	111				2	109.0
Chilipepper	S of 40º10' N. lat.	1,619		10	9	5	1,595.0
Dover sole	Coastwide	25,000	1,497		41.9	55	23,406.1
English sole	Coastwide	7,754	91		5.8	7	7,650.2
Lingcod	N of 40º10' N. lat.	2,719	250	0.5	11.67	16	2,440.8
Lingcod	S of 40º10' N. lat.	1,037		1.0	1.1	7	1,027.9
Longnose skate	Coastwide	2,000	56		13.18	3.8	1,927.0
Longspine thornyhead	N of 34º27' N. lat.	3,305	30		13.5	3	3,258.5
Longspine thornyhead	S of 34º27' N. lat.	1,044			1	2	1,041.0
Pacific cod	Coastwide	1,600	400		7.04	2	1,191.0
Pacific whiting a/	Coastwide	269,745	63,205		2,500		204,040
Sablefish	N of 36º N. lat.	5,467	Table 4-84				
Sablefish	S of 36º N. lat.	1,961			3	2	1,956.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,892	50		7.22	2	1,832.8
Shortspine thornyhead	S of 34º27' N. lat.	1,001			1	41	959.0
Spiny Dogfish	Coastwide	2,285	111.8	1	12.5	49.53	2,110.4
Splitnose	S of 40º10' N. lat.	1,746		1.5	9		1,735.5
Starry flounder	Coastwide	1,686	2			8.3	1,675.7
Widow	Coastwide	1,500	60	9	7.9	3.3	1,419.8
Yellowtail	N of 40º10' N. lat.	10,634	677	10	16.6	3	9,927.4
Nearshore rockfish N.	N of 40º10' N. lat.	69					69.0
Nearshore rockfish S.	S of 40º10' N. lat.	1,006			2.6	1.4	1,002.2
Shelf rockfish N.	N of 40º10' N. lat.	1,952	30	3	13.4	26	1,879.6
Shelf rockfish S.	S of 40º10' N. lat.	1,625		30	9.6	9	1,576.4
Slope rockfish N.	N of 40º10' N. lat.	1,683	36	1	8.1	19	1,618.9
Slope rockfish S.	S of 40º10' N. lat.	689	0	1	2	17	669.0
Other Flatfish	Coastwide	8,633	60		19	125	8,429.0
Other Fish	Coastwide	243					243.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-83. Alternative 1. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2016 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	353.7	Biennial	N/A	85.0	N/A	268.7
CANARY	Coastwide	109.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	325.2	Amendment 21	95%	308.9	5%	16.3
POP	N of 40º10' N. lat.	149.0	Amendment 21	95%	141.6	5%	7.5
PETRALE SOLE	Coastwide	2,673.4	Biennial	N/A	2,638.4	N/A	35.0
YELLOWEYE	Coastwide	13.2	Biennial	N/A	1.1	N/A	12.1
Arrowtooth flounder	Coastwide	3,752.6	Amendment 21	95%	3,565.0	5%	187.6
Black	N of 46º16' N. lat.	390.0	None				
Black	S of 46º16' N. lat.	999.0	None				
Cabezon	OR	47.0	None				
Cabezon	CA	151.0	None				
California scorpionfish	S of 34°27' N. lat.	109.0	None				
Chilipepper	S of 40º10' N. lat.	1,595.0	Amendment 21	75%	1,196.3	25%	398.8
Dover sole	Coastwide	23,406.1	Amendment 21	95%	22,235.8	5%	1,170.3
English sole	Coastwide	7,650.2	Amendment 21	95%	7,267.7	5%	382.5
Lingcod	N of 40º10' N. lat.	2,440.8	Amendment 21	45%	1,098.4	55%	1,342.5
Lingcod	S of 40º10' N. lat.	1,027.9	Amendment 21	45%	462.6	55%	565.3
Longnose skate	Coastwide	1,927.0	Biennial	90%	1,734.3	10%	192.7
Longspine thornyhead	N of 34º27' N. lat.	3,258.5	Amendment 21	95%	3,095.6	5%	162.9
Longspine thornyhead	S of 34º27' N. lat.	1,041.0	None				
Pacific cod	Coastwide	1,191.0	Amendment 21	95%	1,131.4	5%	59.5
Pacific whiting b/	Coastwide	TBD	Amendment 21	100%		0%	
Sablefish	N of 36º N. lat.		See Table 4-84				
Sablefish	S of 36º N. lat.	1,956.0	Amendment 21	42%	821.5	58%	1,134.5
Shortbelly	Coastwide	48.0	None				0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,832.8	Amendment 21	95%	1,741.1	5%	91.6
Shortspine thornyhead	S of 34º27' N. lat.	959.0	Amendment 21	NA	50.0	NA	909.0
Spiny Dogfish	Coastwide	2,110.4	None				
Splitnose	S of 40º10' N. lat.	1,735.5	Amendment 21	95%	1,648.7	5%	86.8
Starry flounder	Coastwide	1,675.7	Amendment 21	50%	837.9	50%	837.9
Widow	Coastwide	1,419.8	Amendment 21	91%	1,292.0	9%	127.8
Yellowtail	N of 40º10' N. lat.	9,927.4	Amendment 21	88%	8,736.1	12%	1,191.3
Nearshore rockfish north	N of 40º10' N. lat.	69.0	None				
Nearshore rockfish south	S of 40º10' N. lat.	1,002.2	None				
Shelf rockfish north	N of 40º10' N. lat.	1,879.6	Biennial	60.2%	1,131.5	39.8%	748.1
Shelf rockfish south	S of 40º10' N. lat.	1,576.4	Biennial	12.2%	192.3	87.8%	1,384.1
Slope rockfish north	N of 40º10' N. lat.	1,618.9	Amendment 21	81%	1,311.3	19%	307.6
Slope rockfish south	S of 40º10' N. lat.	669.0	Amendment 21	63%	421.5	37%	247.5
Other Flatfish	Coastwide	8,429.0	Amendment 21	90%	7,586.1	10%	842.9
Other Fish	Coastwide	243.0	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-84. Alternative 1. Sablefish north of 36° N. latitude ACLs, off-the-top deductions from the ACL used to calculate the commercial harvest guideline (mt).

Stock	Year	ACL	Tribal Share a/	EFP	Research	Rec	Commercial HG
Sablefish N. 36° N. lat.	2015	5,012	501	1	26	6.1	4,478
	2016	5,467	547	1	26	6.1	4,887

a/ The sablefish allocation to Pacific coast treaty Indian Tribes is 10 percent of the sablefish ACL for the area north of 36° N. lat. This allocation represents the total amount available to the treaty Indian fisheries before deductions for discard mortality.

Table 4-85. Alternative 1. Overfished Species.

4.2.3.1 Overview of Management Measure Changes

The following bullet points summarize management measure changes by sector under Alternative 1 compared to the Preferred Alternative. A more detailed discussion of management measures by sector follows. New measures, discussed under Chapter 2, Section XXX and analyzed in Appendix B, would be implemented. New management measures that are specific to a sector are described below.

The Council is also considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the commercial nearshore (OR and CA) and recreational fisheries (WA, OR, and CA) that are necessary to stay within the range of state-specific HGs adopted by the Council at their April meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude, which would be implemented under the action alternatives, at the June Council meeting.

- The shorebased IFQ fishery would operate under the same management measures as described under the Preferred Alternative, except that the shorebased IFQ would be issued based the 2015-2016 ACLs and resulting trawl allocations under Alternative 1.
- The at-sea whiting co-ops would operate under the same management measures described under the Preferred Alternative.
- The non-nearshore fixed gear fishery would operate under the same management measures as under the Preferred Alternative, except that additional trip limit increases are proposed to attain the higher sablefish ACLs under Alternative 1.
- The nearshore fixed gear fishery would operate under the same management measures as the Preferred Alternative.
- Tribal fisheries would operate under the harvest guidelines and allocations under Alternative 1. Tribal management measures would be the same as described under the No Action alternative.
- Washington recreational fisheries would operate under the same management measures as the Preferred Alternative.
- Oregon recreational fisheries would operate under the same management measures as the Preferred Alternative.
- California recreational fisheries would operate under the same management as the Preferred Alternative.

4.2.3.2 Impact (Groundfish Mortality) – Shorebased IFQ – Alternative 1

The shorebased IFQ fishery would operate under the same management measures as described under the Preferred Alternative, except that the shorebased IFQ would be issued based the 2015-2016 ACLs and resulting trawl allocations under Alternative 1 (Table 4-86 and Table 4-87). Notable IFQ increases from No Action include petrale, longspine thornyheads north, sablefish, shortpine thornyhead, yellowtail, and Other Flatfish.

Table 4-86. Alternative 1 – Shorebased IFQ. Projected mortality for IFQ species compared to the allocations or set-asides under Alternative 1 for 2015. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Alternative 1		No Action	
		2015 Projected Mortality (mt)	2015 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.3	81.9	10.9	79.0
CANARY	Coastwide	9.9	43.3	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	111.3	285.6	108.5	278.4
PETRALE	Coastwide	2,405.0	2539.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	50.7	118.5	48.0	112.3
YELLOWEYE	Coastwide	0	1.0	0	1.0
Arrowtooth flounder	Coastwide	2,436	3,696	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	308	1,203	291	1,067
Dover sole	Coastwide	7,712	22,231	7,713	22,235
English sole	Coastwide	152	10,384	137	5,261
Lingcod	North of 40°10' N. lat.	223	1,133	227	1,152
Lingcod	South of 40°10' N. lat.	87	491	84	743
Longspine thornyheads	North of 34°27' N. lat	1,680	3,251	936	1,811
Pacific cod	Coastwide	266	1,126	266	1,126
Pacific halibut a/	North of 40°10 N. lat.		45 max		45 max
Pacific halibut b/	South of 40°10 N. lat.		10		10
Pacific whiting c/	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	2,186	2,303	1,887	1,988
Sablefish	South of 36° N. lat.	354	753	307	653
Shortspine thornyheads	North of 34°27' N.	930	1,741	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	54	1,619	53	1,575
Starry flounder	Coastwide	9	830	9	756
Widow rockfish	Coastwide	430	1,002	426	994
Yellowtail rockfish	North of 40°10' N. lat.	2,484	8,946	816	2,939
Shelf rockfish	North of 40°10' N. lat.	60	1,091	28	508
Shelf rockfish	South of 40°10' N. lat.	27	192	12	81
Slope rockfish	North of 40°10' N. lat.	276	1,200	182	789
Slope rockfish	South of 40°10' N. lat.	110	420	98	379
Other flatfish	Coastwide	1,506	8,675	728	4,194

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)). There is no projection model for Pacific halibut bycatch.
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10’ N. latitude. (estimated to 5 mt each). There is no projection model for Pacific halibut bycatch.
c/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-87. Alternative 1 – Shorebased IFQ. Projected mortality for IFQ species compared to the allocations or set-asides under Alternative 1 for 2016. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Alternative 1		No Action	
		2016 Projected Mortality (mt)	2016 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.8	85.0	10.9	79.0
CANARY	Coastwide	10.2	44.5	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	114.1	292.8	108.5	278.4
PETRALE	Coastwide	2,494.0	2633.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	53.1	124.2	48.0	112.3
YELLOWEYE	Coastwide	0	1.1	0	1.0
Arrowtooth flounder	Coastwide	2,436	3,520	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	306	1,196	291	1,067
Dover sole	Coastwide	7,712	22,231	7,713	22,235
English sole	Coastwide	137	7,263	137	5,261
Lingcod	North of 40°10' N. lat.	213	1,083	227	1,152
Lingcod	South of 40°10' N. lat.	81	463	84	743
Longspine thornyheads	North of 34°27' N. lat	1,597	3,091	936	1,811
Pacific cod	Coastwide	266	1,126	266	1,126
Pacific halibut a/	North of 40°10 N. lat.		45 max		45 max
Pacific halibut b/	South of 40°10 N. lat.		10		10
Pacific whiting c/	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	2,390	2,518	1,887	1,988
Sablefish	South of 36° N. lat.	387	822	307	653
Shortspine thornyheads	North of 34°27' N.	919	1,721	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	55	1,649	53	1,575
Starry flounder	Coastwide	9	833	9	756
Widow rockfish	Coastwide	430	1,002	426	994
Yellowtail rockfish	North of 40°10' N. lat.	2,343	8,436	816	2,939
Shelf rockfish	North of 40°10' N. lat.	60	1,097	28	508
Shelf rockfish	South of 40°10' N. lat.	27	192	12	81
Slope rockfish	North of 40°10' N. lat.	279	1,211	182	789
Slope rockfish	South of 40°10' N. lat.	110	421	98	379
Other flatfish	Coastwide	1,313	7,566	728	4,194

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)). There is no projection model for Pacific halibut bycatch.
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude. (estimated to 5 mt each). There is no projection model for Pacific halibut bycatch.
c/ The 2014 Pacific whiting TAC was unavailable during the preparation of the EIS, therefore the 2013 values were used.

4.2.3.3 Impact (Groundfish Mortality) – At-Sea Whiting Co-ops – Alternative 1

The at-sea whiting co-ops would operate under the same management measures described under the Preferred Alternative with an equivalent level of projected groundfish mortality.

4.2.3.4 Limited Entry and Open Access Fixed Gear – Alternative 1

Impact (Groundfish Mortality) – Non-Nearshore North of 36° N. latitude

Management measures and projected mortality for the non-nearshore fishery north of 36° N. latitude under Alternative 1 is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.45 (Table 4-88), and the resulting sablefish allocations (Table 4-88 and Table 4-89). Trip limit increases for sablefish would be proposed (Table 4-90) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-88 and Table 4-89). The prohibition on lingcod retention in Periods 1, 2, and 6 would be removed and trip limits increased for both limited entry and open access fixed gears to better attain the non-trawl allocation (see Appendix B, Section XXX). Trip limits for other species may also be adjusted to attain the ACL or achieve other conservation goals.

Trip limit decreases for slope rockfish north of 40°10' N. latitude are proposed to reduce mortality of rougheye/blackspotted rockfish (Table XXX and Appendix B, Section XXX). A scientific sorting requirement for rougheye/blackspotted/blackspotted would be implemented which could improve the data used in management.

The overfished species mortality, as a result of harvesting the sablefish allocations, was evaluated using 2002-2012 WCGOP data in the non-nearshore model. Under Alternative 1, trawl and non-trawl allocations were established for overfished species. Further, the non-nearshore fishery was also allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-91). In the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation, routine adjustments of the seaward non-trawl RCA boundary (Table 4-29) could occur. Changes to RCA boundaries can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm). Table 4-92 contains the projected mortality groundfish for the non-nearshore fishery under Alternative 1.

Table 4-88 Alternative 1. Limited entry sablefish FMP allocations north of 36 N. latitude for 2015-2016.

Year	Sablefish Com. HG	Limited Entry Share	LEFG Share (mt)				Estimated Tier Limits (lbs) a/		
			LE FG Total Catch Share	Landed Catch Share a/	Primary Season Share	LEFG DTL Share	Tier 1	Tier 2	Tier 3
2015	4,478	4,057	1,704	1,644	1,397	247	43,071	19,578	11,187
2016	4,887	4,428	1,860	1,794	1,525	269	47,010	21,368	12,210

a/ The limited entry fixed gear total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-89 Alternative 1. Open access FMP allocations (mt) north of north of 36 N. latitude for 2015-2016.

Year	Open Access Total Catch Share	Open Access Landed Catch Share [a/]
2015	421	406
2016	459	443

a/ The open access total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-90 Alternative 1. Sablefish trip limits north of 36° N. latitude for limited entry and open access fixed gears for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	1,075 lb/week, not to exceed 3,225 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 950 lb, not to exceed 1,900 lb/ 2 months					
2016	Limited Entry	1,175 lb/week, not to exceed 3,525 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 1,025 lb, not to exceed 2,050 lb/ 2 months					

Table 4-91. Alternative 1 – Non-Nearshore. Overfished species projected mortality (mt), compared to the shares for the non-nearshore fixed gear fishery and the non-trawl allocations (mt), for 2015-2016.

	2015			2016		
Stock	**Projected Mortality**	**Non-Nearshore Share**	**Non-Trawl Allocation**	**Projected Mortality**	**Non-Nearshore Share**	**Non-Trawl Allocation**
Bocaccio	0.0	79.1	258.8	0.0	82.1	268.7
Canary	1.1	3.8	49.9	1.2	3.9	51.3
Cowcod	0.0		2.6	0.0		2.6
Darkblotched	4.9			5.4		
POP	0.3			0.3		
Petrale Sole	0.3			0.3		
Yelloweye	0.5	1.1	11.2	0.6	1.2	12.1

Table 4-92. Alternative 1. Projected groundfish mortality for the limited entry (LE) and open access (OA) fixed gear fisheries (in mt).

	2015			2016		
Stock	**LE**	**OA**	**Total**	**LE**	**OA**	**Total**
Arrowtooth flounder	46	7	53	50	8	58
Bank rockfish (South of 40°10' N. lat.)	0	0	0	0	0	0
Big skate	6	1	7	7	1	8
Black rockfish (Oregon/California)	0	0	0	0	0	0
Blackgill rockfish (South of 40°10' N. lat.)	13	5	18	14	6	20
Blue rockfish	0	0	0	0	0	0
Cabezon - (California)	0	0	0	0	0	0
Cabezon - (Oregon)	0	0	0	0	0	0
California skate	0	0	0	0	0	0

Stock	2015			2016		
	LE	OA	Total	LE	OA	Total
Chilipepper rockfish	0	0	0	0	0	0
Dover sole	7	1	8	7	1	9
English sole	0	0	0	0	0	0
Greenspotted rockfish	0	0	0	0	0	0
Greenstriped rockfish	1	0	1	1	0	2
Grenadiers	49	16	65	53	18	71
Kelp greenling	0	0	0	0	0	0
Lingcod - (California)	13	4	16	14	4	18
Lingcod - (Washington/Oregon)	3	0	4	3	0	4
Longnose skate	66	13	79	72	14	86
Longspine thornyhead (North Pt. Conception)	3	1	4	3	1	4
Mixed thornyheads	2	1	2	2	1	3
Pacific cod	2	0	2	2	0	2
Pacific hake	0	0	1	1	0	1
Redstripe rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Sharpchin rockfish	0	0	0	0	0	0
Shortbelly rockfish	0	0	0	0	0	0
Shortspine thornyhead (North Pt. Conception)	21	5	26	22	6	28
Silvergrey rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Spiny dogfish	156	25	181	170	28	198
Splitnose rockfish	0	0	0	0	0	0
Starry flounder	0	0	0	0	0	0
Unspecified skate	17	3	20	19	3	22
Widow rockfish	0	0	0	0	0	0
Yellowmouth (North of 40°10' N. lat.)	0	0	0	0	0	0
Yellowtail rockfish	1	0	1	1	0	1
Other flatfish	0	0	0	0	0	0
Other groundfish	3	1	4	4	1	5
Other nearshore rockfish	0	0	0	0	0	0
Other shelf rockfish	3	0	3	3	0	4
Other slope rockfish	105	19	125	115	21	136

Impact (Groundfish Mortality) Non-Nearshore South of 36° N. latitude

Management measures and projected groundfish mortality for the non-nearshore fishery south of 36° N. latitude under Alternative 1 is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.45 (Table 4-93). Anticipated catch of sablefish south of 36º N latitude under Alternative 1 would be approximately equal to the 2015-2016 sablefish allocations and resulting landed catch shares for limited entry and open access fixed gears (Table 4-93). Increases to the sablefish trip limits would be proposed (Table 4-94) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-93). Additionally, trip limit increases are proposed for bocaccio and shelf rockfish south of 34°27’ N. latitude to attain the non-trawl allocations (Table 4-68). Trip limits for other species may also be adjusted to attain the ACL or achieve other conservation goals.

Under Alternative 1, trawl and non-trawl allocations would be established for overfished species. Further, the non-nearshore fishery would be allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-91). Routine adjustments of the non-trawl RCA (Table 4-26) would occur in the event the projected overfished species mortality is projected to exceed the non-nearshore share or non-trawl allocation (Table 4-91). Changes to RCA boundaries can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm).

Table 4-93. Alternative 1. Short-term sablefish allocations south of 36 N. latitude for the non-trawl sector, limited entry and open access for 2015-2016.

Year	ACL	Commercial HG	Non-Trawl Allocation	LE FG Total Catch Share	Directed OA Total Catch Share	LE FG Landed Catch Share a/	Directed OA Landed Catch Share b/
2015	1,798	1,793	1,040	572	468	555	451
2016	1,961	1,956	1,134	624	511	606	492

a/ The limited entry and open access fixed gear total catch shares are reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-94. Alternative 1. Sablefish trip limits south of 36° N. latitude for limited entry and open access fixed for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	2,125 lb/ week					
	Open Access	320 lb/day, or 1 landing per week of up to 1,600 lb, not to exceed 3,200 lb/2 months					
2016	Limited Entry	2,200 lb/ week					
	Open Access	330 lb/day, or 1 landing per week of up to 1,650 lb, not to exceed 3,300 lb/2 months					

Impact (Groundfish Mortality) Nearshore

The commercial nearshore fishery would operate under the same management measures and are projected to have the same groundfish impacts as described under the Preferred Alternative.

4.2.3.5 Impact (Groundfish Mortality) Tribal Fisheries – Alternative 1

Tribal fisheries would operate under the harvest guidelines and allocations displayed in Table 4-80,

Table 4-82, and Table 4-84. Tribal fisheries would be managed using the same measures described under the Preferred Alternative.

4.2.3.6 Washington Recreational – Alternative 1

The Washington recreational fisheries would operate under the same management measures and are projected to have the same groundfish impacts as described under the Preferred Alternative.

4.2.3.7 Oregon Recreational – Alternative 1

The Oregon recreational fisheries would operate under the same management measures and are projected to have the same groundfish impacts as described under the Preferred Alternative.

4.2.3.8 California Recreational – Alternative 1

The California recreational fisheries would operate under the same management measures and are projected to have the same groundfish impacts as described under the Preferred Alternative.

4.2.4 Alternative 2 – P* 0.25

4.2.4.1 Set Asides and Allocations

Table 4-95 through Table 4-100 contains the harvest specifications and allocations under Alternative 2. A description of the harvest control rules used to calculate the ACLs can be found in Section XXX.

Table 4-95. Alternative 2. 2015 ACLs and estimates of tribal (Trib), EFP, research (Res.), and incidental open access (OA) groundfish mortality in metric tons, used to calculate the fishery harvest guideline (HG), under Alternative 2.

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	349		3	4.6	0.7	340.7
CANARY	Coastwide	122	7.7	1	4.5	2	106.8
COWCOD	S of 40º10' N. lat.	10		0.015	2		7.98
DARKBLOTCHED	Coastwide	338	0.2	0.1	2.1	18.4	317.2
POP	N of 40º10' N. lat.	158	9.2		5.2	0.6	143.0
PETRALE	Coastwide	2,310	220		14.2	2.4	2,073.4
YELLOWEYE	Coastwide	18	2.3	0.03	3.3	0.2	12.2
Arrowtooth flounder	Coastwide	4,058	2,041		16.39	30	1,970.6
Black	N of 46º16' N. lat.	330	14				316.0
Black	S of 46º16' N. lat.	922		1			921.0
Cabezon	46º16' to 42º N. lat.	38					38.0
Cabezon	S of 42º N. lat.	126					126.0
California scorpionfish	S of 34º27' N. lat.	93				2	91.0
Chilipepper	S of 40º10' N. lat.	1,335		10	9	5	1,311.0
Dover sole	Coastwide	25,000	1,497		41.9	55	23,406.1
English sole	Coastwide	7,437	91		5.8	7	7,333.2
Lingcod	N of 40º10' N. lat.	2,172	250	0.5	11.67	16	1,893.8
Lingcod	S of 40º10' N. lat.	741		1.0	1.1	7	731.9
Longnose skate	Coastwide	1,920	56		13.18	3.8	1,847.0
Longspine thornyhead	N of 34º27' N. lat.	2,340	30		13.5	3	2,293.5
Longspine thornyhead	S of 34º27' N. lat.	739			1	2	736.0
Pacific cod	Coastwide	1,213	400		7.04	2	804.0
Pacific whiting a/	Coastwide	269,745	63,205		2,500		204,040
Sablefish	N of 36º N. lat.	4,114		See Table 4-99			
Sablefish	S of 36º N. lat.	1,475			3	2	1,470.0
Shortbelly	Coastwide	50			2		48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,288	50		7.22	2	1,228.8
Shortspine thornyhead	S of 34º27' N. lat.	682			1	41	640.0
Spiny Dogfish	Coastwide	1,551	111.8	1	12.5	49.53	1,376.2
Splitnose	S of 40º10' N. lat.	1,406		1.5	9		1,395.5
Starry flounder	Coastwide	1,132	2			8.3	1,121.7
Widow	Coastwide	1,500	60	9	7.9	3.3	1,419.8
Yellowtail	N of 40º10' N. lat.	7,553	677	10	16.6	3	6,846.4
Nearshore rockfish north	N of 40º10' N. lat.	40					40
Nearshore rockfish south	S of 40º10' N. lat.	693			2.6	1.4	689.0
Shelf rockfish north	N of 40º10' N. lat.	1,142	30	3	13.4	26	1,069.6
Shelf rockfish south	S of 40º10' N. lat.	802		30	9.6	9	753.4
Slope rockfish north	N of 40º10' N. lat.	1,215	36	1	8.1	19	1,150.9
Slope rockfish south	S of 40º10' N. lat.	384		1	2	17	364.0
Other Flatfish	Coastwide	5,606	60		19	125	5,402.0
Other Fish	Coastwide	110					110.0

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-96. Alternative 2. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2015 (in mt).

Stock	Area	Fishery HG or ACT		Trawl		Non-trawl	
			Allocation Type	%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	340.7	Biennial	N/A	81.9	N/A	258.8
CANARY	Coastwide	106.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	317.2	Amendment 21	95%	301.3	5%	15.9
POP	N of 40º10' N. lat.	143.0	Amendment 21	95%	135.9	5%	7.2
PETRALE	Coastwide	2,073.4	Biennial	N/A	2,038.4	N/A	35.0
YELLOWEYE	Coastwide	12.2	Biennial	N/A	1.0	N/A	11.2
Arrowtooth flounder	Coastwide	1,970.6	Amendment 21	95%	1,872.1	5%	98.5
Black	N of 46º16' N. lat.	316.0	None				
Black	S of 46º16' N. lat.	921.0	None				
Cabezon	OR	38.0	None				
Cabezon	CA	126.0	None				
California scorpionfish	S of 34°27' N. lat.	91.0	None				
Chilipepper	S of 40º10' N. lat.	1,311.0	Amendment 21	75%	983.3	25%	327.8
Dover sole	Coastwide	23,406.1	Amendment 21	95%	22,235.8	5%	1,170.3
English sole	Coastwide	7,333.2	Amendment 21	95%	6,966.5	5%	366.7
Lingcod	N of 40º10’ N. lat.	1,893.8	Amendment 21	45%	852.2	55%	1,041.6
Lingcod	S of 40º10’ N. lat.	731.9	Amendment 21	45%	329.4	55%	402.5
Longnose skate	Coastwide	1,847.0	Biennial	90%	1,662.3	10%	184.7
Longspine thornyhead	N of 34º27' N. lat.	2,293.5	Amendment 21	95%	2,178.8	5%	114.7
Longspine thornyhead	S of 34º27' N. lat.	736.0	None				
Pacific cod	Coastwide	804.0	Amendment 21	95%	763.8	5%	40.2
Pacific whiting b/	Coastwide	0.0	Amendment 21	100%	0.0	0%	0.0
Sablefish	N of 36º N. lat.		See Table 4-99				
Sablefish	S of 36º N. lat.	1,470.0	Amendment 21	42%	617.4	58%	852.6
Shortbelly	Coastwide	48.0	None		48.0		0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,228.8	Amendment 21	95%	1,167.3	5%	61.4
Shortspine thornyhead	S of 34º27' N. lat.	640.0	Amendment 21	NA	50.0	NA	590.0
Spiny Dogfish	Coastwide	1,376.2	None				
Splitnose	S of 40º10' N. lat.	1,395.5	Amendment 21	95%	1,325.7	5%	69.8
Starry flounder	Coastwide	1,121.7	Amendment 21	50%	560.9	50%	560.9
Widow	Coastwide	1,419.8	Amendment 21	91%	1,292.0	9%	127.8
Yellowtail	N of 40º10' N. lat.	6,846.4	Amendment 21	88%	6,024.8	12%	821.6
Nearshore rockfish N.	N of 40º10' N. lat.	40.0	None				
Nearshore rockfish S.	S of 40º10' N. lat.	689.0	None				
Shelf rockfish N.	N of 40º10' N. lat.	1,069.6	Biennial	60.2%	643.9	39.8%	425.7
Shelf rockfish S.	S of 40º10' N. lat.	753.4	Biennial	12.2%	91.9	87.8%	661.5
Slope rockfish N.	N of 40º10' N. lat.	1,150.9	Amendment 21	81%	932.2	19%	218.7
Slope rockfish S.	S of 40º10' N. lat.	364.0	Amendment 21	63%	229.3	37%	134.7
Other Flatfish	Coastwide	5,402.0	Amendment 21	90%	4,861.8	10%	540.2
Other Fish	Coastwide	110	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-97. Alternative 2. 2016 ACLs and estimates of tribal (Trib), EFP, research (Res.), and incidental open access (OA) groundfish mortality in metric tons, used to calculate the fishery harvest guideline (HG), under Alternative 2.

Stock	Area	ACL	Tribal	EFP	Research	OA	Fishery HG
BOCACCIO	S of 40º10' N. lat.	362	0	3	4.6	0.7	353.7
CANARY	Coastwide	125	7.7	1	4.5	2	109.8
COWCOD	S of 40º10' N. lat.	10	0	0.015	2	0	7.98
DARKBLOTCHED	Coastwide	346	0.2	0.1	2.1	18.4	325.2
POP	N of 40º10' N. lat.	164	9.2		5.2	0.6	149.0
PETRALE	Coastwide	2,386	220		14.2	2.4	2,149.4
YELLOWEYE	Coastwide	19	2.3	0.03	3.3	0.2	13.2
Arrowtooth flounder	Coastwide	3,934	2,041		16.39	30	1,846.6
Black	WA	332	14		0	0	318.0
Black	OR and CA	927	0	1	0	0	926.0
Cabezon	OR	38	0		0	0	38.0
Cabezon	CA	124	0		0	0	124.0
California scorpionfish	S of 34°27' N. lat.	91	0		0	2	89.0
Chilipepper	S of 40º10' N. lat.	1,328	0	10	9	5	1,304.0
Dover sole	Coastwide	25,000	1,497		41.9	55	23,406.1
English sole	Coastwide	5,223	91		5.8	7	5,119.2
Lingcod	N of 40º10' N. lat.	2,089	250	0.5	11.67	16	1,810.8
Lingcod	S of 40º10' N. lat.	699	0	1.0	1.1	7	689.9
Longnose skate	Coastwide	1,885	56		13.18	3.8	1,812.0
Longspine thornyhead	N of 34º27' N. lat.	2,226	30		13.5	3	2,179.5
Longspine thornyhead	S of 34º27' N. lat.	703	0		1	2	700.0
Pacific cod	Coastwide	1,213	400		7.04	2	804.0
Pacific whiting a/	Coastwide	269,745			2,500		204,040
Sablefish	N of 36º N. lat.	4,540		See Table 4-99			
Sablefish	S of 36º N. lat.	1,629	0		3	2	1,624.0
Shortbelly	Coastwide	50	0		2	0	48.0
Shortspine thornyhead	N of 34º27' N. lat.	1,275	50		7.22	2	1,215.8
Shortspine thornyhead	S of 34º27' N. lat.	674	0		1	41	632.0
Spiny Dogfish	Coastwide	1,540	111.8	1	12.5	49.53	1,364.7
Splitnose	S of 40º10' N. lat.	1,432	0	1.5	9	0	1,421.5
Starry flounder	Coastwide	1,136	2		0	8.3	1,125.7
Widow	Coastwide	1,500	60	9	7.9	3.3	1,419.8
Yellowtail	N of 40º10' N. lat.	7,163	677	10	16.6	3	6,456.4
Nearshore rockfish N.	N of 40º10' N. lat.	41					41
Nearshore rockfish S.	S of 40º10' N. lat.	694			2.6	1.4	690.0
Shelf rockfish N.	N of 40º10' N. lat.	1,148	30	3	13.4	26	1,705.6
Shelf rockfish S.	S of 40º10' N. lat.	803	0	30	9.6	9	754.4
Slope rockfish N.	N of 40º10' N. lat.	1,227	36	1	8.1	19	1,162.9
Slope rockfish S.	S of 40º10' N. lat.	386	0	1	2	17	366.0
Other Flatfish	Coastwide	4,775	60		19	125	4,571.0
Other Fish	Coastwide	110					

a/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-98. Alternative 2. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2016 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40º10' N. lat.	353.7	Biennial	N/A	85.0	N/A	268.7
CANARY	Coastwide	109.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40º10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	325.2	Amendment 21	95%	308.9	5%	16.3
POP	N of 40º10' N. lat.	149.0	Amendment 21	95%	141.6	5%	7.5
PETRALE	Coastwide	2,149.4	Biennial	N/A	2,114.4	N/A	35.0
YELLOWEYE	Coastwide	13.2	Biennial	N/A	1.0	N/A	11.2
Arrowtooth flounder	Coastwide	1,846.6	Amendment 21	95%	1,754.3	5%	92.3
Black	WA	318.0	None				
Black	OR and CA	926.0	None				
Cabezon	46º16' to 42º N. lat.	38.0	None				
Cabezon	S of 42º N. lat.	124.0	None				
California scorpionfish	S of 34°27' N. lat.	89.0	None				
Chilipepper	S of 40º10' N. lat.	1,304.0	Amendment 21	75%	978.0	25%	326.0
Dover sole	Coastwide	23,406.1	Amendment 21	95%	22,235.8	5%	1,170.3
English sole	Coastwide	5,119.2	Amendment 21	95%	4,863.2	5%	256.0
Lingcod	N of 40º10’ N. lat.	1,810.8	Amendment 21	45%	814.9	55%	996.0
Lingcod	S of 40º10’ N. lat.	689.9	Amendment 21	45%	310.5	55%	379.4
Longnose skate	Coastwide	1,812.0	Biennial	90%	1,630.8	10%	181.2
Longspine thornyhead	N of 34º27' N. lat.	2,179.5	Amendment 21	95%	2,070.5	5%	109.0
Longspine thornyhead	S of 34º27' N. lat.	700.0	None				
Pacific cod	Coastwide	804.0	Amendment 21	95%	763.8	5%	40.2
Pacific whiting b/	Coastwide	204,040	Amendment 21	100%	0.0	0%	0.0
Sablefish	N of 36º N. lat.	0.0	See Table 1 c				
Sablefish	S of 36º N. lat.	1,624.0	Amendment 21	42%	682.1	58%	941.9
Shortbelly	Coastwide	48.0	None		48.0		0.0
Shortspine thornyhead	N of 34º27' N. lat.	1,215.8	Amendment 21	95%	1,155.0	5%	60.8
Shortspine thornyhead	S of 34º27' N. lat.	632.0	Amendment 21	NA	50.0	NA	582.0
Spiny Dogfish	Coastwide	1,364.7	None				
Splitnose	S of 40º10' N. lat.	1,421.5	Amendment 21	95%	1,350.4	5%	71.1
Starry flounder	Coastwide	1,125.7	Amendment 21	50%	562.9	50%	562.9
Widow	Coastwide	1,419.8	Amendment 21	91%	1,292.0	9%	127.8
Yellowtail	N of 40º10' N. lat.	6,456.4	Amendment 21	88%	5,681.6	12%	774.8
Nearshore rockfish N	N of 40º10' N. lat.	41.0	None				
Nearshore rockfish S	S of 40º10' N. lat.	690.0	None				
Shelf rockfish N	N of 40º10' N. lat.	1,075.6	Biennial	60.2%	647.5	39.8%	428.1
Shelf rockfish S	S of 40º10' N. lat.	754.4	Biennial	12.2%	92.0	87.8%	662.4
Slope rockfish N	N of 40º10' N. lat.	1,162.9	Amendment 21	81%	941.9	19%	221.0
Slope rockfish S	S of 40º10' N. lat.	366.0	Amendment 21	63%	230.6	37%	135.4
Other Flatfish	Coastwide	4,571.0	Amendment 21	90%	4,113.9	10%	457.1
Other Fish	Coastwide	110	None				

a/ The cowcod fishery harvest guideline is further reduced to an ACT of 4 mt.
b/ Pacific whiting TAC forecasts for 2015-2016 were unavailable during the preparation of the EIS, therefore the 2013 values were used.

Table 4-99. Alternative 2. Sablefish north of 36° N. latitude ACLs, off-the-top deductions from the ACL used to calculate the commercial harvest guideline (mt).

Stock	Year	ACL	Tribal Share a/	Research	Rec	EFP	Non-Tribal Comm. Share
Sablefish N. 36° N. lat.	2015	4,114	411	26	6.1	1	3,670
	2016	4,540	454	26	6.1	1	4,053

a/ The sablefish allocation to Pacific coast treaty Indian Tribes is 10 percent of the sablefish ACL for the area north of 36° N. lat. This allocation represents the total amount available to the treaty Indian fisheries before deductions for discard mortality.

Table 4-100. Overfished Species Scorecard.

4.2.4.2 Overview of Management Measure Changes

The following bullet points summarize management measure by sector under Alternative 2. If adopted by the Council, new management measures discussed under Section 2.1.2 and Appendix C would be implemented.

The Council is also considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10’ N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the commercial nearshore (OR and CA) and recreational fisheries (WA, OR, and CA) that are necessary to stay within the range of state-specific HGs adopted by the Council at their April meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10’ N. latitude, which would be implemented under the action alternatives, at the June Council meeting.

- The shorebased IFQ fishery would receive IFQ based on the 2015-2016 ACLs and resulting trawl allocations under Alternative 2, which are generally lower than under No Action and the Preferred Alternative. The IFQ fishery would operate under the same management measures as described under the Preferred Alternative.
- The at-sea whiting co-ops would operate under the same allocations and management measures described under the Preferred Alternative.
- Allocations and harvest guidelines for the tribal fishery would be issued based the 2015-2016 ACLs under Alternative 2. The tribal fishery would operate under the same management measures described under the Preferred Alternative.
- The non-nearshore fixed gear fishery would operate under the same management measures under the Preferred Alternative, except trip limits decreases for several species, including sablefish, would be necessary to stay within the lower ACLs under Alternative 2.
- The nearshore fixed gear fishery would operate under the same management measures as the Preferred Alternative, except trip limits decreases for several species would be necessary to stay within the lower ACLs under Alternative 2. Greater trip limit decreases or longer periods of non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or the state-specific nearshore rockfish HGs under Alternative 2, compared to the Preferred Alternative.
- Tribal fisheries would operate under the harvest guidelines and allocations under Alternative 2. Tribal fisheries would be managed using the same measures described under the Preferred Alternative.
- Washington recreational fisheries would operate under the same management measures as described under the Preferred Alternative. Greater reductions to bag limits or longer periods of non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or the state-specific nearshore rockfish HGs under Alternative 2, compared to the Preferred Alternative.
- Oregon recreational fisheries would operate under the same management measures as the Preferred Alternative. Greater reductions to bag limits or longer periods of non-retention may be required for nearshore rockfish to keep mortality at or within the complex ACL or the state-specific nearshore rockfish HGs under Alternative 2, compared to the Preferred Alternative.
- Season lengths and depth restrictions were explored for the California recreational fisheries under Alternative 2. Bag limit reductions for kelp greenling (10 to 2) and California Scorpionfish (5 to 3) and increases for lingcod (2 to 3) are proposed under Alternative 2. Greater reductions to bag limits or longer periods of non-retention may be required for nearshore rockfish to keep mortality

at or within the complex ACL or the state-specific nearshore rockfish HGs under Alternative 2, compared to the Preferred Alternative.

4.2.4.3 Impact (Groundfish Mortality) – Shorebased IFQ – Alternative 2

The shorebased IFQ fishery would operate under the same management measures as described under the Preferred Alternative, except that the shorebased IFQ would be issued based the 2015-2016 ACLs and resulting trawl allocations under Alternative 2 (Table 4-95, Table 4-97, and Table 4-99) and resulting trawl allocations (Table 4-101 and Table 4-102). Notable IFQ decreases from No Action include petrale and arrowtooth flounder. Notable increases from No Action include longspine thornyhead and yellowtail.

Table 4-101. Alternative 2 – Shorebased IFQ. Projected mortality for IFQ species and Pacific halibut compared to the allocations or set-asides under Alternative 2 for 2015. No action estimates of mortality are provided (right panel).

IFQ Stock	Area	Alternative 2		No Action	
		2015 Projected Mortality (mt)	2015 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.3	81.9	10.9	79.0
CANARY	Coastwide	9.9	43.3	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	111.3	285.6	108.5	278.4
PETRALE	Coastwide	1,925.8	2033.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	50.7	118.5	48.0	112.3
YELLOWEYE	Coastwide	0	1.0	0	1.0
Arrowtooth flounder	Coastwide	1,827	1,827	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	291	983	291	1,067
Dover sole	Coastwide	7,712	22,231	7,713	22,235
English sole	Coastwide	137	6,962	137	5,261
Lingcod	North of 40°10' N. lat.	216	837	227	1,152
Lingcod	South of 40°10' N. lat.	74	329	84	743
Longspine thornyheads	North of 34°27' N. lat	1,123	2,174	936	1,811
Pacific cod	Coastwide	179	759	266	1,126
Pacific halibut a/	North of 40°10' N. lat.		45 max		45 max
Pacific halibut b/	South of 40°10' N. lat.		10		10
Pacific whiting	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	1,860	1,878	1,887	1,988
Sablefish	South of 36° N. lat.	291	617	307	653
Shortspine thornyheads	North of 34°27' N.	713	1,147	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	44	1,326	53	1,575
Starry flounder	Coastwide	6	556	9	756
Widow rockfish	Coastwide	430	1,002	426	994
Yellowtail rockfish	North of 40°10' N. lat.	1,590	5,725	816	2,939
Shelf rockfish	North of 40°10' N. lat.	33	608	28	508
Shelf rockfish	South of 40°10' N. lat.	13	92	12	81
Slope rockfish	North of 40°10' N. lat.	191	832	182	789
Slope rockfish	South of 40°10' N. lat.	60	229	98	379
Other flatfish	Coastwide	840	4,842	728	379

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)).
b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude. (estimated to 5 mt each).

Table 4-102. Alternative 2 – Shorebased IFQ. Projected mortality for IFQ species and Pacific halibut compared to the allocations or set-asides under Alternative 2 for 2016. No action estimates of mortality are provided (right panel).

IFQ Species	Area	Alternative 2		No Action	
		2015 Projected Mortality (mt)	2016 SB IFQ Allocation (mt) a/ b/	Projected Mortality (mt)	SB IFQ Allocation (mt)
BOCACCIO	South of 40°10' N. lat.	11.8	85.0	10.9	79.0
CANARY	Coastwide	10.2	44.5	9.4	41.1
COWCOD	South of 40°10' N. lat.	0.1	1.4	0.1	1.0
DARKBLOTCHED	Coastwide	114.1	292.8	108.5	278.4
PETRALE	Coastwide	1,997.7	2109.4	2,252.1	2378.0
POP	North of 40°10' N. lat.	53.1	124.2	48.0	112.3
YELLOWEYE	Coastwide	0	1.1	0	1.0
Arrowtooth flounder	Coastwide	1,709	1,709	2,436	3,467
Chilipepper rockfish	South of 40°10' N. lat.	291	978	291	1,067
Dover sole	Coastwide	7,712	22,231	7,713	22,235
English sole	Coastwide	137	4,858	137	5,261
Lingcod	North of 40°10' N. lat.	217	800	227	1,152
Lingcod	South of 40°10' N. lat.	73	310	84	743
Longspine thornyheads	North of 34°27' N. lat	1,067	2,066	936	1,811
Pacific cod	Coastwide	179	759	266	1,126
Pacific halibut a/	North of 40°10' N. lat.		45 max		45 max
Pacific halibut b/	South of 40°10' N. lat.		10		10
Pacific whiting	Coastwide	83,928	85,679	83,946	85,697
Sablefish	North of 36° N. lat.	1,973	2,078	1,887	1,988
Sablefish	South of 36° N. lat.	321	682	307	653
Shortspine thornyheads	North of 34°27' N.	713	1,135	733	1,372
Shortspine thornyheads	South of 34°27' N	4	50	4	50
Splitnose rockfish	South of 40°10' N. lat.	45	1,350	53	1,575
Starry flounder	Coastwide	6	558	9	756
Widow rockfish	Coastwide	430	1,002	426	994
Yellowtail rockfish	North of 40°10' N. lat.	1,494	5,382	816	2,939
Shelf rockfish	North of 40°10' N. lat.	34	612	28	508
Shelf rockfish	South of 40°10' N. lat.	13	92	12	81
Slope rockfish	North of 40°10' N. lat.	194	842	182	789
Slope rockfish	South of 40°10' N. lat.	60	231	98	379
Other flatfish	Coastwide	711	4,094	728	379

a/ Pacific halibut is managed using IBQ, see regulations at §660.140. Starting in 2015, the maximum IBQ allocation is 45 mt, see (§660.55 (m)).

b/ As stated in regulations (§660.55 (m)), a Pacific halibut set-aside of 10 mt, to accommodate bycatch in the at-sea Pacific whiting fisheries and in the shorebased trawl sector south of 40°10' N. latitude (estimated to 5 mt each).

4.2.4.4 Impact (Groundfish Mortality) – At-Sea Whiting Co-ops – Alternative 2

The at-sea whiting co-ops would operate under the same management measures described under the Preferred Alternative with equivalent levels of groundfish mortality.

4.2.4.5 Limited Entry and Open Access Fixed Gear– Alternative 2

Impact (Groundfish Mortality) Non-Nearshore North of 36° N. latitude

Management measures and projected mortality for the non-nearshore fishery north of 36° N. latitude under Alternative 2 are largely influenced by the sablefish ACL, which would be calculated with a P* of 0.25 (Table 4-103), and the resulting sablefish allocations (Table 4-103 and Table 4-104). Trip limit decreases for sablefish would be proposed (Table 4-105) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-103 and Table 4-104).). The prohibition on lingcod retention in Periods 1, 2, and 6 would be removed and trip limits increased for both limited entry and open access fixed gears (see Appendix B, Section XXX).

Trip limit decreases for slope rockfish north of 40°10' N. latitude are proposed to reduce rougheye/blackspotted rockfish mortality (Table XXX and Appendix B, Section XXX). A scientific sorting requirement for rougheye/blackspotted would be implemented which could improve the data used in management.

The overfished species mortality, as a result of harvesting the sablefish allocations, were evaluated using 2002-2012 WCGOP data in the non-nearshore model. Under Alternative 2, trawl and non-trawl allocations were established for overfished species. Further, the non-nearshore fishery was also allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye (Table 4-106). Routine adjustments of the non-trawl RCA (same as No Action, Table 4-29) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation. Changes to RCA boundaries can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm). Table 4-107 contains the projected mortality groundfish for the non-nearshore fishery under Alternative 2.

Table 4-103. Alternative 2: Limited entry sablefish FMP allocations north of 36 N. latitude for 2015-2016.

Year	ACL	Com. HG	Limited Entry Share	LEFG Share (mt)				Estimated Tier Limits (lbs) a/		
				LE FG Total Catch Share	Landed Catch Share a/	Primary Season Share	LEFG DTL Share	Tier 1	Tier 2	Tier 3
2015	4,114	3,670	3,325	1,396	1,347	1,145	202	35,297	16,044	9,168
2016	4,540	4,053	3,672	1,542	1,488	1,264	223	38,985	17,720	10,126

a/ The limited entry fixed gear total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-104. Alternative 2: Open access FMP allocations north of north of 36 N. latitude for 2015-2016.

Year	Open Access Total Catch Share (mt)	Open Access Landed Catch Share (mt) a/
2015	345	333
2016	381	367

a/ The open access total catch share is reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-105. Alternative 2. Sablefish trip limits north of 36° N. latitude for limited entry and open access fixed gears for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	875 lb/week, not to exceed 2,625 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 800 lb, not to exceed 1,600 lb/ 2 months					
2016	Limited Entry	975 lb/week, not to exceed 2,925 lb/ 2 months					
	Open Access	300 lb/ day, or 1 landing per week of up to 850 lb, not to exceed 1,700 lb/ 2 months					

Table 4-106. Alternative 2 – Non-Nearshore. Overfished species projected mortality (mt), compared to the shares for the non-nearshore fixed gear fishery and the non-trawl allocations (mt), for 2015-2016.

	2015			2016		
Stock	Projected Mortality	Non-Nearshore Share	Non-Trawl Allocation	Projected Mortality	Non-Nearshore Share	Non-Trawl Allocation
Bocaccio	0.0	79.1	258.8	0.0	82.1	268.7
Canary	0.9	3.8	49.9	1.0	3.9	51.3
Cowcod	0.0		2.6	0.0		2.6
Darkblotched	4.1			4.5		
POP	0.2			0.2		
Petrale Sole	0.2			0.3		
Yelloweye	0.4	1.1	11.2	0.5	1.2	12.1

Table 4-107. Alternative 2. Projected groundfish mortality for the limited entry (LE) and open access (OA) fixed gear fisheries (in mt).

Stocks	2015			2016		
	LE	OA	Total	LE	OA	Total
Arrowtooth flounder	38	6	43	42	6	48
Bank rockfish (South of 40°10' N. lat.)	0	0	0	0	0	0
Big skate	5	1	6	6	1	6
Black rockfish (Oregon/California)	0	0	0	0	0	0
Blackgill rockfish (South of 40°10' N. lat.)	10	4	15	12	5	16
Blue rockfish	0	0	0	0	0	0
Cabezon - (California)	0	0	0	0	0	0
Cabezon - (Oregon)	0	0	0	0	0	0
California skate	0	0	0	0	0	0
Chilipepper rockfish	0	0	0	0	0	0
Dover sole	5	1	6	6	1	7
English sole	0	0	0	0	0	0
Greenspotted rockfish	0	0	0	0	0	0
Greenstriped rockfish	1	0	1	1	0	1
Grenadiers	40	13	53	44	15	59
Kelp greenling	0	0	0	0	0	0
Lingcod - (California)	10	3	14	12	3	15

Stocks	2015			2016		
	LE	OA	Total	LE	OA	Total
Lingcod - (Washington/Oregon)	3	0	3	3	0	3
Longnose skate	54	11	65	60	12	72
Longspine thornyhead (North Pt. Conception)	2	1	3	3	1	3
Mixed thornyheads	1	0	2	2	1	2
Pacific cod	2	0	2	2	0	2
Pacific hake	0	0	0	0	0	1
Redstripe rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Sharpchin rockfish	0	0	0	0	0	0
Shortbelly rockfish	0	0	0	0	0	0
Shortspine thornyhead (North Pt. Conception)	17	4	21	19	5	23
Silvergrey rockfish (North of 40°10' N. lat.)	0	0	0	0	0	0
Spiny dogfish	128	21	148	141	23	164
Splitnose rockfish	0	0	0	0	0	0
Starry flounder	0	0	0	0	0	0
Unspecified skate	14	3	16	15	3	18
Widow rockfish	0	0	0	0	0	0
Yellowmouth (North of 40°10' N. lat.)	0	0	0	0	0	0
Yellowtail rockfish	0	0	1	0	0	1
Other flatfish	0	0	0	0	0	0
Other groundfish	3	1	3	3	1	4
Other nearshore rockfish	0	0	0	0	0	0
Other shelf rockfish	2	0	3	3	0	3
Other slope rockfish	86	16	102	95	17	113

Impact (Groundfish Mortality Non-Nearshore South of 36° N. latitude)

Management measures and projected groundfish mortality for the non-nearshore fishery south of 36° N. latitude under Alternative 2 is largely influenced by the sablefish ACL, which would be calculated with a P* of 0.25 (Table 4-99). Anticipated catch of sablefish south of 36º N latitude under Alternative 2 would be approximately equal to the 2015-2016 sablefish allocations and resulting landed catch shares for limited entry and open access fixed gears (Table 4-108). Decreases to the sablefish trip limits would be proposed (Table 4-109) and would be routinely adjusted to achieve the limited entry and open access sablefish allocations (Table 4-108). Additionally, trip limit increases are proposed for bocaccio and shelf rockfish south of 34°27’ N. latitude to attain the non-trawl allocations (Table 4-68).

Under Alternative 2, trawl and non-trawl allocations would be established for overfished species. Further, the non-nearshore fishery would be allocated a share of the non-trawl allocation for bocaccio, canary, and yelloweye to ensure that total non-trawl catches remained within the non-trawl allocations for these overfished species (Table 4-106). Routine adjustments of the non-trawl RCA (same as No Action, Table 4-29) would occur in the event the projected overfished species mortality is expected to exceed the non-nearshore share or non-trawl allocation (Table 4-108). Changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the non-nearshore share or non-trawl allocation (e.g., changing from 125 to 100 fm).

Table 4-108 Alternative 2: Short-term sablefish allocations south of 36 N. latitude for the non-trawl sector, limited entry and open access for 2015-2016.

Year	ACL	Commercial HG	Non-Trawl Allocation	LE FG Total Catch Share	Directed OA Total Catch Share	LE FG Landed Catch Share a/	Directed OA Landed Catch Share a/
2015	1,475	1,470	853	469	384	456	371
2016	1,629	1,624	942	518	424	504	410

a/ The limited entry and open access fixed gear total catch shares are reduced by the anticipated discard mortality of sablefish, based on WCGOP data from 2002 to 2012. In 2015-2016, 17.7 percent of the sablefish caught are anticipated to be discarded and 20 percent are expected to die.

Table 4-109. Alternative 2. Sablefish trip limits south of 36° N. latitude for limited entry and open access fixed for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	1,975 lb/week					
	Open Access	300 lb/ day, or 1 landing per week of up to 1,500 lb, not to exceed 3,000 lb/ 2 months					
2016	Limited Entry	2,050 lb/week					
	Open Access	310 lb/ day, or 1 landing per week of up to 1,550 lb, not to exceed 3,100 lb/ 2 months					

Impact (Groundfish Mortality) Nearshore – Alternative 2

There are Federal limits and state quotas for nearshore species that limit target species landings in the commercial nearshore fishery (Table 4-38). Alternative 2 is based on the expectation that landings in the Oregon nearshore fishery will be equal to their allocations (Table 4-109), except for lingcod, which is based on the historical average landings. In California, nearshore fishery allocations are unable to be achieved given the current overfished species allocations. As such, landings are reduced to stay within the nearshore fishery overfished species allocations. Nearshore fishery landings are influenced by a variety of factors, including weather and market, and can vary annually (Table 4-40). As such, there is substantial uncertainty surrounding the estimated landings under the action alternatives, which in turn influence the projected overfished species mortality and socioeconomic analysis. In the event fishery performance is lower than the allocations, mortality of groundfish species will be lower.

The Council is also considering removing the prohibition on lingcod retention in Periods 1, 2, and 6 and increasing trip limits for both limited entry and open access fixed gears (see Appendix B, Section XXX). In the event this option is selected for implementation, the estimated lingcod landings (Table 4-109), and the projected overfished species mortality would be updated (Table 4-111).

Trawl and non-trawl allocations for overfished species, would be implemented under Alternative 2 (Table 4-111). Specifically, the nearshore fishery would be managed to stay within its share of the non-trawl allocation for bocaccio, canary, and yelloweye. Under Alternative 2, catch of canary and yelloweye rockfish in California exceed the catch sharing agreements with Oregon (Table 4-111); however total catch of canary and yelloweye by both states is within the non-trawl allocation. In the event the projected overfished species mortality is expected to exceed the nearshore fishery share or the non-trawl allocation, routine adjustments of the non-trawl RCA (Table 4-29) or reductions to trip limits would occur. Changes can also be accommodated to provide greater access to target species when overfished species mortality is projected to be within the nearshore share or non-trawl allocation (e.g., changing from 20 to 30 fm).

Table 4-110. Alternative 2. Expected landings under Alternative 2, compared to the Federal and state limits. Target species landings by area are also shown (far right panel).

Stock	**Area**	**Total Target Species Landings 2015-2016 (mt)**	**Target Species Landings by Area for 2015-2016**			
			OR Total (mt)	**CA Total (mt)**	40°10' – 42° N. lat. (mt)	S. of 40°10' N. lat. (mt)
Black rockfish	S. 46°16 N. lat.	212	128	83.9	80	3.9
Cabezon	OR	25	25			
Cabezon	CA	49		49	5.0	44.0
Kelp greenling	OR	4.3	4.3			
Kelp greenling	CA	21.2		21.2	0.2	21.0
Lingcod	N. 40°10 N. lat.	32.9	29	3.9	3.9	
Lingcod	S. 40°10 N. lat.	14.9		14.9		14.9
Nearshore rockfish N. a/	N. 40°10 N. lat.	12				
--Blue rockfish		*6.6*	*1.9*	*4.7*	*4.7*	
--Other Nearshore Rockfish		*5.4*	*3.2*	*2.2*	*2.2*	
Nearshore rockfish S.	S. 40°10 N. lat.	79.2				
--Blue rockfish		*1.9*		*1.9*		*1.9*
--Shallow nearshore rockfish b/		*53.3*		*53.3*		*53.3*
--Deeper nearshore rockfish c/		*24.0*		*24.0*		*24.0*

a/ Nearshore rockfish totals consists of black-and-yellow, blue rockfish, China, gopher, grass, kelp, brown, olive, copper, treefish, calico, quillback. These species are part of the nearshore rockfish complex north and south of 40°10’ N. latitude.
b/Shallow nearshore rockfish consists of black and yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.
c/ Deeper nearshore consists of black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, and treefish south of 40°10’ N. latitude. These species are part of the nearshore rockfish complex south of 40°10’ N. latitude.

Table 4-111. Alternative 2. Total projected overfished species (OFS) mortality compared to the nearshore fishery share of the non-trawl allocation for 2015-2016 (mt). Projected overfished species mortality by area is also shown in the right panel and compared to the state specific shares, where applicable (in parenthesis).

Stock	Area	Total Projected OFS Mortality 2015/2016 (mt)	Nearshore Fishery Share 2015/2016 (mt)	Projected OFS Mortality by Area for 2015-2016			
				Oregon Total (Share 2015/2016) (mt)	CA Total (Share 2015/2016) (mt)	40°10' – 42° N. lat. (mt)	S. of 40°10' N. lat. (mt)
BOCACCIO	S. 40°10 N.	0.4	1.0/1.0	N/A	0.4	N/A	0.4
COWCOD	S. 40°10 N.	0		N/A	0	N/A	0
CANARY	Coastwide	6.8	6.7/6.9	0.9	5.9 (4.9/5.0)	0.7	5.2
DARKBLOTCHE	Coastwide	0.2		0.1	0.1	0	0.1
POP	N. 40°10 N.	0		0	0	0	0
PETRALE	Coastwide	0		0	0	0	0
YELLOWEYE	Coastwide	1.2	1.2/1.3	0.8	0.4	0.3	0.1

4.2.4.6 Impact (Groundfish Mortality) Tribal Fisheries – Alternative 2

Tribal fisheries would operate under the harvest guidelines and allocations displayed in Table 4-95, Table 4-97, and Table 4-99. Tribal fisheries would be managed using the same measures described under the Preferred Alternative.

4.2.4.7 Washington Recreational – Alternative 2

Washington recreational fisheries would operate under the same management measures and are projected to have the same groundfish mortality under Alternative 2 as under the Preferred Alternative.

Impact (Groundfish Mortality)

Projected mortality to overfished and non-overfished species and angler effort in 2015 and 2016 under Alternative 2 are expected to be similar to previous seasons however, if anger effort and fishing success result in catch estimates higher than what is projected, inseason action through state regulations such as modifications to seasons, groundfish retention and closed areas may be considered to ensure catches do not exceed harvest guideline.

4.2.4.8 Oregon Recreational – Alternative 2

Under Alternative 2 the Oregon recreational Federal HGs for yelloweye and canary rockfish remain the same as under all other action alternatives. The black rockfish ACL will decrease, which decreases the Oregon recreational state quota from 440.8 mt to 406.0 mt in 2015 and 408.2 mt in 2016 (Table 4-112). XXX Under this alternative, yelloweye rockfish allocations directly relate to the recommended management measures and prevent the full utilization of the black rockfish state harvest cap. Therefore, even though there is a reduction in the black rockfish state harvest cap, the fisheries would operate under the same management measures as under the Preferred Alternative.

Under the Preferred Alternative, the Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the Oregon recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

Impact (Groundfish Mortality)

The Council is considering a range of state-specific nearshore HGs to keep mortality of nearshore rockfish north of 40°10' N. latitude at or within the ACL. Appendix B, Section XXX contains the management measures for the Oregon recreational fisheries that are necessary to stay within the range of state-specific HGs adopted at the April Council meeting. The Council is scheduled to adopt preferred nearshore HGs north of 40°10' N. latitude at the June Council meeting.

Table 4-112. Alternative 2. Oregon recreational Federal HGs or state quotas under the No Action Alternative and Alternative 2, with a P* of 0.25. XXX

Stock	HG or State Quotas a/		
	No Action	Alternative 2	
		2015	2016
CANARY ROCKFISH	11.1	11.7	12.0
YELLOWEYE ROCKFISH	2.6	2.6	2.8
Black Rockfish	440.8	406.0	408.2
Kelp Greenling b/	N/A	TBD	TBD
Nearshore Rockfish N. 40°10 N. lat. a/	N/A	TBD	TBD
--*Blue Rockfish*			
--*Other Nearshore rockfish*			

a/ Federal HG are established for canary and yelloweye rockfish only. The state process in Oregon establishes quotas for black rockfish, blue rockfish, other nearshore rockfish, and greenlings (all species). Black and blue rockfish are managed to a combined state quota, the estimated quotas by species are represented in this table. The state quotas are not intended to be implemented in Federal regulation, they are only provided as information.
b/ Includes kelp and other greenlings

4.2.4.9 California Recreational – Alternative 2

While harvest limits on overfished species do not change under Alternative 2, the ABC values from a P* of 0.25 applied to all target species reduce the harvest limits relative to Alternatives 1 and 3 requiring additional recreational management measures under all Options. The three fish lingcod bag limit can be accommodated under all the Options of this Alternative.

Groundfish Seasons and Area Restrictions

Option 1

Under Alternative 2, the lower black rockfish ACL apportioned to the recreational fishery would limit the season length north of Point Conception to May 1 to December 31, a one month reduction from Alternative 1 (Figure 4-28). To maintain this season, while remaining below harvest limits under the lower ACLs for kelp greenling and California scorpionfish, bag limits would need to be reduced. This would require a reduction from 10 fish to two fish for kelp greenling and from five fish to three fish for California scorpionfish. The season length in the Southern Management Area would remain March 1st through December 31st with a 60 fm depth restriction.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May 1 – Dec 31 <20 fm							
Mendocino	Closed				May 1 –Dec 31 <20 fm							
San Francisco	Closed				May 1 – Dec 31 <30 fm							
Central	Closed				May 1 – Dec 31 <40 fm							
Southern	Closed		Mar 1 – Dec 31 <60fm									

Figure 4-28. Alternative 2 (Option 1): California recreational groundfish season structure and depth restrictions for 2015-2016 with maximized season length.

Option 2

As in Option 1, the season in management areas north of Point Conception would be May 1 to Dec 31 to keep black rockfish mortality below the lower ACLs under a P* of 0.25 for target stocks, while the season in the Southern Management Area would remain March 1st – December 31st (Figure 4-29). The split depth season in the Northern and Mendocino Management Areas starting in 20 fm from May 1 to Sept 30 to 30 fm from October 1st through Dec 31st could be accommodated. As in Option 1 the kelp greenling bag limit would need to be reduced from ten fish to two fish and for California scorpionfish, from five fish to three fish, to keep mortality below harvest limits without further reduction to season lengths.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May 1 – Sep 30 <20 fm, Oct 1– Dec 31 <30 fm							
Mendocino	Closed				May 1 – Sep 30 <20 fm, Oct 1– Dec 31 <30 fm							
San Francisco	Closed				May 1 – Dec 31 <30 fm							
Central	Closed				May 1 – Dec 31 <40 fm							
Southern	Closed		Mar 1 – Dec 31 <60fm									

Figure 4-29. Alternative 2 (Option 2): California recreational groundfish season structure and depth restrictions for 2015-2016.

Option 3

Under Option 3, season length and depth restrictions are the same as those described in Option 3 of Alternative 3 and Alternative 1, analyzing mortality from a depth restriction 10 fm deeper than the No Action Alternative. In order to keep catches within allowable limits, season lengths north of Point Conception were reduced to May 15th through August 15th to prevent yelloweye rockfish mortality from exceeding the harvest guidelines (Figure 4-30). The reduced season length north of Point Conception reduces the kelp greenling mortality to below the harvest limit even with the current ten fish bag limit.

Season length in the Southern Management Area would be reduced by seven months relative to the No Action Alternative while maintaining the 60 fm depth restriction. This is intended to illustrate the magnitude of reduction in mortality that can be achieved by a reduction in season length and to bracket the low end of the seasons analyzed to facilitate implementation inseason if needed. California scorpionfish would remain open year round to 60 fm. A reduction in the California scorpionfish bag limit from five fish to three fish is necessary to keep mortality below the lower harvest limit under Alternative 2, to maintain year round fishing opportunity.

Similar to Option 3 in Alternative 1 when depth restrictions are modified uncertainty increases, as effort shifts to deeper depths may be greater than projected, resulting in mortality exceeding projected values. If inseason monitoring projects mortality is expected to exceed allowable limits inseason action to implement shallower depth restrictions or close the fishery prematurely may be necessary.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May15–Aug15<30fm				Closed			
Mendocino	Closed				May15–Aug15<30fm				Closed			
San Francisco	Closed				May15–Aug15<40fm				Closed			
Central	Closed				May15–Aug15<50fm				Closed			
Southern	Closed				May15–Aug15<60fm				Closed			

Figure 4-30. Alternative 2 (Option 3): California recreational groundfish season structure and depth restrictions for 2015-2016.

Groundfish Bag Limits and Size Limits

Under Alternative 2, groundfish bag limits and size limits are the same as No Action, except for the following:

Lingcod – The No Action bag limit for lingcod is two fish. The Council is proposing to increase the bag limit from two fish to three fish. The increase in the bag limit is expected to increase total lingcod mortality by 17% south of Point Conception and 21% north of Point Conception (the mortality in metric tons is provided for option 1, 2, and 3 –in Table 4-114). An increase in the lingcod bag limit from two to three fish can be accommodated statewide with the aforementioned season and depth restrictions under all options. The Council is not proposing any changes to the lingcod minimum size restriction. There are no expected increases to overfished species as a result of this increase.

Kelp Greenling- Analyses used in the 2013-2014 regulatory specification analysis (http://www.pcouncil.org/groundfish/current-season-management/current-management-cycle/) provide the results expected from a decrease in mortality with lower bag limits. A reduction in the bag limit from ten fish to two fish corresponding to a 20.6 percent reduction in mortality would be necessary to reduce mortality to below the harvest limits under Options 1 and 2 (the mortality in metric tons is provided for Options 1 and 2 –in Table 4-114).

California Scorpionfish - The bag limit management measure analysis for this biennium in section X.X provides the decrease in mortality expected with lower bag limits. A reduction in the bag limit from five fish to three fish corresponding to a reduction in mortality of 21.9 percent would be necessary to reduce mortality to below the harvest limits while maintaining the status quo fishing season (the mortality in metric tons is provided for Options 1, 2, and 3 (Table 4-114).

Impact (Groundfish Mortality)

With all Options under Alternative 2, the projected mortality of, bocaccio, canary rockfish, cowcod and yelloweye rockfish is expected to increase compared to the No Action Alternative, due to the increased season lengths or deeper depth restrictions with the exception of bocaccio and cowcod in Option 3 (Table 4-113). The number of angler trips is expected to increase under the Options allowing increased opportunity for both private/rental boats (PR) and the commercial passenger fishing vessels (CPFV). Projections for non-overfished species under Alternative 2 for each Option are provided in Table 4-114.

The same inseason management actions as the No Action Alternative and Alternative 1 are available if allowable limits are projected to be exceeded. The YRCAs described under No Action would also be available under this Alternative.

Table 4-113. Alternative 2: California recreational projected mortality of overfished species for 2015-2016 under Option 1, Option 2 and Option 3.

Stock	California Recreational 2015 HG (mt)	California Recreational 2016 HG (mt)	Projected Mortality (mt)		
			Option 1	Option 2	Option 3
BOCACCIO	178.8	185.6	116.8	116.8	23.5
CANARY	24.3	25.0	18.0	18.0	10.6
COWCOD a/			1.2	1.2	0.3
YELLOWEYE	3.4	3.7	2.6	2.7	2.7

a/The non-trawl allocation of cowcod is 2.6 mt.

Table 4-114. Alternative 2: California recreational projected mortality of non-overfished species for 2015-2016 under Option 1, Option 2, and Option 3. Results in parenthesis reflect lingcod mortality with a three fish bag limit.

Stock	Projected Mortality (mt)		
	Option 1	Option 2	Option 3
Black Rockfish	208.3	207.6	110.3
Blue Rockfish	59.4	59.3	22.9
Cabezon	38.1	38.0	16.9
California scorpionfish	63.3	63.3	13.3
Greenlings	16.2	16.1	8.7
Lingcod	265.6 (319.7)	265.5 (319.6)	111.0 (134.0)
Widow Rockfish	3.4	3.4	1.5
Nearshore Rockfish North	14.1	14.6	6.7
Nearshore Rockfish South	354.0	354.2	118.6

4.3 Socioeconomic Impacts of 2015-2016 Harvest Specifications and Management Measures

This section evaluates the effects of the alternatives (see Section 2.x) on fishery participants and fishing communities. Section 3.2 describes the economic status of these affected groups during the baseline period 2003-2012 based on historical commercial landings data, estimates of recreational fishing activity, and census data. Here, various methods are used to estimate how conditions may change from the baseline, either by continuing to apply the ACLs and management measures in effect in 2014 (No Action) or under the action alternatives, which are organized around different combinations of ACLs for key species. ACLs for other groundfish species categories may or may not vary depending on the alternative.

4.3.1 Models and Data

The GMT has developed several methods or models to project catch of overfished and principal target species in different groundfish fisheries, or "sectors." (Appendix A) For commercial and tribal fisheries these catch (or landings) estimates are converted to ex-vessel revenue estimates by applying historical price information derived from the PacFIN database. A landings distribution model is then used to estimate where landings are likely to occur and the resulting port-level ex-vessel revenue. The landings distribution model was reviewed by the SSC in September 2011. A description of the model and SSC review comments can be found at http://www.pcouncil.org/wp-content/uploads/G5a_ATT6_DIST_MDL_SEPT2011BB.pdf and http://www.pcouncil.org/wp-content/uploads/G5b_SUP_SSC_SEPT2011BB.pdf.

Another measure used to compare impacts on commercial fisheries under the alternatives is the estimated change in total accounting net revenues by each directed shoreside groundfish vessel sector. Results are presented for vessels engaged in shoreside whiting, non-whiting trawl, limited entry fixed gear, and directed open access sectors.

In addition to ex-vessel revenue, the effect of the alternatives on coastal communities (ports where commercial groundfish landings are made) is evaluated by estimating personal income generated ("income impacts") and resulting employment. These metrics are derived from the IOPAC model developed by economists at the NWFSC.[51] Personal income impact is a valuable metric because in addition to earnings received by harvesters, it also captures effects on processors, local input suppliers, and some retail businesses in the communities. However since personal income impacts are generated by an economic model and only produced for the base years and the alternative scenarios being evaluated, there is no existing time series of personal income impacts that can be used to establish baseline conditions in the communities. Consequently personal income impacts are not used to compare effects under the alternatives against historic conditions, but rather solely to illustrate the differences between the alternatives (including No Action) in terms of regional economic effects that can be expected in coastal communities.

Personal income impact results are also used to project the average change in employment and overall unemployment rates in each community under the alternatives.

The relationship between ex-vessel revenue, accounting net revenue, and commercial fisheries income (and employment) impacts can seem confusing. However, the starting point for all three measures is the same. Ex-vessel revenues represent the total amounts paid by first receivers to harvesters for deliveries or "landings" of raw fish. Ex-vessel revenues therefore represent gross income received by harvesters (and a corresponding cost to first receivers). Accounting net revenues are a rough estimate of the "profit" or return to investment earned by harvesting vessels. Net revenues are calculated by subtracting estimated operating costs and prorated fixed cost components from total ex-vessel revenues received by a vessel. Vessel cost components are estimated for each groundfish sector based on data collected through annual economic data reports for the IFQ fisheries sectors and periodic cost-earnings surveys for the non-IFQ fleets.[52]

Commercial fisheries income impacts measure the combined effects of fish harvesting and processing activities in a given port. These are calculated by treating a portion of the costs paid by harvesting vessels as expenditures in local economies. These expenditures in turn drive additional spending by the

[51] Commercial fishing sectors in IOPAC are based on vessel costs and earnings estimates gathered using systematic data collection efforts. Since cost and earnings for tribal vessels have not been formally surveyed, estimates of community income, employment and net revenue impacts attributable to activities by the tribal groundfish fleet are not calculated. Landings from tribal groundfish fisheries are concentrated in communities along the Washington Coast.

[52] Net revenue is an upward-biased indicator of profitability, since the underlying fisheries data collection efforts do not capture all of the costs associated with operating commercial fishing vessels.

businesses and individuals supplying inputs and services, as well as by local restaurants and retail outlets patronized by people involved in the fishing industry and other affected businesses. Similarly expenditures for inputs and labor used to process fish and distribute seafood products will drive additional economic activity. The sum of all economic activity triggered by the landing of fish and subsequent processing and distribution of seafood products is termed the multiplier effect and is calculated using impact models such as IOPAC. Income impacts are the portion of the total multiplier effect that is paid as wages and salaries to workers and proprietors residing in the local economy.

Since recreationally-caught fish are not sold, a different metric—recreational angler trips—is used to compare the impacts of the alternatives on recreational fisheries. Estimates of numbers of recreational angler trips are made for each state by management region. Recreational fisheries income impacts are calculated by applying estimated average per-trip expenditures to the number of recreational angler trips, and then modeling the additional spending those expenditures generate as the funds flow through the local economy. Estimated average trip expenditures are derived from periodic angler economic surveys.[53] The sum of all economic activity triggered by expenditures made by recreational anglers is termed the multiplier effect and is calculated using impact models such as IOPAC. Income impacts are the portion of the total multiplier effect that is paid as wages and salaries to workers and proprietors residing in the local economies.

Employment impacts generated by commercial and recreational fisheries activities are calculated from the income impacts by applying estimated average income per job in the affected industries in the local economy. Most of the total income and employment effects are the effects of the direct expenditures by the originating industry sectors, e.g., fish harvesters, seafood processors and the guides, tackle shops, hotels and restaurants that service recreational anglers. The additional income and employment impacts generated from re-spending by support businesses, input suppliers and their employees are termed indirect and induced effects. Total impacts are the sum of all direct, indirect and induced effects.

Change in unemployment rates are calculated by adding or subtracting the estimated change in local employment impact to the estimated number of unemployed workers in the local labor force[54].

The models used to project harvest by fisheries sector, and the socioeconomic impacts associated with those activities are detailed in Appendices A and C and summarized in the sections below.

The socioeconomic impacts of the alternatives are evaluated using the following comparisons.

4.3.1.1 Commercial and Tribal Groundfish Fisheries: Change in total ex-vessel revenue (and accounting net revenue) from No Action from the 2003-2012 baseline by fishery sector

In Section 4.3.2.1 the alternatives are compared based on data summarized in Table 4-116 and Table 4-117 showing projected ex-vessel revenues by groundfish fisheries sectors under the proposed management alternatives. Revenue estimates are based on projected landings estimates shown in Table 4-115. All comparisons are with respect to the No Action Alternative unless otherwise indicated. Projections assume average ex-vessel prices observed in 2013. Effects are presented according to groundfish fishery "sectors," which are described in Section 3.2.2. It should be noted that shoreside whiting trawl is presented separately from non-whiting trawl, although both sectors, along with a nontrawl fixed gear component, have comprised the shorebased IFQ fishery beginning in 2011. As

[53] For example: Gentner, Brad, and Scott Steinback. 2008. The Economic Contribution of Marine Angler Expenditures in the United States, 2006. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-94, 301 p.

[54] Estimated unemployment by county is based on 2012 county labor force and employment statistics from the U.S. Bureau of Labor Statistics http://www.bls.gov/data/

explained in Section 3.2.2.2, because vessels fishing under the IFQ program may use any legal groundfish gear, the terminology is moving away from referring to "trawl" sectors. Participants in the IFQ fishery may use fixed gear, principally to target sablefish, while species such as Pacific whiting and flatfish will continue to be harvested with trawl gear since they are not vulnerable to fixed gear. In the evaluations of alternatives below, in some cases the terminology "trawl" sector may include non-trawl components of the shorebased IFQ fishery.

In modeling commercial fishery impacts, it is assumed that effort that is displaced or discouraged by management measures under a particular alternative is not able to switch readily into another fishery in the same region, or another region elsewhere along the coast. Thus the numbers reported probably represent something of an upper bound on regional economic impacts on commercial fisheries, or the maximum amount of displacement that could be expected to occur under the alternatives. This also means that the models may not necessarily be able to distinguish subtle differences resulting from relatively fine distinctions between the alternatives if those differences lie within the models' margins of error. Economic impact models like IOPAC are calibrated to represent a baseline or "snapshot" of the economy at a particular point in time. Consequently these models are best able to address impacts of scenarios that are not too far removed from the realm of what has occurred in the recent past (i.e., five to ten years) during which time the local economy has developed its characteristic structure. Analysis of scenarios that represent particularly large departures from baseline conditions that are well beyond experience of the recent past may therefore result in somewhat biased estimates of total economic impacts.

Catch projection in the shorebased IFQ fishery (which has historically accounted for almost 45 percent of groundfish ex-vessel revenue, see Section 3.2.2.2) was based on catch in 2013. Because of the scheduling of this EIS process, data for the last weeks of that year were not yet available at the time catch projection modeling was conducted. As a result fishing patterns in late 2013 had to be inferred from the seasonal distribution apparent in the prior two years under the IFQ fishery.

Under IFQ management, where harvesters are individually accountable for covering their catch with matching QP, quotas for rebuilding stocks function like performance standards. While the direct revenue realized from landing the small amounts of available rebuilding species stocks is negligible, these stocks leverage access to much higher levels of target species landings.[55] Consequently a higher allocation of, e.g., canary rockfish to the shorebased IFQ fishery may generate more actual revenue than is forecast using the current catch projection models.

In addition to the limitations in catch projection models, stock recruitment variability and catch monitoring uncertainty mean that actual catches may differ from the projections. If encounters with rebuilding species run higher than projected, reductions in trip limits or adjustments to the RCAs may be necessary inseason. While overall target species landings may not be increased directly, higher overfished species ACLs may provide an additional buffer against the need to impose more restrictive inseason measures if actual mortality proves to be higher than modeled.

For Pacific whiting a total allowable catch (TAC) is determined annually consistent with the Agreement with Canada on Pacific Hake/Whiting; 73.88 percent of the TAC is allocated to U.S. fisheries. As noted in Chapter 2 the actual TACs and related allocations to U.S. fisheries for 2015 and 2016 were not known at the time this document was prepared. To model the socioeconomic impacts of the alternatives the same

[55] The at-sea whiting fishery, managed with co-ops, has similar accountability mechanisms. While the same 2013 Pacific whiting TAC must be assumed for forecasting revenue and income impacts in the whiting fisheries under the alternatives, similar dynamics in terms of fleet performance in response to bycatch limits are likely to play out in these fisheries.

TAC, U.S. allocation, and sector allocations—equal to those set for 2013—were used for No Action and all of the action alternatives. Note however there is some variation in estimated ex-vessel revenues earned by the shoreside whiting IFQ sector under the action alternatives chiefly due to variation in ACLs or other inferred management measures for constraining bycatch species such as POP and canary rockfish.

To facilitate comparison of the effects under the alternatives with the experience of the recent past,

	No Action	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Shoreside Sectors:							
Whiting	*22.5*	+2.9%	+2.4%	+1.1%	+2.7%	+2.2%	+0.9%
Non-whiting Trawl+Nontrawl	*28.9*	+44.5%	+16.9%	-2.0%	+47.1%	+19.5%	-0.21%
Limited Entry Fixed Gear	*11.8*	+9.0%	+13.4%	-4.9%	+18.1%	+22.7%	+3.8%
Nearshore Open Access	*3.5*	+21.0%	+24.1%	+13.3%	+21.0%	+24.1%	+13.3%
Non-nearshore Open Access	*4.9*	+9.6%	+14.2%	-5.3%	+19.3%	+24.2%	+4.0%
Incidental Open Access	*0.1*	-	-	-	-	-	-
Tribal (incl. whiting)	*10.7*	+2.5%	+2.5%	+2.5%	+4.6%	+4.6%	+4.6%
Shoreside sectors' Totals	*82.3*	+19.5%	+10.7%	-0.5%	+22.5%	+13.8%	+2.1%
At-Sea Sectors:		-	-	-	-	-	-
Non Tribal Whiting	*31.5*	-	-	-	-	-	-
Tribal Whiting	*9.1*	-	-	-	-	-	-
At-sea sectors' Totals	*40.5*	-	-	-	-	-	-
TOTAL Groundfish Revenue	*122.9*	+13.0%	+7.2%	-0.4%	+15.1%	+9.2%	+1.4%

Table 4-118 and Table 4-119 show the change in groundfish ex-vessel revenue by fishery sector from the baseline period described in Section 3.2.2 in absolute and percentage terms. The baseline used is average annual inflation-adjusted ex-vessel revenue from 2003 to 2012. In order to be more directly comparable with the revenue impact estimates under the alternatives the 2003-2012 annual average baseline is expressed in terms of inflation-adjusted $2013.

In addition, Table 4-120 and Table 4-121 report projected aggregate accounting net revenues (an indicator of profitability) for the non-tribal, directed, shoreside groundfish sectors in terms of dollar and percentage change from No Action, respectively. Accounting net revenues are calculated as the difference between the ex-vessel value of landings and the estimated costs incurred in achieving those landings. Estimates are based on a comparison of landings revenues projected under the alternatives with landings and average costs reported in economic data reports (for IFQ sectors) and cost-earnings surveys of samples of vessels in the remaining groundfish sectors. Values reported are "total cost net revenues" which include pro-rations of certain estimated fixed cost components in addition to the variable costs directly associated with each groundfish fishery sector.

Table 4-115. Projected combined commercial and tribal fisheries landings (mt) of non-overfished west coast groundfish species and species complexes under No Action and the 2015-16 Action Alternatives ("PA"= Preferred Alternative).

Stock or Stock Complex	No Action	2015 PA	2015 Alt1	2015 Alt2	2016 PA	2016 Alt1	2016 Alt2
Non-Overfished Stocks							
Arrowtooth Flounder	2,146	2,154	2,146	1,611	2,154	2,146	1,508
Black Rockfish OR and CA	165	183	227	216	183	227	216
Black Rockfish WA	0	0	0	0	0	0	0
Cabezon CA	25	58	61	50	58	61	50
Cabezon OR	29	32	33	27	32	33	27
California Scorpionfish	2	2	2	2	2	2	2
Chilipper S. of 40-10	248	261	261	248	260	260	248
Dover Sole	7,704	15,935	7,703	7,703	15,935	7,703	7,703
English Sole	267	279	279	267	267	267	267
Kelp greenling	23	46	46	33	46	46	33
Lingcod WA	129	127	129	125	125	126	125
Lingcod OR	246	240	245	233	233	236	233
Lingcod N. of 40-10 CA	5	4	4	4	4	4	4
Lingcod S. of 40-10	40	38	39	38	38	38	38
Longnose Skate	750	750	750	750	750	750	750
Longspine Thornyheads N. of 34-27	900	1,514	1,612	1,079	1,442	1,533	1,025
Longspine Thornyheads S. of 34-27	10	10	10	10	10	10	10
Pacific Cod	556	556	556	469	556	556	469
Pacific Whiting	112,504	112,504	112,504	112,504	112,504	112,504	112,504
Petrale sole	2,402	2,555	2,553	2,080	2,643	2,641	2,151
Sablefish N. of 36	4,297	4,881	4,945	4,215	5,324	5,398	4,565
Sablefish S. of 36	1,009	1,111	1,161	953	1,215	1,267	1,053
Shortspine Thornyheads N. of 34-27	789	916	984	770	907	974	770
Shortspine Thornyheads S. of 34-27	62	62	62	62	62	62	62
Spiny dogfish	128	128	128	128	128	128	128
Splitnose Rockfish S. of 40-10	16	16	16	13	16	16	13

Stock or Stock Complex	No Action	2015 PA	2015 Alt1	2015 Alt2	2016 PA	2016 Alt1	2016 Alt2
Starry flounder	11	11	12	9	11	12	9
Widow Rockfish	478	672	481	481	672	481	481
Yellowtail Rockfish N. of 40-10	1,497	3,165	3,165	2,271	3,023	3,023	2,175
Stock Complexes							
Minor Nearshore Rockfish N. of 40-10	29	27	17	15	27	17	15
Minor Shelf Rockfish N. of 40-10	33	59	59	38	59	59	38
Minor Slope Rockfish N. of 40-10	241	329	325	249	332	327	251
Minor Nearshore Rockfish S. of 40-10	87	82	81	81	82	81	81
Minor Shelf Rockfish S. of 40-10	19	22	21	20	22	21	20
Minor Slope Rockfish S. of 40-10	118	130	130	81	130	130	81
Other flatfish	687	1,185	1,348	783	1,036	1,185	672
Other Groundfish	104	104	104	104	104	104	104
TOTALS	**137,756**	**150,150**	**142,199**	**137,719**	**150,390**	**142,428**	**137,880**

4.3.1.2 Recreational Fisheries: Change in marine angler trips from No Action under the alternatives

In Section 4.3.2.2 impacts of the alternatives on recreational fisheries are compared using the data summarized in Table 4-134 showing projected numbers of marine area angler boat trips taken in groundfish plus Pacific halibut recreational fisheries under the proposed management alternatives. All comparisons are with respect to the No Action Alternative unless otherwise indicated.

In modeling recreational fishery impacts, it is assumed that anglers who are displaced or discouraged by management measures under a particular alternative are not able to switch readily into a different fishery in the same region or another region elsewhere along the coast. Thus the numbers reported below probably represent something of an upper bound on regional economic impacts on recreational fisheries, or the maximum amount of displacement likely to occur under the alternatives. This also means that the models may not necessarily be able to distinguish subtle differences resulting from relatively fine distinctions between the alternatives if those differences lie within the models' margins of error.

Also note that impacts projected for most management areas vary little if at all under most of the action alternatives. This is for two main reasons: (1) certain groundfish species are not generally caught by recreational anglers, and (2) measures used to manage recreational fisheries to stay within the common ACLs and HGs for cowcod, bocaccio and yelloweye rockfish allow little or no flexibility to respond to variation in ACLs for other recreational target species.

Recreational fisheries impacts are compared at the coastwide and individual state levels. Comparison of income impacts at the sub-state regional level are discussed under the communities impacts section, below.

4.3.1.3 Communities: Change in personal income and employment from No Action under the alternatives and change from the 2003-12 baseline in ex-vessel revenue

Change in personal income (income impacts) and employment-related measures for communities under the alternatives are compared in Section 4.3.2.3. These effects are a function of the projected changes in commercial and recreational fishing activity described above. Comparisons are with respect to the No Action Alternative unless otherwise indicated. Impacts were estimated using NWFSC IOPAC input-output model and convey combined direct, indirect, and induced economic effects resulting from projected changes in recreational angling, commercial fishing, fish processing and related input supply and support activities.

For simplification and ease of combining and comparing impacts from commercial and recreational fishing activities, coastal ports are grouped regionally into the following community groups:

- Puget Sound: ports in combined King, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston and Whatcom counties in Washington.
- Washington Coast: ports in combined Jefferson, Clallam, Grays Harbor and Pacific counties in Washington.
- Astoria-Tillamook: ports in combined Clatsop and Tillamook counties in Oregon.
- Newport: ports in Lincoln County Oregon.
- Coos Bay – Brookings: ports in combined Lane, Douglas, Coos and Curry counties in Oregon.
- Crescent City – Eureka: ports in combined Del Norte and Humboldt counties in California.
- Fort Bragg – Bodega Bay: ports in combined Mendocino and Sonoma counties in California.
- San Francisco: ports in combined Marin, Alameda, Contra Costa, San Francisco and San Mateo counties in California.

- Santa Cruz – Monterey – Morro Bay: ports in combined Santa Cruz, Monterey and San Luis Obispo counties in California.
- Santa Barbara – Los Angeles – San Diego: ports in combined Santa Barbara, Ventura, Los Angeles, Orange and San Diego counties in California.

Commercial fishery and recreational fishery impacts are calculated and displayed separately. Impacts are calculated by applying income and employment multipliers generated using IOPAC regional impact models to the projected levels of local expenditures by commercial harvesters, processors and recreational anglers under the alternatives. Although strictly speaking, the commercial and recreational impact components are not directly additive due to the slightly different estimation procedures used, in the following discussion, income impacts generated by combined commercial and recreational fishing activities are presented at the community level in order to provide an index to facilitate comparison of effects under the alternatives.

Economic impact models like IOPAC are calibrated to represent a baseline or "snapshot" of the economy at a particular point in time. Consequently these models are best able to address impacts of scenarios that are within the realm of what may have occurred over the past five to ten years. Analysis of scenarios that represent particularly large departures from baseline conditions may therefore result in biased impact estimates.

As noted above, it is assumed that commercial and recreational fishing effort displaced or discouraged under a particular alternative is not able to switch readily into a different fishery in the same region or another region elsewhere along the coast. Therefore the numbers reported below probably represent something of an upper bound on community income and employment impacts, or the maximum amount of short term economic disruption likely to occur under the alternatives. Also as noted above, the impact models are not necessarily able to distinguish subtle differences resulting from relatively fine distinctions between the alternatives if those differences lie within the models' margins of error.

Projected changes in measures of personal income and employment in community groups under the alternatives are shown in the following tables. Table 4-129 displays the dollar change in commercial fishery income impacts from No Action. Table 4-130 displays the same information in terms of percentage change. Table 4-131 and Table 4-132 display the projected change in commercial fishery employment impacts from No Action in terms of in number of total jobs (combined full-time and part-time) and percentage change, respectively. Table 4-133 displays the projected change in regional unemployment rates from No Action in each community resulting from the commercial fishery employment impacts. Table 4-134 and Table 4-135 display recreational fishery income impacts in terms of change in dollars and percentage change, respectively. Table 4-136. Change in recreational fishery employment impacts (from No Action) by community group (number of jobs).

Community Groups	*No Action*	PA Op1	PA Op2	Alt1 Op1	Alt1 Op2	Alt2 Op1	Alt2 _Op2	Op3 (All Alts)
Puget Sound	-	-	-	-	-	-	-	-
Washington Coast	*155*	-	-	-	-	-	-	-
Astoria-Tillamook	*32*	-	-	-	-	-	-	-
Newport	*139*	-	-	-	-	-	-	-
Coos Bay-Brookings	*68*	-	-	-	-	-	-	-
Crescent City-Eureka	*33*	+7	+4	+7	+4	+2	+2	-10
Fort Bragg - Bodega Bay	*14*	+6	+5	+6	+5	+4	+4	-2
San Francisco Area	*148*	+26	+20	+26	+20	+13	+13	-93
SC – Mo – MB*	*216*	+18	+9	+18	+9	-53	-53	-125
SB – LA – SD*	*2,146*	-	-	-	-	-	-	-1,198
Coastwide Total	*2,952*	+57	+38	+57	+38	-35	-35	-1,428

Table 4-137. Change in recreational fishery employment impacts (from No Action) by community group (percent).

Community Groups	*No Action (jobs)*	PA Op1	PA Op2	Alt1 Op1	Alt1 Op2	Alt2 Op1	Alt2 _Op2	Op3 (All
Puget Sound	-	-	-	-	-	-	-	
Washington Coast	*155*	-	-	-	-	-	-	
Astoria-Tillamook	*32*	-	-	-	-	-	-	
Newport	*139*	-	-	-	-	-	-	
Coos Bay-Brookings	*68*	-	-	-	-	-	-	
Crescent City-Eureka	*33*	+21.8%	+13.3%	+21.8%	+13.3%	+4.8%	+4.8%	-3
Fort Bragg - Bodega Bay	*14*	+46.9%	+36.6%	+46.9%	+36.6%	+26.4%	+26.4%	-1
San Francisco Area	*148*	+17.8%	+13.4%	+17.8%	+13.4%	+8.9%	+8.9%	-6
SC – Mo – MB*	*216*	+8.1%	+4.1%	+8.1%	+4.1%	-24.7%	-24.7%	-5
SB – LA – SD*	*2,146*	-	-	-	-	-	-	-5
Coastwide Total	*2,952*	+1.9%	+1.3%	+1.9%	+1.3%	-1.2%	-1.2%	-4

Table 4-138 and Table 4-139 display the combined commercial plus recreational fishery income impacts for each community group under the alternatives in terms of change in dollars and percentage change, respectively, subject to the caveat in the preceding paragraph.

As discussed above, estimates of personal income for the full range of baseline years are not available for comparison. Therefore, Table 4-146 and Table 4-147 use the change in total commercial groundfish ex-vessel revenue to compare impacts under the alternatives against the baseline for each community group. The baseline, described above, is average annual inflation-adjusted average ($2013) ex-vessel revenue during 2003-12.

4.3.1.4 Processors

Section 4.3.2.4 describes impacts to processors under the proposed management alternatives using the comparison in Table 4-148 and Table 4-149, which show the change in projected processor purchases of groundfish landings from No Action in dollar and percentage terms, respectively. These are actually estimates of ex-vessel revenues paid to harvesters but are used here as a measure of the value of raw material inputs available to groundfish processors. Comparisons are with respect to the No Action Alternative unless otherwise indicated. The projections assume average 2013 ex-vessel prices. Results are summarized for whiting and combined non-whiting groundfish species.

In modeling impacts on processors, it is assumed that effects of the management measures under a particular alternative are not avoidable by simply buying from another fishery in the same region or from another region elsewhere along the coast. Thus the numbers reported below probably represent something of an upper bound on regional economic impacts on processors, or the maximum amount of economic disruption likely to occur under the alternatives. Also note that the models used to estimate impacts are not necessarily able to distinguish subtle differences resulting from relatively fine distinctions between the alternatives if those differences lie within the models' margins of error.

4.3.1.5 Impacts on Non-market and Non-use Values

EISs evaluating previous harvest specifications discussed effects related to non-market and non-use (NMNU) values. These are non-consumptive uses that range from recreational enjoyment of the environment (e.g., wildlife viewing) to option or existence value (benefit derived from the knowledge that these resources will be available in the future or simply that environmental quality is maintained). There is no information to directly determine these preferences with respect to the resources most directly affected by the proposed action (groundfish species). Since all the alternatives evaluated here (including No Action) are consistent with FMP goals and MSA National Standards, which among other things include the objective of maintaining or rebuilding fish stocks to MSY (or proxy) biomass, there are not likely to be substantive differences among the alternatives in terms of NMNU values.

4.3.1.6 Impacts on Vessel Safety

The differences between the integrated alternatives in terms of their possible effects on vessel safety are expected to be negligible. Any proposed differences between the alternatives in RCA boundaries, thereby potentially pushing vessels to fish in much deeper waters or much closer to shore, are minimal and therefore are not expected to adversely impact vessel safety. Also the introduction of the fixed gear sablefish permit stacking program and the individual quota program for groundfish trawl fisheries during prior management cycles has relieved pressure on vessels to pursue “use-it-or-lose-it” periodic trip limits.

4.3.1.7 Impacts on Other Indicators of Social Welfare

The effect of the integrated alternatives on other indicators of community social welfare (e.g., poverty, divorce rates, graduation/dropout rates, incidents of domestic violence, etc.) cannot be directly measured, but are expected to be negligible. Change in personal income in communities may be used as a rough proxy for other socioeconomic effects to the degree change in these indicators correlates with potential change in income. However, changes in the broader regional economy (“cumulative effects”) and long term trends in fishery-related employment are more likely to drive these indicators of social well being than the short term economic effects of the alternatives.

4.3.2 Direct and Indirect Economic Impacts of the Alternatives

4.3.2.1 Commercial and Tribal Groundfish Fisheries

No Action

Under No Action, total shoreside ex-vessel revenues from groundfish landings of $82.3 million are projected in 2014. This total includes the following projections for shoreside groundfish sectors: Whiting Trawl $22.5 million; Non-whiting Trawl and Non-trawl IFQ $28.9 million; Limited Entry Fixed Gear $11.8 million; Nearshore Open Access $3.5 million; Non-nearshore Open Access $4.9 million; Tribal groundfish (including shoreside tribal whiting) $10.7 million; and Incidental Open Access $0.1 million. In addition, $31.5 million ex-vessel revenue equivalent[56] from At-Sea Non-Tribal whiting (combined Motherships and Catcher Processors), and $9.1 million ex-vessel revenue equivalent from At-Sea Tribal whiting (Mothership) fisheries are projected under No Action. These same amounts for the tribal and non-tribal at-sea whiting fisheries are also projected under all the action alternatives.

There is no projected change from No Action for groundfish landings by the Incidental Open Access and At-sea whiting sectors under the action alternatives. Therefore discussion of results for these sectors is omitted from the summary of impacts, below. Also note that a small amount of revenue projected from groundfish landings by EFP and miscellaneous fisheries has been omitted from the tables and the relevant discussion of impacts.

[56] Ex-vessel revenue equivalent is the estimated value of Pacific whiting delivered as raw material inputs to at-sea mothership floating processers plus the imputed value of Pacific whiting caught by at-sea catcher-processors.

Comparing estimated commercial shoreside ex-vessel revenue to average annual (inflation adjusted) revenue during the 2003-12 baseline, revenue increases by $3.6 million (5 percent) for all shoreside groundfish fisheries combined. Projected shoreside whiting ex-vessel revenue accounts for most of this change, increasing by $9.6 million (75 percent) from the baseline under No Action due to relatively high Pacific whiting ACL in 2013 and recently-observed high ex-vessel prices. Changes from the baseline for non-whiting fishery sectors are all negative. The combined non-nearshore limited entry and open access fixed gear sector shows a decline of $1.1 million (-6 percent), and revenue in the non-whiting IFQ sector declines under No Action by $4.9 million (-14 percent).

Total shoreside directed groundfish net accounting revenues ("profits") for participating groundfish sectors are estimated to be $19.7 million under No Action. Sectors with greatest estimated net revenues under No Action are Whiting ($10 million), Non-whiting trawl ($6.7 million), and Limited entry fixed gear ($1.8 million).

The Preferred Alternative (PA)

The Preferred Alternative (PPA) is a combination of selected components from Alternative 1 and Alternative 2 plus increased ACLs for Dover sole and widow rockfish. Projections were made for both years of the management cycle (2015 and 2016), although for simplicity unless the general pattern changes between the two years, only results for 2015 are discussed below.

Total shoreside sectors' ex-vessel revenue under the Preferred Alternative is projected to be the highest among the action alternatives. Compared with No Action, total shoreside ex-vessel revenue under the PA is projected to increase by $16 million (20 percent) in 2015.

Projected revenues are higher than under No Action for every shorebased groundfish sector. The greatest absolute and percentage increase in revenue is projected for the IFQ sector: $12.8 million (45 percent) in 2015.

Comparing estimated commercial shoreside ex-vessel revenue to average annual (inflation adjusted) revenue during the 2003-12 baseline, revenue increases by $19.3 million (28 percent) in 2015 for all shoreside groundfish sectors combined. Projected shoreside whiting ex-vessel revenue accounts for most of this, increasing from the baseline by 80 percent due to the relatively high assumed Pacific whiting ACL and ex-vessel prices. Changes from the baseline for non-whiting fishery sectors are all positive but smaller in dollar terms. The non-whiting IFQ sector shows the second largest absolute and percentage increase among non-whiting fishery sectors, increasing from the baseline by $8 million (24 percent) in 2015.

Total shoreside directed groundfish net accounting revenues ("profits") for participating groundfish sectors are projected to be $8.8 million higher under the Preferred Alternative than under No Action. The sector with greatest estimated absolute change in net revenues over No Action is Non-whiting trawl, which increases by $6.7 million (100 percent). The largest increase in percentage terms is Open access nearshore which increases by $0.5 million (132 percent).

Alternative 1

Under this alternative projected revenues are higher than No Action for every shorebased groundfish sector. The greatest absolute increase in revenue is projected for the IFQ sector: $4.9 million (17 percent) in 2015. The greatest percentage increase in revenue is projected for the nearshore open access sector: $0.8 million (24 percent) in 2015.

Comparing estimated commercial shoreside ex-vessel revenue to average annual (inflation adjusted) revenue during the 2003-12 baseline, revenues increase by $19.3 million (28 percent) in 2015 for all shoreside groundfish fisheries combined. Again most of the projected increase is shoreside whiting ex-vessel revenues, which increases from the baseline by 79 percent in 2015 due to the relatively high assumed Pacific whiting ACL and ex-vessel prices. Changes from the baseline for non-whiting fishery sectors are all positive but relatively small in dollar terms. The non-nearshore fixed gear sector shows the largest dollar increase among the non-whiting fishery sectors, increasing from the baseline by $1.1 million (6 percent) in 2015. The nearshore open access fixed gear sector shows the largest percentage increase among the non-whiting fishery sectors, increasing from the baseline by 23 percent in 2015.

Total shoreside directed groundfish net accounting revenues ("profits") for participating groundfish sectors are projected to be $4.1 million higher under the Alternative than under No Action. The sector with greatest estimated absolute change in net revenues over No Action is Non-whiting trawl, which increases by $2 million (29 percent). The largest increase in percentage terms is Open access nearshore which increases by $0.5 million (132 percent).

Alternative 2

Total aggregated shoreside sectors' ex-vessel revenue under Alternative 2 is projected to be the lowest among the action alternatives. Compared with No Action, under Alternative 2 total shoreside ex-vessel revenue is projected to decrease by $0.4 million (-1 percent) in 2015, and increase by $1.8 million (2 percent) in 2016.

Projected revenue changes from No Action under Alternative 2 across groundfish sectors are mixed. The greatest absolute increase in revenue for 2015 is projected for the Nearshore Open access sector at $0.5 million (13 percent). In 2016 the largest increases are projected for the Nearshore Open access sector at $0.5 million (13 percent) and Limited Entry fixed gear sector at $0.5 million (4 percent). The greatest absolute decrease in revenue for 2015 is projected for the Limited Entry fixed gear sector at -$0.6 million (-5 percent) in 2015, and the Non-whiting IFQ sector at -$0.1 million (-0.2 percent) in 2016. The largest percentage increase in both 2015 and 2016 is projected for the Nearshore Open access sector at 13 percent ($0.5 million). The largest percentage decreases are for the Non-nearshore Open access sector in 2015 at -5 percent (-$0.3 million), and the Non-whiting IFQ sector at -0.2 percent (-$0.1 million) in 2016.

Comparing estimated commercial shoreside ex-vessel revenue to average annual (inflation adjusted) revenue during the 2003-12 baseline, revenue increases by $2.9 million (4 percent) for all shoreside groundfish sectors combined in 2015, and $4.9 million (7 percent) in 2016. Again most of the projected increase is shoreside whiting ex-vessel revenues, increasing from the baseline by 77 percent in both 2015 and 2016 due to the relatively high assumed Pacific whiting ACL and ex-vessel prices. Changes from the baseline for non-whiting fishery sectors are mixed. The Non-whiting IFQ sector shows the largest dollar and percentage decrease among the fishery sectors, decreasing from the baseline by $5.4 million (-16 percent) in 2015 and $4.9 million (-15 percent) in 2016. The non-nearshore fixed gear sector is also negatively affected relative to the baseline under this alternative. The nearshore open access sector shows the largest dollar and percentage increase among the non-whiting fishery sectors, increasing from the baseline by 13 percent ($0.4 million) in both 2015 and 2016.

Total shoreside directed groundfish net accounting revenues ("profits") for participating groundfish sectors are projected to be $0.1 million lower under the Alternative in 2015 than under No Action. The sector with greatest estimated absolute decline in net revenues over No Action is Non-whiting trawl, which decreases by $0.3 million (-4 percent). The sector with greatest estimated increase in net revenues over No Action in both absolute and percentage terms is Open access nearshore, which increases by $0.3

million (70 percent). The sector with the largest decrease in percentage terms is Open access non-nearshore which decreases by $0.1 million (-23 percent).

Table 4-116. Change in groundfish ex-vessel revenues from No Action by groundfish harvest sector under the 2015-16 alternatives ($million).

	No Action	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Shoreside Sectors:							
Whiting	22.5	+0.6	+0.5	+0.2	+0.6	+0.5	+0.2
Non-whiting Trawl+Nontrawl	28.9	+12.8	+4.9	-0.564	+13.6	+5.6	-0.1
Limited Entry Fixed Gear	11.8	+1.1	+1.6	-0.578	+2.1	+2.7	+0.5
Nearshore Open Access	3.5	+0.7	+0.8	+0.5	+0.7	+0.8	+0.5
Non-nearshore Open Access	4.9	+0.5	+0.7	-0.3	+0.9	+1.2	+0.2
Incidental Open Access	0.1	-	-	-	-	-	-
Tribal (incl. whiting)	10.7	+0.3	+0.3	+0.3	+0.5	+0.5	+0.5
Shoreside sectors Totals	82.3	+16.0	+8.8	-0.4	+18.5	+11.3	+1.8
At-Sea Sectors:		-	-	-	-	-	-
Non Tribal Whiting	31.5	-	-	-	-	-	-
Tribal Whiting	9.1	-	-	-	-	-	-
At-sea sectors Totals	40.5	-	-	-	-	-	-
TOTAL Groundfish Revenue	122.9	+16.0	+8.8	-0.4	+18.5	+11.3	+1.8

Table 4-117. Change in groundfish ex-vessel revenues from No Action by shoreside harvest sector under the 2015-16 alternatives (percent).

	No Action	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Shoreside Sectors:							
Whiting	22.5	+2.9%	+2.4%	+1.1%	+2.7%	+2.2%	+0.9%
Non-whiting Trawl+Nontrawl	28.9	+44.5%	+16.9%	-2.0%	+47.1%	+19.5%	-0.21%
Limited Entry Fixed Gear	11.8	+9.0%	+13.4%	-4.9%	+18.1%	+22.7%	+3.8%
Nearshore Open Access	3.5	+21.0%	+24.1%	+13.3%	+21.0%	+24.1%	+13.3%
Non-nearshore Open Access	4.9	+9.6%	+14.2%	-5.3%	+19.3%	+24.2%	+4.0%
Incidental Open Access	0.1	-	-	-	-	-	-
Tribal (incl. whiting)	10.7	+2.5%	+2.5%	+2.5%	+4.6%	+4.6%	+4.6%
Shoreside sectors' Totals	82.3	+19.5%	+10.7%	-0.5%	+22.5%	+13.8%	+2.1%
At-Sea Sectors:		-	-	-	-	-	-
Non Tribal Whiting	31.5	-	-	-	-	-	-
Tribal Whiting	9.1	-	-	-	-	-	-
At-sea sectors' Totals	40.5	-	-	-	-	-	-
TOTAL Groundfish Revenue	122.9	+13.0%	+7.2%	-0.4%	+15.1%	+9.2%	+1.4%

Table 4-118. Change in groundfish ex-vessel revenues from the Baseline (10 year 2003-2012 inflation-adjusted average annual ex-vessel revenue) by aggregated non-tribal shoreside commercial harvest sector under the 2015-16 alternatives (2013 $million).

$ million	*Baseline*	No Action	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Whiting	*12.8*	*+9.6*	+10.3	+10.2	+9.9	+10.3	+10.1	+9.9
Non-whiting Trawl+Nontrawl IFQ	*33.7*	*-4.9*	+8.0	+0.0	-5.4	+8.7	+0.8	-4.9
Nearshore Fixed Gear	*3.5*	*-0.0*	+0.7	+0.8	+0.4	+0.7	+0.8	+0.4
Non-nearshore Fixed Gear	*17.8*	*-1.1*	+0.4	+1.1	-2.0	+1.9	+2.7	-0.5
Totals	*0.1*	*-0.0*	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
	68.0	*+3.6*	+19.3	+12.1	+2.9	+21.6	+14.4	+4.9

Table 4-119. Change in groundfish ex-vessel revenues from the Baseline (10 year 2003-2012 inflation-adjusted average annual ex-vessel revenue) by aggregated non-tribal shoreside commercial harvest sector under the 2015-16 alternatives (percent).

	Baseline	No Action	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Whiting	*12.8*	+75.1%	+80.2%	+79.3%	+76.9%	+79.9%	+79.0%	+76.8%
Non-whiting Trawl+Nontrawl IFQ	*33.7*	*-14.4%*	+23.7%	+0.1%	-16.1%	+25.9%	+2.3%	-14.6%
Nearshore Fixed Gear	*3.5*	*-0.7%*	+20.1%	+23.2%	+12.5%	+20.1%	+23.2%	+12.5%
Non-nearshore Fixed Gear	*17.8*	*-6.4%*	+2.2%	+6.4%	-11.1%	+10.9%	+15.3%	-2.7%
Totals	*0.1*	*-21.5%*	-21.5%	-21.5%	-21.5%	-21.5%	-21.5%	-21.5%
	68.0	*+5.3%*	+28.4%	+17.8%	+4.2%	+31.8%	+21.2%	+7.1%

Table 4-120. Change in groundfish accounting net revenue impacts by shoreside commercial fishery sector from No Action under the 2015-16 alternatives ($1,000).

Alternatives:	*No Action*	2015 PA	2015 Alt1	2015 Alt2	2016 PA	2016 Alt1	2016 Alt2
Whiting	*9,979*	+642	+522	+237	+599	+479	+209
Non-whiting trawl IFQ	*6,685*	+6,662	+1,962	-272	+6,577	+1,861	-251
Non-whiting non-trawl IFQ	*415*	+372	+209	-40	+491	+338	+51
Limited entry fixed gear	*1,761*	+401	+598	-218	+808	+1,013	+171
Open access nearshore	*406*	+534	+534	+284	+534	+534	+284
Open access non-nearshore	*488*	+202	+300	-112	+406	+511	+85
TOTAL SHORESIDE SECTOR CHANGE ($,000)	*19,733*	+8,813	+4,124	-120	+9,416	+4,736	+549

Table 4-121. Change in groundfish accounting net revenue impacts by shoreside commercial fishery sector from No Action under the 2015-16 alternatives (percent).

Alternatives:	*No Action ($,000)*	2015 PA	2015 Alt1	2015 Alt2	2016 PA	2016 Alt1	2016 Alt2
Whiting	*9,979*	+6.4%	+5.2%	+2.4%	+6.0%	+4.8%	+2.1%
Non-whiting trawl IFQ	*6,685*	+99.7%	+29.3%	-4.1%	+98.4%	+27.8%	-3.7%
Non-whiting non-trawl IFQ	*415*	+89.7%	+50.4%	-9.5%	+118.5%	+81.6%	+12.4%
Limited entry fixed gear	*1,761*	+22.8%	+34.0%	-12.4%	+45.9%	+57.6%	+9.7%
Open access nearshore	*406*	+131.5%	+131.5%	+70.0%	+131.5%	+131.5%	+70.0%
Open access non-nearshore	*488*	+41.5%	+61.4%	-22.9%	+83.2%	+104.7%	+17.5%
TOTAL SHORESIDE SECTOR CHANGE (%)	*19,733*	+44.7%	+20.9%	-0.6%	+47.7%	+24.0%	+2.8%

4.3.2.2 Recreational Fisheries

Each action alternative for recreational fisheries includes three optional scenarios describing projected angler effort impacts under three different sets of possible management measures. Options 1 and 2 apply to the Preliminary Preferred Alternative, Alternative 1 and Alternative 2 (although note that Option 1 and Option 2 have identical impacts under Alternative 2. Projected impacts under Option 3 are identical under all three action alternatives and have the most highly negative effects on projected angler effort.

No Action

Projected angler effort levels under the No Action alternative are derived from estimates developed independently by each state. No Action for Washington's recreational fishery is based on total bottomfish plus Pacific halibut marine-area angler boat trips taken in 2012. For Oregon's fishery, the annual average of marine area bottomfish plus Pacific halibut angler boat trips recorded during 2010 to 2012 is used to quantify No Action. California's angler effort level under No Action is based on average annual bottomfish boat trips recorded during 2011-2012.

Under No Action, a total of 835,500 groundfish and Pacific halibut trips are projected coastwide. Sixty two percent of these are charter boat trips with the remainder taken on private boats. The breakdown by state is: Washington 33,600 trips (18,100 charter + 15,500 private), Oregon 90,200 trips (38,500 charter + 51,600 private), and California 711,800 (465,100 charter + 246,600 private).

Washington Recreational – No Action

Under the No Action Alternative, management measures necessary to keep recreational harvest of yelloweye rockfish within harvest guidelines require closure or significant restriction of the groundfish fishery in areas deeper than 20 and 30 fathoms along a substantial portion of the Washington coast, restrictions on groundfish retention during peak recreational fishing periods, and closed areas. While these restrictions have been effective at keeping recreational catch of overfished species under specified harvest guidelines in the past, they are limiting recreational fishing opportunity.

Projected impacts to overfished and non-overfished species and angler effort in 2015 and 2016 under status quo management measures are expected to be similar to previous seasons however, if anger effort and fishing success result in catch estimates higher than what is projected, additional fishing restrictions will be considered and could be implemented through state regulations to ensure that harvest of overfished species does not exceed harvest guidelines. If necessary, additional restrictions to groundfish management measures could result in fewer anglers participating in recreational fisheries which would put additional burden on coastal communities that are economically dependent on recreational fishing.

Oregon Recreational – No Action

Depth restrictions for the recreational groundfish fishery are the primary management method used to keep overfished yelloweye and canary rockfish mortality within their respective HGs in the Oregon recreational fisheries. Depth restrictions reduce mortality of overfished species because catch rates and discard mortality rates for those species are lesser in shallower depths. The depth restrictions under the No Action Alternative are all-depths from Jan-Feb, inside 40 fathoms from Apr-Sep, and all depths Oct-Dec (Figure 4-19).

Although depth restrictions reduce mortality of overfished species, they can also decrease angler trips by reducing the quantity and quality of fishable bottomfish grounds. Ports are disproportionately affected by depth restrictions due to varying amounts of fishing grounds by depth. For example, Newport is relatively unaffected by a 40 fathom depth restriction because the majority (98%) of bottomfish grounds are shallower than 20 fathoms (Figure 4-31). In contrast, Winchester Bay and Florence are greatly impacted by depth restrictions because nearly all bottomfish grounds are deeper than 40 fathoms. Other ports, such as Garibaldi and Gold Beach, where the majority of bottomfish grounds are between 20-40 fathoms, are relatively unaffected by 40 fathoms depth restrictions, but are greatly affected by 20 fathoms depth restrictions.

Under the No Action Alternative, mortality of canary and yelloweye rockfish in the groundfish fishery and the Pacific halibut fishery are projected to be within allocations and expected angler trips are anticipated to be similar to what has been seen in recent years (

Table 4-122 and

Table 4-123). However, projections are based on past catch rates and angler trips, and greater than expected values for these parameters could necessitate more conservative inseason depth restrictions and/or closures of the fisheries.

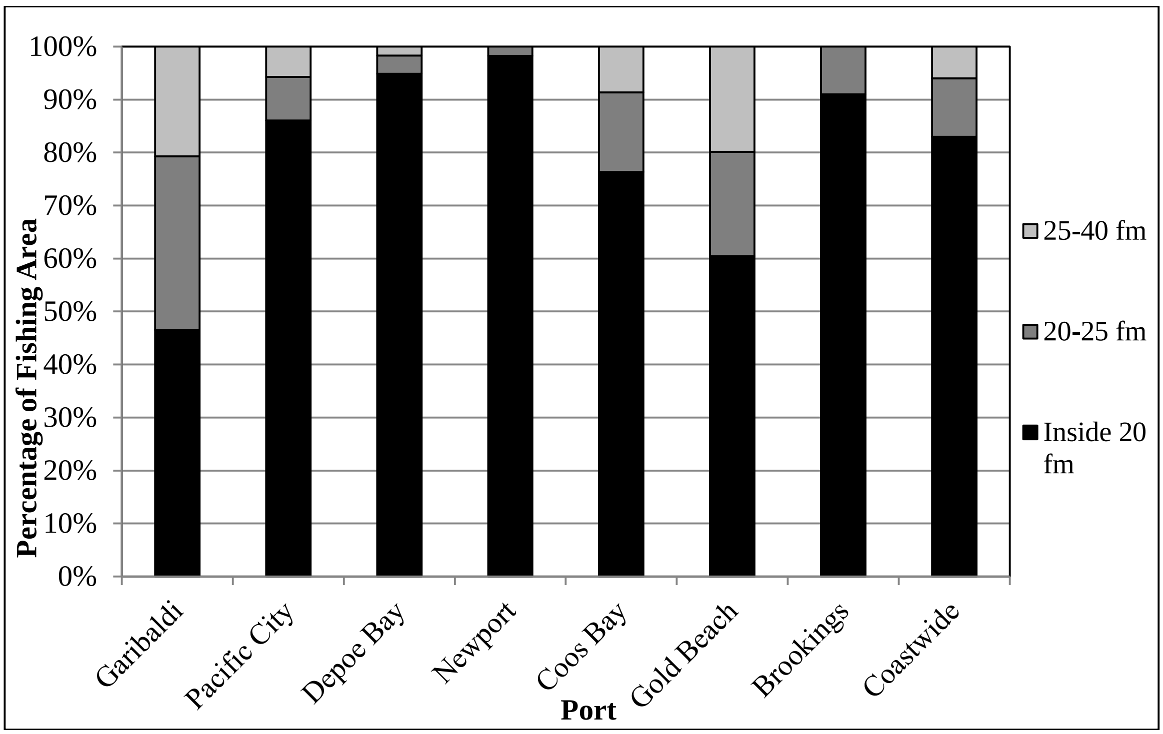


Figure 4-31. **Percentage of Marine Area by Depth Bin for Ports on the Oregon Coast.**

Table 4-122. Average bottomfish angler trips per month by port and boat type for months without depth restrictions (all-depth), 2010-2012.

	Charter						Private						Total					
Port	Jan	Feb	Mar	Oct	Nov	Dec	Jan	Feb	Mar	Oct	Nov	Dec	Jan	Feb	Mar	Oct	Nov	Dec
Astoria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Garibaldi	24	82	77	112	7	20	23	50	30	88	4	35	47	132	107	200	11	55
Pacific City	2	7	15	25	3	2	21	69	78	172	14	28	23	77	93	197	17	30
Depoe Bay	44	178	395	402	42	37	26	70	41	98	12	46	70	248	436	501	54	83
Newport	142	337	738	537	170	139	83	173	172	159	33	99	225	510	910	696	203	239
Winchester	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Charleston	17	59	109	153	5	10	78	139	162	298	19	116	95	198	271	451	24	127
Bandon	0	0	13	40	6	3	2	11	17	65	2	7	2	11	30	105	8	11
Port Orford	0	0	0	4	0	0	6	7	9	28	4	8	6	7	9	32	4	8
Gold Beach	0	3	8	26	4	2	6	22	35	100	6	14	6	25	43	126	9	16
Brookings	10	48	62	77	0	6	168	370	263	495	109	205	178	418	325	573	109	211
Total	240	714	1,417	1,376	237	220	412	912	806	1,504	203	558	652	1,626	2,223	2,880	440	779

Table 4-123. Average bottomfish angler trips per month by port and boat type for months with 40 fathoms depth restrictions, 2010-2012.

	Charter						Private						Total					
Port	Apr	May	Jun	Jul	Aug	Sep	Apr	May	Jun	Jul	Aug	Sep	Apr	May	Jun	Jul	Aug	Sep
Astoria	0	10	35	6	6	5	2	92	133	60	24	10	2	102	168	66	30	15
Garibaldi	147	340	837	1,167	858	389	121	359	661	491	519	223	267	699	1,498	1,658	1,377	613
Pacific City	25	47	77	168	170	37	202	464	552	893	626	191	227	510	629	1,061	797	228
Depoe Bay	782	1,446	1,870	2,659	2,437	808	251	418	545	312	259	171	1,033	1,864	2,415	2,971	2,696	978
Newport	964	1,106	1,896	2,289	2,322	1,219	624	1,111	1,051	1,176	1,163	493	1,588	2,217	2,948	3,465	3,485	1,712
Winchester	0	0	0	0	0	0	0	6	13	2	0	3	0	6	13	2	0	3
Charleston	299	449	669	694	664	451	380	878	1,231	789	1,345	825	679	1,327	1,900	1,484	2,009	1,276
Bandon	31	66	216	256	426	161	68	165	185	144	279	93	99	231	401	400	706	254
Port Orford	0	28	32	0	0	7	30	100	59	188	63	49	30	129	91	188	63	56
Gold Beach	45	88	133	194	238	119	69	283	184	389	667	135	114	371	318	583	905	254
Brookings	149	280	541	580	556	274	633	1,906	2,386	2,923	2,587	1,407	782	2,186	2,927	3,502	3,143	1,681
Total	2,443	3,859	6,306	8,014	7,678	3,471	2,379	5,782	7,000	7,367	7,533	3,599	4,822	9,641	13,306	15,381	15,211	7,070

California Recreational – No Action

Under the No Action Alternative, California communities will continue to be negatively impacted by existing shallow depth restrictions and shortened seasons. The California recreational groundfish fishery has historically operated in deeper depths with longer seasons (PFMC 2003); however, with more restrictive recreational harvest guidelines for overfished groundfish species, communities in all management areas coastwide have seen drastic reductions in season length and considerable increases in depth restrictions. Management areas north of Point Arena have seen the most restrictive season and depth constraints. Due to these restrictions placed on the groundfish fishery and other marine fisheries in the region (e.g., salmon), many communities along the North Coast have seen a decrease in angler effort. In particular, the northern California ports of Crescent City, Humboldt Bay, Shelter Cove, and Fort Bragg have seen their season length slowly reduced over the past decade. The port of Crescent City often competes with the Oregon ports of Brookings and Gold Beach, where fewer restrictions and lower fuel prices have attracted many anglers who once fished out of Crescent City (Pomeroy et al. 2010).

The Preliminary Preferred Alternative and Alternative 1

Impacts under recreational fisheries Alternative 1 and the Preliminary Preferred Alternative are identical in all cases.

Under the Preliminary Preferred Alternative Option 1, an increase of 25,800 angler trips is projected from No Action coastwide, all in California. Trips increase by 4,400 (22 percent) in the North Coast region, 3,700 (47 percent) in the upper North-Central Coast region, 8,900 (18 percent) in the lower North-Central Coast region and 8,800 (8 percent) in the South-Central Coast region. No change from No Action is projected for California's South Coast region or for recreational fisheries in Washington and Oregon.

Under the Preliminary Preferred Alternative Option 2, an increase of 16,700 angler trips is projected from No Action, all in California. Trips increase by 2,700 (13 percent) in the North Coast region, 2,900 (37 percent) in the upper North-Central Coast region, 6,700 (13 percent) in the lower North-Central Coast region and 4,400 (4 percent) in the South-Central Coast region. No change from No Action is projected for California's South Coast region or for recreational fisheries in Washington and Oregon.

Under the Preliminary Preferred Alternative Option 3, a decrease of 394,700 angler trips is projected from No Action, all in California. This represents more than half of total California angler trips under No Action. Trips decrease by 6,100 (-30 percent) in the North Coast region, by 1,300 (-16 percent) in the upper North-Central Coast region, by 31,300 (-63 percent) in the lower North-Central Coast region, by 62,900 (-58 percent) in the South-Central Coast region, and by 293,100 (-56 percent) in the South Coast region. No change from No Action is projected for California's South Coast region or for recreational fisheries in Washington and Oregon.

Washington Recreational – Alternative 1

Management measures under Alternative 1 modify the time period that the 20 fathom depth restriction is in place in the North Coast (Marine Areas 3 and 4) and provides recreational fishing access to deepwater areas off the North Coast for a small amount of time prior to the opening of the recreational halibut fishery and again late in the summer. Angler effort in May is driven in large part by recreational halibut opportunities while angler effort in September is driven by salmon and albacore tuna opportunities. The modification to the depth restriction in this area is designed to occur when angler effort is low, prior to the opening of recreational halibut fisheries in May or, focused on other fishing opportunities such as salmon and albacore tuna in September after Labor Day.

In 2012, a large deepwater area covering all of the South Coast (Marine Area 2) and a large portion of the Columbia River (Marine Area 1) was closed to lingcod retention year round to reduce encounters with yelloweye rockfish by anglers targeting lingcod. Implementation of this large closed area allows for the removal of the prohibition on lingcod retention in the area seaward of 30 fathoms, south of 46°58' on Fridays and Saturday from July 1 through August 31, a regulation that was somewhat complicated, making regulations easier to follow while keeping yelloweye mortalities from exceeding Washington recreational harvest guidelines. Additional review of the deepwater lingcod closure area in Marine Area 1 and discussions with recreational anglers in this area indicate that moving the southern boundary three miles north covers the area where increased yelloweye encounters were a concern.

Projected impacts to overfished species and angler effort in 2015 and 2016 under Alternative 1 management measures are expected to be similar to previous seasons however, if anger effort and fishing success result in catch estimates higher than what is projected, additional fishing restrictions may be considered to ensure that harvest of overfished species do not exceed harvest guidelines.

Washington state specific harvest guidelines for the nearshore rockfish complex, including china rockfish, and cabezon under Alternative 1 could be reached before the end of the year and, as such, inseason action through state regulations may be considered to ensure catches do not exceed harvest guidelines. If necessary, additional restrictions to groundfish management measures could result in fewer anglers participating in recreational fisheries which would put an additional burden on coastal communities that are economically dependent on recreational fishing.

Oregon Recreational – Alternative 1

Table 4-124 shows the allocations, or model targets, for overfished species and key target species for the Oregon recreational fisheries under Alternative 1, the same as the No Action Alternative.

Oregon recreational management measures and community impacts under the Preferred Alternative are expected to be the same as the No Action Alternative; except the seasonal cabezon sub-bag limit would be removed. Cabezon impacts would be limited via state processes. Any management measures necessary to reduce impacts on nearshore rockfish complex or greenlings would be done through the state process.

Table 4-124. Oregon recreational harvest guidelines (in mt) under the Alternative 1 (P* = 0.45) for 2015-2016.

Species	2015	2016
Black Rockfish	440.4	440.4
Canary Rockfish	11.7	12.0
Yelloweye Rockfish	2.6	2.8
Nearshore Rockfish*	*19.7*	*19.8*
Lingcod	N/A	N/A
Kelp Greenling	*2.5*	*2.5*
Other Greenlings	TBD	TBD

* includes blue rockfish

California Recreational – Alternative 1

Table 4-125 shows the season lengths under Alternative 1 Options 1, 2 and 3 compared with No Action. Implications for community impacts under each Option are discussed below.

Option 1

Under Option 1, season lengths would be increased in every Management Area north of Point Conception compared to the No Action Alternative, which will provide for increased fishing opportunity thereby affording greater economic benefit to ports in the region. This will be particularly true for coastal communities in the Northern and Mendocino Management Areas, especially in March, November and December when effort is otherwise low since other fisheries (e.g. Pacific halibut and salmon) are closed. Opening the season on March 1st and extending the season in the Northern and Mendocino Management Area through December 31 will increase fishing opportunity four and a half months and six and a half months, respectively.

While the season length in the Southern Management Area would not be extended, a deeper depth restriction of 60 fm depth will increase fishing opportunity by opening more fishing grounds. While the economic effects of such a change in depth restriction are not quantified, industry has commented that deeper depth restrictions provide significant improvements in fishing opportunity that affect their business (PMFC, March 2013, H.3.c, Public Comment).

Option 2

The benefits from changes to season lengths and depth restrictions under Option 1 apply to Option 2 as well. While the current depth restrictions in the Northern and Mendocino Management Areas have greatly reduced yelloweye rockfish impacts, anglers are still confined to fishing within 20 fm year round. A deeper depth restriction of 30 fm from October 1 to December 31 in the Northern and Mendocino Management Areas will allow access to more fishing grounds, when fishing effort is historically low compared to summer months. Although this increased fishing opportunity may attract some anglers to the coast during months of the 30 fm depth restriction, changes in effort are expected to be relatively minor.

Option 3

A ten fathom increase in depth restriction for each of the management areas north of Point Conception (relative to No Action) would require substantial reductions in season lengths to keep overfished species impacts within harvest guidelines given the high uncertainty in projected impacts.

The season under Option 3 would be reduced relative to No Action by two and a half months in the Northern Management Area, by 16 days in the Mendocino Management Area reduced, reduced by four months in the San Francisco Management Area, and reduced by five months in the Central management area. Compared to Option 2, the season in the Northern Management Area would be reduced by six months, the Mendocino Management Area reduced by five and a half months, while the San Francisco and Central Management Areas would have a six month reduction in season length.

In the Southern Management Area, loss of seven months of season relative to the No Action alternative would result in a severe reduction in trips. The limited opportunity for California scorpionfish during the closed months of fishing for the RCG complex is not expected to draw as much effort as the forgone opportunities. In addition, any increase in effort as a result of the deeper depth restriction relative to status quo is not quantified and is not expected to compensate for the loss of fishing season during March and April as well as September through and December, when the RCG complex is one of few opportunities available in the absence of pelagic species which are distributed further to the south or offshore that time of year.

While a deeper depth restriction would increase fishing opportunity, the effect in terms of additional trips is not quantified. However, the reduction in season length would translate to a greatly reduced number of fishing trips. Mortality estimates do not account for the use of descending devices in the release of overfished species, which began in 2013. If anglers use descending devices with sufficient frequency, future projections may indicate sufficient reduction in mortality to allow increased opportunity in deeper depths as the devices have been shown to greatly reduce mortality on released rockfish.

Table 4-125. Preliminary Preferred Alternative: Summary of season structures under No Action, Option 1, Option 2, and Option 3. Season length (in months) is included in parenthesis.

Management Area	Season Length and Number of months			
	No Action	Option 1	Option 2	Option 3
Northern	May 15 – Oct 31 (5.5)	Mar 1 – Dec 31 (10)	Apr 1 – Dec 31 (9)	May 15 – Aug 15 (3)
Mendocino	May 15 – Sep 1 (3.5)	Mar 1 – Dec 31 (10)	Apr 1 – Dec 31 (9)	May 15 – Aug 15 (3)
San Francisco	June 1 – Dec 31 (7)	Mar 1 – Dec 31 (10)	Apr 1 – Dec 31 (9)	May 15 – Aug 15 (3)
Central	May 1- Dec 31 (1)	Mar 1 – Dec 31 (10)	Apr 1 – Dec 31 (9)	May 15 – Aug 15 (3)
Southern	Mar 1 – Dec 31 (10)	Mar 1 – Dec 31 (10)	Mar 1 – Dec 31 (10)	May 15 – Aug 15 (3)

Alternative 2

Under Alternative 2 Option 1, a decrease of a total of 19,300 angler trips (-3 percent) is projected from No Action in California although impacts vary considerably by region. Trips increase by 1,000 (5 percent) in the North Coast region, by 2,100 (26 percent) in the upper North-Central Coast region, by 4,500 (9 percent) in the lower North-Central Coast region, but decrease by 26,800 (-25 percent) in the South-Central Coast region. No change from No Action is projected for California's South Coast region or for recreational fisheries in Washington and Oregon.

Impacts under Alternative 2 Option 2 are the same as under Alternative 2 Option 1.

Impacts under Alternative 2 Option 3 are the same as under Alternative 1 - the Preliminary Preferred Alternative Option 3.

California Recreational – Alternative 2

Table 4-126 shows the season lengths under Alternative 2 Options 1, 2 and 3 compared with No Action. Implications for community impacts under each Option are discussed below.

Option 1

Combined with reduced yelloweye rockfish mortality in recent years informing the catch projection model, the relatively higher ACL will allow increased fishing opportunity north of Point Conception where they are more commonly encountered. This will provide increased economic benefit to coastal communities in the region from expenditures by anglers fishing in the area during the open months of the season. Compared to the Alternative 1 and Alternative 3, the season north of Point Conception would be one month shorter since April would have to remain closed to keep black rockfish mortality within the lower harvest limit under Alternative 2. Extending the season in the Northern and Mendocino Management Area through December 31 will increase fishing opportunity, especially in November and December when effort is low and other fisheries such as Pacific halibut and salmon are closed.

The reduced bag limit for kelp greenling will mainly affect anglers fishing north of Point Conception where the majority of these encounters occur. This will decrease fishing opportunity for shore based anglers who regularly encounter kelp greenling as well as boat based anglers fishing in waters within 20 fm. In addition, reduced bag limits for California scorpionfish will adversely affect anglers south of Point Conception where the vast majority of encounters occur, having a disproportionate affect during January and February when the season is closed for many groundfish species and pelagic species have moved south into Mexican waters and are unavailable. During this period of the year, California scorpionfish are targeted more frequently and the reduced bag limit of three fish will diminish fishing opportunity for this species. However the effects of bag limit changes on effort have not been quantified.

Option 2

The season length can be extended north of Point Conception relative to status quo due to the increase in ACLs as a result of rebuilding and recent reductions in yelloweye rockfish impacts. The season would be one month shorter than under Alternative 1 or Alternative 3, opening May 1 instead of April 1. The current depth restrictions in the Northern and Mendocino Management Areas are the shallowest in the state with anglers confined to fishing within 20 fm year round under status quo regulations, thereby greatly reduced OFS impacts. A deeper depth restriction of 30 fm from October to December in the Northern and Mendocino Management Areas will allow access to more fishing grounds, at a time when fishing effort is relatively low compared to summer months. Although this increased fishing opportunity may attract some anglers, changes in effort are expected to be relatively minor and are not accounted for in economic modeling, which quantifies only the increase in the number of expected fishing trips with an increase in season length. As noted under Option 1, the reduced bag limits for kelp greenling and California scorpionfish would diminish the quality of fishing opportunity, but the economic effects of this are not quantified.

While the season length in the Southern Management Area would not be extended, a deeper depth restriction of 60 fm will increase fishing opportunity by opening more fishing grounds. While the economic effects of changes in depth restriction are not quantified, industry has commented that deeper depth restrictions provide significant improvements in fishing opportunity that affect their business (PMFC, March 2013, H.3.c, Public Comment). A three fish California scorpionfish bag limit may reduce effort. Qualitatively, the greatest impact would be in January and February when California scorpionfish is one of a few fishing opportunities available in the Southern Management Area. At this time of the year most other groundfish fisheries are closed and pelagic species are unavailable.

Option 3

A ten fathom deeper depth restriction in each of the management areas north of Point Conception would require substantial reductions in season lengths to keep overfished species impacts within harvest guidelines. The season under Option 3 would be reduced in the Northern Management Area relative to No Action by two and a half months, in the Mendocino Management Area it would be reduced by 16 days, San Francisco Management Area reduced by four months and the Central management area reduced by five months. Compared to Option 1, the season in the northern management area would be reduced by five months, the Mendocino Management Area reduced by four and a half months, San Francisco Management Area reduced by five months and the Central management area reduced by five months.

In the Southern Management Area, loss of seven months of season relative to the No Action alternative would result in a severe reduction in the number of fishing trips. Any increase in effort as a result of the deeper depth restriction relative to the status quo is not quantified but is not expected to compensate for the loss of fishing season at a time when the RCG complex is one of few opportunities available. The limited opportunity for California scorpionfish during the closed months of fishing for the RCG complex is not expected to draw as much effort as the forgone opportunities. Furthermore a reduced bag limit for California scorpionfish would still be necessary under this alternative to maintain the status quo year round season length south of Point Conception given the ACLs in Alternative 2. This would diminish fishing opportunity for anglers in the Southern Management Area where California scorpionfish are predominantly encountered, with greater effects during January and February when few other opportunities are available as discussed in Option 1 and Option 2.

While a deeper depth restriction would increase fishing opportunity, the effect in terms of increased effort is not quantified, but the reduction in season length would translate into a greatly reduced number of fishing trips during the season. Mortality estimates do not account for the use of descending devices in the release of overfished species, which began in 2013.

Table 4-126. Alternative 2: Summary of season structures under No Action in addition Option 1, Option 2, and Option 3. Season length (in months) is included in parenthesis.

Management Area	Season Length and Number of months			
	No Action	Option 1	Option 2	Option 3
Northern	May 15 – Oct 31 (5.5)	May 1 – Dec 31 (8)	May 1 – Dec 31 (8)	May 15 – Aug 15 (3)
Mendocino	May 15 – Sep 1 (3.5)	May 1 – Dec 31 (8)	May 1 – Dec 31 (8)	May 15 – Aug 15 (3)
San Francisco	June 1 – Dec 31 (7)	May 1 – Dec 31 (8)	May 1 – Dec 31 (8)	May 15 – Aug 15 (3)
Central	May 1- Dec 31 (8)	May 1 – Dec 31 (8)	May 1 – Dec 31 (8)	May 15 – Aug 15 (3)
Southern	Mar 1 – Dec 31 (10)	Mar 1 – Dec 31 (10)	Mar 1 – Dec 31 (10)	May 15 – Aug 15 (3)

Table 4-127. Estimated bottomfish + Pacific halibut marine angler boat trips under No Action and change from No Action under the 2015-16 recreational fisheries action alternatives (thousands of trips).

State / District	*No Action*			PPA Option 1			Alt 1 Option 1			Alt 2 Option 1			
	Charter	*Private*	*Total*	Charter	Private	Total	Charter	Private	Total	Charter	Private	Total	
Washington													
La Push-Neah Bay	*1.2*	*11.6*	*12.8*	-	-	-	-	-	-	-	-	-	
Westport	*15.5*	*2.5*	*18.0*	-	-	-	-	-	-	-	-	-	
Ilwaco-Chinook	*1.4*	*1.4*	*2.8*	-	-	-	-	-	-	-	-	-	
Washington Total	***18.1***	***15.5***	***33.6***	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
Oregon													
Astoria	*0.2*	*0.5*	*0.7*	-	-	-	-	-	-	-	-	-	
Tillamook	*5.0*	*8.2*	*13.2*	-	-	-	-	-	-	-	-	-	
Newport	*24.6*	*18.0*	*42.6*	-	-	-	-	-	-	-	-	-	
Coos Bay	*5.1*	*8.3*	*13.4*	-	-	-	-	-	-	-	-	-	
Brookings	*3.6*	*16.6*	*20.2*	-	-	-	-	-	-	-	-	-	
Oregon Total	***38.5***	***51.6***	***90.2***	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
California													
North Coast: Del Norte and Humboldt	*2.5*	*17.6*	*20.1*	+0.5	+3.8	+4.4	+0.5	+3.8	+4.4	+0.1	+0.9	+1.0	
North-Central Coast: Mendocino and Sonoma	*1.5*	*6.5*	*8.0*	+0.7	+3.0	+3.7	+0.7	+3.0	+3.7	+0.4	+1.7	+2.1	
North-Central Coast: Marin through San Mateo	*27.5*	*22.4*	*49.9*	+4.9	+4.0	+8.9	+4.9	+4.0	+8.9	+2.5	+2.0	+4.5	
South-Central Coast: Santa Cruz through San Luis Obispo	*31.1*	*77.4*	*108.5*	+2.5	+6.3	+8.8	+2.5	+6.3	+8.8	-7.7	-19.1	-26.8	
South Coast: Santa Barbara through San Diego	*402.5*	*122.8*	*525.3*	-	-	-	-	-	-	-	-	-	
California Total	***465.1***	***246.6***	***711.8***	**+8.7**	**+17.1**	**+25.8**	**+8.7**	**+17.1**	**+25.8**	**-4.7**	**-14.6**	**-19.3**	
Washington-Oregon-California Total	***521.8***	***313.7***	***835.5***	**+8.7**	**+17.1**	**+25.8**	**+8.7**	**+17.1**	**+25.8**	**-4.7**	**-14.6**	**-19.3**	

Table 4-127. Estimated bottomfish + Pacific halibut marine angler boat trips under No Action and change from No Action under the 2015-16 recreational fisheries action alternatives (thousands of trips). (cont.)

	No Action			PPA Option 2			Alt 1 Option 2			Alt 2 Option 2			All Alts Option 3		
State / District	***Charter***	***Private***	***Total***	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**
Washington															
La Push-Neah Bay	*1.2*	*11.6*	*12.8*	-	-	-	-	-	-	-	-	-	-	-	-
Westport	*15.5*	*2.5*	*18.0*	-	-	-	-	-	-	-	-	-	-	-	-
Ilwaco-Chinook	*1.4*	*1.4*	*2.8*	-	-	-	-	-	-	-	-	-	-	-	-
Washington Total	***18.1***	***15.5***	***33.6***	**-**	**-**	**-**	-	-	-	-	**-**	**-**	**-**	**-**	**-**
Oregon															
Astoria	*0.2*	*0.5*	*0.7*	-	-	-	-	-	-	-	-	-	-	-	-
Tillamook	*5.0*	*8.2*	*13.2*	-	-	-	-	-	-	-	-	-	-	-	-
Newport	*24.6*	*18.0*	*42.6*	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	*5.1*	*8.3*	*13.4*	-	-	-	-	-	-	**-**	**-**	**-**	**-**	**-**	**-**
Brookings	*3.6*	*16.6*	*20.2*	-	-	-	-	-	-	-	-	-	-	-	-
Oregon Total	***38.5***	***51.6***	***90.2***	**-**	**-**	**-**	-	**-**	**-**	-	-	-	-	-	-
California															
North Coast: Del Norte and Humboldt	*2.5*	*17.6*	*20.1*	+0.3	+2.3	+2.7	+0.3	+2.3	+2.7	+0.1	+0.9	+1.0	-0.8	-5.3	-6.1
North-Central Coast: Mendocino and Sonoma	*1.5*	*6.5*	*8.0*	+0.5	+2.4	+2.9	+0.5	+2.4	+2.9	+0.4	+1.7	+2.1	-0.2	-1.0	-1.3
North-Central Coast: Marin through San Mateo	*27.5*	*22.4*	*49.9*	+3.7	+3.0	+6.7	+3.7	+3.0	+6.7	+2.5	+2.0	+4.5	-17.3	-14.1	-31.3
South-Central Coast: Santa Cruz through San Luis Obispo	*31.1*	*77.4*	*108.5*	+1.3	+3.1	+4.4	+1.3	+3.1	+4.4	-7.7	-19.1	-26.8	-18.0	-44.9	-62.9
South Coast: Santa Barbara through San Diego	*402.5*	*122.8*	*525.3*	-	-	-	-	-	-	-	-	-	-224.6	-68.5	-293.1
California Total	***465.1***	***246.6***	***711.8***	**+5.8**	**+10.9**	**+16.7**	**+5.8**	**+10.9**	**+16.7**	**-4.7**	**-14.6**	**-19.3**	**-260.9**	**-133.8**	**-394.7**
Washington-Oregon-California Total	***521.8***	***313.7***	***835.5***	**+5.8**	+10.9	+16.7	**+5.8**	**+10.9**	**+16.7**	**-4.7**	**-14.6**	**-19.3**	**-260.9**	**-133.8**	**-394.7**

Table 4-128. Estimated change in bottomfish + Pacific halibut marine angler boat trips under No Action and change from No Action under the 2015-16 action alternatives (percent).

	No Action			PPA Option 1			Alt 1 Option 1			Alt 2 Option 1			
State / District	*Charter*	*Private*	*Total*	Charter	Private	Total	Charter	Private	Total	Charter	Private	Total	
Washington													
La Push-Neah Bay	*1.2*	*11.6*	*12.8*	-	-	-	-	-	-	-	-	-	
Westport	*15.5*	*2.5*	*18.0*	-	-	-	-	-	-	-	-	-	
Ilwaco-Chinook	*1.4*	*1.4*	*2.8*	-	-	-	-	-	-	-	-	-	
Washington Total	***18.1***	***15.5***	***33.6***	-	-	-	-	-	-	-	-	-	
Oregon													
Astoria	*0.2*	*0.5*	*0.7*	-	-	-	-	-	-	-	-	-	
Tillamook	*5.0*	*8.2*	*13.2*	-	-	-	-	-	-	-	-	-	
Newport	*24.6*	*18.0*	*42.6*	-	-	-	-	-	-	-	-	-	
Coos Bay	*5.1*	*8.3*	*13.4*	-	-	-	-	-	-	-	-	-	
Brookings	*3.6*	*16.6*	*20.2*	-	-	-	-	-	-	-	-	-	
Oregon Total	***38.5***	***51.6***	***90.2***	-	-	-	-	-	-	-	-	-	
California													
North Coast: Del Norte and Humboldt	*2.5*	*17.6*	*20.1*	+21.8%	+21.8%	+21.8%	+21.8%	+21.8%	+21.8%	+4.8%	+4.8%	+4.8%	
North-Central Coast: Mendocino and Sonoma	*1.5*	*6.5*	*8.0*	+46.9%	+46.9%	+46.9%	+46.9%	+46.9%	+46.9%	+26.4%	+26.4%	+26.4%	
North-Central Coast: Marin through San Mateo	*27.5*	*22.4*	*49.9*	+17.8%	+17.8%	+17.8%	+17.8%	+17.8%	+17.8%	+8.9%	+8.9%	+8.9%	
South-Central Coast: Santa Cruz through San Luis	*31.1*	*77.4*	*108.5*	+8.1%	+8.1%	+8.1%	+8.1%	+8.1%	+8.1%	-24.7%	-24.7%	-24.7%	
South Coast: Santa Barbara through San Diego	*402.5*	*122.8*	*525.3*	-	-	-	-	-	-	-	-	-	
California Total	*465.1*	*246.6*	*711.8*	+1.9%	+7.0%	+3.6%	+1.9%	+7.0%	+3.6%	-1.0%	-5.9%	-2.7%	
Washington-Oregon-California Total	*521.8*	*313.7*	*835.5*	+1.7%	+5.5%	+3.1%	+1.7%	+5.5%	+3.1%	-0.9%	-4.6%	-2.3%	

Table 4-128. Estimated change in bottomfish + Pacific halibut marine angler boat trips under No Action and change from No Action under the 2015-16 action alternatives (percent). (cont.)

	No Action			PPA Option 2			Alt 1 Option 2			Alt 2 Option 2			All Alts Option 3		
State / District	*Charter*	*Private*	*Total*	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**
Washington															
La Push-Neah	*1.2*	*11.6*	*12.8*	-	-	-	-	-	-	-	-	-	-	-	-
Westport	*15.5*	*2.5*	*18.0*	-	-	-	-	-	-	-	-	-	-	-	-
Ilwaco-Chinook	*1.4*	*1.4*	*2.8*	-	-	-	-	-	-	-	-	-	-	-	-
Washington Total	*18.1*	*15.5*	*33.6*	-	-	-	-	-	-	-	-	-	-	-	-
Oregon															
Astoria	*0.2*	*0.5*	*0.7*	-	-	-	-	-	-	-	-	-	-	-	-
Tillamook	*5.0*	*8.2*	*13.2*	-	-	-	-	-	-	-	-	-	-	-	-
Newport	*24.6*	*18.0*	*42.6*	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	*5.1*	*8.3*	*13.4*	-	-	-	-	-	-	-	-	-	-	-	-
Brookings	*3.6*	*16.6*	*20.2*	-	-	-	-	-	-	-	-	-	-	-	-
Oregon Total	*38.5*	*51.6*	*90.2*	-	-	-	-	-	-	-	-	-	-	-	-
California															
North Coast: Del Norte and Humboldt	*2.5*	*17.6*	*20.1*	+13.3%	+13.3%	+13.3%	+13.3%	+13.3%	+13.3%	+4.8%	+4.8%	+4.8%	-30.2%	-30.2%	-30.2%
North-Central Coast: Mendocino and	*1.5*	*6.5*	*8.0*	+36.6%	+36.6%	+36.6%	+36.6%	+36.6%	+36.6%	+26.4%	+26.4%	+26.4%	-15.7%	-15.7%	-15.7%
North-Central Coast: Marin through San Mateo	*27.5*	*22.4*	*49.9*	+13.4%	+13.4%	+13.4%	+13.4%	+13.4%	+13.4%	+8.9%	+8.9%	+8.9%	-62.8%	-62.8%	-62.8%
South-Central Coast: Santa Cruz through San	*31.1*	*77.4*	*108.5*	+4.1%	+4.1%	+4.1%	+4.1%	+4.1%	+4.1%	-24.7%	-24.7%	-24.7%	-58.0%	-58.0%	-58.0%
South Coast: Santa Barbara through San Diego	*402.5*	*122.8*	*525.3*	-	-	-	-	-	-	-	-	-	-55.8%	-55.8%	-55.8%
California Total	*465.1*	*246.6*	*711.8*	+1.3%	+4.4%	+2.3%	+1.3%	+4.4%	+2.3%	-1.0%	-5.9%	-2.7%	-56.1%	-54.2%	-55.5%
Washington-Oregon-California Total	*521.8*	*313.7*	*835.5*	+1.1%	+3.5%	+2.0%	+1.1%	+3.5%	+2.0%	-0.9%	-4.6%	-2.3%	-50.0%	-42.6%	-47.2%

4.3.2.3 Communities

No Action

Coastwide:

Compared to the 2003-12 baseline period, total groundfish ex-vessel revenue would increase by $12.4 million coastwide, or 18 percent under the No Action Alternative. Relative to the baseline period, No Action would produce the second smallest increase in ex-vessel revenue among the alternatives.

The average estimated coastwide unemployment rate under No Action is 9.3 percent (based on 2012 county statistics).

Estimated coastwide commercial fishery income impacts under the No Action alternative are $111.2 million. Estimated coastwide recreational fishery income impacts under the No Action alternative are $145.6 million.

Estimated coastwide commercial fishery employment impacts under the No Action alternative are 2,300 jobs. Estimated coastwide recreational fishery income impacts under the No Action alternative are 3,000 jobs.

Puget Sound:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $1.5 million in Puget Sound, or -46 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is the lowest among the coastal communities at 7.6 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $3 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 44 jobs.

Washington Coast:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $4.6 million on the Washington Coast, or 32 percent under the No Action Alternative. Note that revenues from landings in tribal groundfish fisheries are included in these totals but not in the income impact results since cost and earnings data for tribal vessels have not been formally surveyed.

The average estimated unemployment rate in the region under No Action is 10.6 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $21.7 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 464 jobs.

Astoria – Tillamook:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $5.7 million in Astoria-Tillamook, or 45 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 7.8 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $31 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 510 jobs.

Newport:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $3.7 million in Newport, or 35 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 9.3 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $27 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 532 jobs.

Coos Bay – Brookings:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $0.9 million in Coos Bay - Brookings, or -10 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 9.6 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $14.4 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 367 jobs.

Crescent City – Eureka:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $2.4 million in Crescent City - Eureka, or -40 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is the highest among the coastal communities at 10.9 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $7.3 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 163 jobs.

Fort Bragg – Bodega Bay:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $0.2 million in Fort Bragg – Bodega Bay, or 6 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 8 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $6.9 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 204 jobs.

San Francisco Area:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would decrease by $0.6 million in the San Francisco Area, or -35 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 8.2 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $10.3 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 203 jobs.

Santa Cruz – Monterey – Morro Bay:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $1.9 million in the Santa Cruz – Monterey – Morro Bay region, or 37 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 10.4 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $18.4 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 491 jobs.

Santa Barbara – Los Angeles – San Diego:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $1.7 million in the Santa Barbara – Los Angeles – San Diego region, or 61 percent under the No Action Alternative.

The average estimated unemployment rate in the region under No Action is 10 percent (based on 2012 county statistics).

Combined commercial plus recreational fisheries income impacts in the port area under No Action are $116.7 million.

Combined commercial plus recreational fisheries employment impacts in the port area under No Action are 2,300 jobs.

The Preferred Alternative

Coastwide:

Compared to the 2003-12 baseline period, total groundfish ex-vessel revenue would increase by $28.4 million coastwide in 2015 (41 percent). Relative to the baseline period, this alternative would produce the largest increase in ex-vessel revenue among the alternatives.

The change in commercial fisheries–related employment is projected to decrease the average coastwide unemployment rate under the Preferred Alternative (compared with No Action) by 0.003 percent (based on 2012 county statistics).

Coastwide combined commercial plus recreational fishery income impacts under the Preferred Alternative are projected to increase over No Action by $27.3 million (11 percent) under recreational option 1 and by $26.3 million (10 percent) under recreational option 2, but decrease by $49.2 million (-19 percent) under recreational option 3.

Coastwide combined commercial plus recreational fishery employment impacts under the Preferred Alternative are projected to increase over No Action by 529 jobs (10 percent) under recreational option 1 and by 510 jobs (10 percent) under recreational option 2, but decrease by 957 jobs (-18 percent) under recreational option 3.

Puget Sound:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $1 million (-31 percent) in the port area in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.001 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $0.9 million (29 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 11 jobs (26 percent) under all three recreational options.

Washington Coast:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $5.8 million on the Washington Coast in 2015 (40 percent). Note that revenues from landings in tribal groundfish fisheries are included in these totals but not in the income impact results since cost and earnings data for tribal vessels have not been formally surveyed.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.009 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $1.5 million (7 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 26 jobs (6 percent) under all three recreational options.

Astoria – Tillamook:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $10.9 million (85 percent) in Astoria-Tillamook in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.026 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $7.9 million (25 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 114 jobs (22 percent) under all three recreational options.

Newport:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $4.9 million (46 percent) in Newport in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.119 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $1.6 million (6 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 27 jobs (5 percent) under all three recreational options.

Coos Bay – Brookings:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $1.9 million (20 percent) in Coos Bay – Brookings in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.032 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $4.2 million (29 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 84 jobs (23 percent) under all three recreational options.

Crescent City – Eureka:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $0.6 million (-10 percent) in Crescent City – Eureka in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.086 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $3.6 million (50 percent) under recreational option 1, $3.5 million (48 percent) under recreational option 2, and $2.8 million (39 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 69 jobs (42 percent) under recreational option 1, 66 jobs (40 percent) under recreational option 2, and 52 jobs (32 percent) under recreational option 3.

Fort Bragg – Bodega Bay:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $1.2 million (32 percent) in Fort Bragg – Bodega Bay in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.010 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $2 million (29 percent) under recreational option 1, $2 million (28 percent) under recreational option 2, and $1.6 million (23 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 51 jobs (25 percent) under recreational option 1, 50 jobs (24 percent) under recreational option 2, and 42 jobs (21 percent) under recreational option 3.

San Francisco Area:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $0.1 million (5 percent) in the San Francisco Area in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.001 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $2.9 million (28 percent) under recreational option 1, $2.5 million (24 percent) under recreational option 2, and decrease by $3.6 million (-35 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 55 jobs (27 percent) under recreational option 1, 49 jobs (24 percent) under recreational option 2, and decrease by 64 jobs (-32 percent) under recreational option 3.

Santa Cruz – Monterey – Morro Bay:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $3.2 million (63 percent) in the Santa Cruz – Monterey – Morro Bay region in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) by 0.011 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $2.4 million (13 percent) under recreational option 1, $1.9 million (10 percent) under recreational option 2, and decrease by $4.7 million (-26 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 76 jobs (16 percent) under recreational option 1, 67 jobs (14 percent) under recreational option 2, and decrease by 67 jobs (-14 percent) under recreational option 3.

Santa Barbara – Los Angeles – San Diego:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $2.1 million (76 percent) in the Santa Barbara – Los Angeles – San Diego region in 2015.

The change in commercial fisheries–related employment is projected to slightly decrease the average regional unemployment rate under the Preferred Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Preferred Alternative are projected to increase over No Action by $0.5 million (0.4 percent) under recreational option 1and option 2, and decrease by $61.2 million (-53 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Preferred Alternative are projected to increase over No Action by 16 jobs (0.7 percent) under recreational option 1 and option 2, and decrease by 1,182 jobs (-51 percent) under recreational option 3.

Alternative 1

Coastwide:

Compared to the 2003-12 baseline period, total groundfish ex-vessel revenue would increase by $21.2 million coastwide in 2015 (30 percent). Relative to the baseline period, this alternative would produce the second largest increase in ex-vessel revenue among the alternatives.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.002 percent (based on 2012 county statistics).

Coastwide combined commercial plus recreational fishery income impacts under the Alternative 1 are projected to increase over No Action by $15 million (6 percent) under recreational option 1 and by $14 million (5 percent) under recreational option 2, but decrease by $61.6 million (-24 percent) under recreational option 3.

Coastwide combined commercial plus recreational fishery employment impacts under the Alternative 1 are projected to increase over No Action by 336 jobs (10 percent) under recreational option 1 and by 316 jobs (10 percent) under recreational option 2, but decrease by 1,150 jobs (-22 percent) under recreational option 3.

Puget Sound:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $1.2 million (-35 percent) in Puget Sound in 2015.

The change in commercial fisheries–related employment is projected to slightly decrease the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $0.6 million (19 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 8 jobs (18 percent) under all three recreational options.

Washington Coast:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $5.6 million on the Washington Coast in 2015 (39 percent). Note that revenues from landings in tribal groundfish fisheries are included in these totals but not in the income impact results since cost and earnings data for tribal vessels have not been formally surveyed.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.007 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $1.1 million (5 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 21 jobs (5 percent) under all three recreational options.

Astoria – Tillamook:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $8.2 million (64 percent) in Astoria-Tillamook in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.013 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $3.6 million (12 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 55 jobs (11 percent) under all three recreational options.

Newport:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $4.4 million (41 percent) in Newport in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.069 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $0.8 million (3 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 16 jobs (3 percent) under all three recreational options.

Coos Bay – Brookings:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $0.3 million (3 percent) in Coos Bay – Brookings in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.015 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $1.6 million (11 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 39 jobs (11 percent) under all three recreational options.

Crescent City – Eureka:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $1.9 million (-31 percent) in Crescent City – Eureka in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.026 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $1.1 million (16 percent) under recreational option 1, $1 million (14 percent) under recreational option 2, and $0.4 million (5 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 26 jobs (16 percent) under recreational option 1, 23 jobs (14 percent) under recreational option 2, and 9 jobs (6 percent) under recreational option 3.

Fort Bragg – Bodega Bay:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $0.9 million (23 percent) in Fort Bragg – Bodega Bay in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.008 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $1.3 million (19 percent) under recreational option 1, $1.3

million (18 percent) under recreational option 2, and $0.9 million (13 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 41 jobs (20 percent) under recreational option 1, 40 jobs (20 percent) under recreational option 2, and 33 jobs (16 percent) under recreational option 3.

San Francisco Area:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would decrease by $0.4 million (-25 percent) in the San Francisco Area in 2015.

The change in commercial fisheries–related employment is projected to slightly decrease the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $1.8 million (17 percent) under recreational option 1, $1.4 million (14 percent) under recreational option 2, and decrease by $4.7 million (-46 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 34 jobs (17 percent) under recreational option 1, 28 jobs (14 percent) under recreational option 2, and decrease by 85 jobs (-42 percent) under recreational option 3.

Santa Cruz – Monterey – Morro Bay:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $3.1 million (61 percent) in the Santa Cruz – Monterey – Morro Bay region in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.011 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $2.2 million (12 percent) under recreational option 1, $1.7 million (9 percent) under recreational option 2, and decrease by $5 million (-27 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 75 jobs (15 percent) under recreational option 1, 67 jobs (14 percent) under recreational option 2, and decrease by 68 jobs (-14 percent) under recreational option 3.

Santa Barbara – Los Angeles – San Diego:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $2.2 million (82 percent) in the Santa Barbara – Los Angeles – San Diego region.

The change in commercial fisheries–related employment is projected to slightly decrease the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

The average estimated unemployment rate in the region under the Alternative is projected to decrease slightly compared with No Action (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase over No Action by $0.7 million (0.6 percent) under recreational option 1 and option 2, and decrease by $61 million (-52 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase over No Action by 20 jobs (0.9 percent) under recreational option 1and option 2, and decrease by 1,177 jobs (-51 percent) under recreational option 3.

Alternative 2

Coastwide:

Compared to the 2003-12 baseline period, total groundfish ex-vessel revenue would increase by $12 million coastwide in 2015 (17 percent). Relative to the baseline period, this alternative would produce the lowest total coastwide increase in ex-vessel revenue among the alternatives.

The change in commercial fisheries–related employment is projected to slightly decrease the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Coastwide combined commercial plus recreational fishery income impacts under Alternative 2 are projected to decrease over No Action by $2.8 million (-1 percent) under recreational option 1 and option 2, and decrease by $74.7 million (-29 percent) under recreational option 3.

Coastwide combined commercial plus recreational fishery employment impacts under the Alternative 2 are projected to decrease over No Action by 30 jobs (-0.6 percent) under recreational option 1 and option 2, and decrease by 1,423 jobs (-27 percent) under recreational option 3.

Puget Sound:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $1.6 million (-47 percent) in Puget Sound in 2015.

The change in commercial fisheries–related employment is projected to slightly increase the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to decrease compared with No Action by $0.06 million (-2 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to decrease compared with No Action by 1 job (-3 percent) under all three recreational options.

Washington Coast:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $4.8 million on the Washington Coast in 2015 (34 percent). Note that revenues from landings in tribal groundfish fisheries are included in these totals but not in the income impact results since cost and earnings data for tribal vessels have not been formally surveyed.

The change in commercial fisheries–related employment is projected to increase the average regional unemployment rate under the Alternative (compared with No Action) by 0.001 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to decrease compared with No Action by $0.08 million (-0.4 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to decrease compared with No Action by 2 jobs (-0.5 percent) under all three recreational options.

Astoria – Tillamook:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $5.8 million (45 percent) in Astoria-Tillamook in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.001 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase compared with No Action by $0.1 million (0.3 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase compared with No Action by 3 jobs (0.6 percent) under all three recreational options.

Newport:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $3.6 million (34 percent) in Newport in 2015.

The change in commercial fisheries–related employment is projected to increase the average regional unemployment rate under the Alternative (compared with No Action) by 0.012 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to decrease compared with No Action by $0.2 million (-0.6 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to decrease compared with No Action by 3 jobs (-0.5 percent) under all three recreational options.

Coos Bay – Brookings:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $1.3 million (-13 percent) in Coos Bay – Brookings in 2015.

The change in commercial fisheries–related employment is projected to increase the average regional unemployment rate under the Alternative (compared with No Action) by 0.006 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to decrease compared with No Action by $0.5 million (-3 percent) under all three recreational options.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to decrease compared with No Action by 15 jobs (-4 percent) under all three recreational options.

Crescent City – Eureka:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would decrease by $2.4 million (-40 percent) in Crescent City – Eureka in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.002 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase compared with No Action by $0.03 million (0.4 percent) under recreational option 1 and option 2, and decrease by $0.5 million (-7 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase compared with No Action by 3 jobs (2 percent) under recreational option 1 and option 2, and decrease by 8 jobs (-5 percent) under recreational option 3.

Fort Bragg – Bodega Bay:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $0.1 million (3 percent) in Fort Bragg – Bodega Bay in 2015.

The change in commercial fisheries–related employment is projected to slightly increase the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase compared with No Action by $0.03 million (0.4 percent) under recreational option 1 and option 2, and decrease by $0.3 million (-4 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase compared with No Action by 3 jobs (1 percent) under recreational option 1 and option 2, and decrease by 3 jobs (-1.5 percent) under recreational option 3.

San Francisco Area:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would decrease by $0.6 million (-36 percent) in the San Francisco Area in 2015.

The change in commercial fisheries–related employment is projected to slightly decrease the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to increase compared with No Action by $0.7 million (6 percent) under recreational option 1 and option 2, and decrease by $5.1 million (-50 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to increase compared with No Action by 13 jobs (7 percent) under recreational option 1 and option 2, and decrease by 93 jobs (-46 percent) under recreational option 3.

Santa Cruz – Monterey – Morro Bay:

Compared to the 2003-12 baseline period, groundfish ex-vessel revenue would increase by $1.9 million (38 percent) in the Santa Cruz – Monterey – Morro Bay region in 2015.

The change in commercial fisheries–related employment is projected to decrease the average regional unemployment rate under the Alternative (compared with No Action) by 0.004 percent (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to decrease compared with No Action by $2.6 million (-14 percent) under recreational option 1 and option 2, and decrease by $6.2 million (-34 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to decrease compared with No Action by 31 jobs (-6 percent) under recreational option 1 and option 2, and decrease by 103 jobs (-21 percent) under recreational option 3.

Santa Barbara – Los Angeles – San Diego:

Compared to the 2003-12 baseline period groundfish ex-vessel revenue would increase by $1.5 million (56 percent) in the Santa Barbara – Los Angeles – San Diego region in 2015.

The change in commercial fisheries–related employment is projected to slightly increase the average regional unemployment rate under the Alternative (compared with No Action) (based on 2012 county statistics).

Combined commercial plus recreational fishery income impacts in the port area under the Alternative are projected to decrease compared with No Action by $0.2 million (-0.2 percent) under recreational option 1 and option 2, and decrease by $62 million (-53 percent) under recreational option 3.

Combined commercial plus recreational fishery employment impacts in the port area under the Alternative are projected to decrease compared with No Action by 1 job (-0 percent) under recreational option 1 and option 2, and decrease by 1,198 jobs (-52 percent) under recreational option 3.

Table 4-129. Change in commercial fishery income impacts (from No Action) under the action alternatives by community group ($1,000).

Community Groups	*No Action ($,000)*	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Puget Sound	*2,987*	+850	+559	-64	+1,013	+725	+92
Washington Coast	*16,084*	+1,507	+1,149	-79	+1,807	+1,482	+211
Astoria-Tillamook	*29,943*	+7,850	+3,644	+99	+8,104	+3,890	+273
Newport	*22,331*	+1,571	+820	-167	+1,909	+1,163	+110
Coos Bay-Brookings	*11,964*	+4,168	+1,648	-455	+4,703	+2,183	-33
Crescent City-Eureka	*5,772*	+3,275	+806	-40	+3,438	+968	+77
Fort Bragg - Bodega Bay	*6,226*	+1,691	+1,000	-161	+2,042	+1,355	+134
San Francisco Area	*2,250*	+1,431	+345	-58	+1,496	+413	-3
SC – Mo - MB	*7,705*	+1,485	+1,302	+19	+1,971	+1,797	+481
SB – LA - SD	*5,987*	+524	+737	-197	+975	+1,204	+239
Coastwide Total	*111,249*	+24,351	+12,010	-1,104	+27,458	+15,179	+1,581

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-130. Change in commercial fishery income impacts (from No Action) under the action alternatives by community group (percent).

Community Groups	*No Action ($,000)*	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Puget Sound	*2,987*	+ 28.5%	+ 18.7%	- 2.1%	+ 33.9%	+ 24.3%	+ 3.1%
Washington Coast	*16,084*	+ 9.4%	+ 7.1%	- 0.5%	+ 11.2%	+ 9.2%	+ 1.3%
Astoria-Tillamook	*29,943*	+ 26.2%	+ 12.2%	+ 0.3%	+ 27.1%	+ 13.0%	+ 0.9%
Newport	*22,331*	+ 7.0%	+ 3.7%	- 0.7%	+ 8.5%	+ 5.2%	+ 0.5%
Coos Bay-Brookings	*11,964*	+ 34.8%	+ 13.8%	- 3.8%	+ 39.3%	+ 18.2%	- 0.3%
Crescent City-Eureka	*5,772*	+ 56.7%	+ 14.0%	- 0.7%	+ 59.6%	+ 16.8%	+ 1.3%
Fort Bragg - Bodega Bay	*6,226*	+ 27.2%	+ 16.1%	- 2.6%	+ 32.8%	+ 21.8%	+ 2.1%
San Francisco Area	*2,250*	+ 63.6%	+ 15.3%	- 2.6%	+ 66.5%	+ 18.3%	- 0.1%
SC – Mo - MB	*7,705*	+ 19.3%	+ 16.9%	+ 0.2%	+ 25.6%	+ 23.3%	+ 6.2%
SB – LA - SD	*5,987*	+ 8.8%	+ 12.3%	- 3.3%	+ 16.3%	+ 20.1%	+ 4.0%
Coastwide Total	*111,249*	+ 21.9%	+ 10.8%	- 1.0%	+ 24.7%	+ 13.6%	+ 1.4%

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-131. Change in commercial fishery employment impacts (from No Action) under the action alternatives by community group (number of jobs).

Community Groups	*No Action*	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Puget Sound	*44*	+11	+8	-1	+14	+11	+1
Washington Coast	*308*	+26	+21	-2	+33	+28	+4
Astoria-Tillamook	*478*	+114	+55	+3	+118	+60	+7
Newport	*394*	+27	+16	-3	+33	+22	+3
Coos Bay-Brookings	*299*	+84	+39	-15	+94	+50	-6
Crescent City-Eureka	*131*	+61	+19	+2	+65	+22	+4
Fort Bragg - Bodega Bay	*190*	+45	+35	-1	+58	+48	+10
San Francisco Area	*55*	+29	+8	+0	+30	+9	+1
SC – Mo - MB	*274*	+58	+58	+23	+70	+70	+34
SB – LA - SD	*169*	+16	+20	-1	+25	+30	+8
Coastwide Total	*2,341*	+472	+278	+5	+542	+350	+67

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-132. Change in commercial fishery employment impacts (from No Action) under the action alternatives by community group (percent).

Community Groups	*No Action*	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Puget Sound	*44*	+ 25.7%	+ 17.7%	- 2.7%	+ 31.9%	+ 24.0%	+ 3.2%
Washington Coast	*308*	+ 8.6%	+ 6.9%	- 0.7%	+ 10.7%	+ 9.2%	+ 1.4%
Astoria-Tillamook	*478*	+ 23.8%	+ 11.5%	+ 0.7%	+ 24.8%	+ 12.5%	+ 1.4%
Newport	*394*	+ 6.9%	+ 4.0%	- 0.7%	+ 8.5%	+ 5.6%	+ 0.7%
Coos Bay-Brookings	*299*	+ 28.1%	+ 13.2%	- 5.0%	+ 31.6%	+ 16.7%	- 2.1%
Crescent City-Eureka	*131*	+ 47.1%	+ 14.4%	+ 1.2%	+ 49.7%	+ 17.0%	+ 3.2%
Fort Bragg - Bodega Bay	*190*	+ 23.5%	+ 18.3%	- 0.4%	+ 30.4%	+ 25.3%	+ 5.5%
San Francisco Area	*55*	+ 52.7%	+ 14.1%	+ 0.4%	+ 55.2%	+ 16.8%	+ 2.5%
SC – Mo - MB	*274*	+ 21.3%	+ 21.1%	+ 8.3%	+ 25.6%	+ 25.5%	+ 12.4%
SB – LA - SD	*169*	+ 9.6%	+ 12.1%	- 0.5%	+ 15.1%	+ 17.8%	+ 4.9%
Coastwide Total	*2,341*	+ 20.1%	+ 11.9%	+ 0.2%	+ 23.1%	+ 15.0%	+ 2.8%

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-133. Change in regional unemployment rates[t] for all industries (from No Action) resulting from commercial fishery employment impacts under the action alternatives by community group.

Community Groups	*No Action*[t]	2015_PA	2015_A1	2015_A2	2016_PA	2016_A1	2016_A2
Puget Sound	*7.553%*	-0.001%	-0.000%	+0.000%	-0.001%	-0.000%	-0.000%
Washington Coast	*10.553%*	-0.009%	-0.007%	+0.001%	-0.011%	-0.010%	-0.001%
Astoria-Tillamook	*7.772%*	-0.026%	-0.013%	-0.001%	-0.027%	-0.014%	-0.001%
Newport	*9.295%*	-0.119%	-0.069%	+0.012%	-0.148%	-0.097%	-0.011%
Coos Bay-Brookings	*9.551%*	-0.032%	-0.015%	+0.006%	-0.036%	-0.019%	+0.002%
Crescent City-Eureka	*10.916%*	-0.086%	-0.026%	-0.002%	-0.091%	-0.031%	-0.006%
Fort Bragg - Bodega Bay	*7.960%*	-0.010%	-0.008%	+0.000%	-0.013%	-0.011%	-0.002%
San Francisco Area	*8.221%*	-0.001%	-0.000%	-0.000%	-0.001%	-0.000%	-0.000%
SC – Mo - MB	*10.394%*	-0.011%	-0.011%	-0.004%	-0.013%	-0.013%	-0.007%
SB – LA - SD	*10.015%*	-0.000%	-0.000%	+0.000%	-0.000%	-0.000%	-0.000%
Coastwide Total	*9.333%*	-0.003%	-0.002%	-0.000%	-0.003%	-0.002%	-0.000%

t Based on 2012 county labor force and employment statistics from the Bureau of Labor Statistics http://www.bls.gov/data/

SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-134. Change in recreational fishery income impacts (from No Action) by community group ($1,000).

Community Groups	*No Action ($,000)*	PA Op1	PA Op2	Alt1 Op1	Alt1 Op2	Alt2 Op1	Alt2 _Op2	Op3 (All Alts)
Puget Sound	-	-	-	-	-	-	-	-
Washington Coast	*5,606*	-	-	-	-	-	-	-
Astoria-Tillamook	*1,023*	-	-	-	-	-	-	-
Newport	*4,722*	-	-	-	-	-	-	-
Coos Bay-Brookings	*2,465*	-	-	-	-	-	-	-
Crescent City-Eureka	*1,498*	+327	+200	+327	+200	+73	+73	-452
Fort Bragg - Bodega Bay	*714*	+335	+262	+335	+262	+189	+189	-112
San Francisco Area	*8,034*	+1,428	+1,073	+1,428	+1,073	+718	+718	-5,045
SC – Mo – MB*	*10,711*	+870	+435	+870	+435	-2,645	-2,645	-6,212
SB – LA – SD*	*110,778*	-	-	-	-	-	-	-61,813
Coastwide Total	*145,552*	+2,960	+1,969	+2,960	+1,969	-1,666	-1,666	-73,635

Table 4-135. Change in recreational fishery income impacts (from No Action) by community group (percent).

Community Groups	*No Action ($,000)*	PA Op1	PA Op2	Alt1 Op1	Alt1 Op2	Alt2 Op1	Alt2 _Op2	Op3 (All Alts)
Puget Sound	-	-	-	-	-	-	-	-
Washington Coast	*5,606*	-	-	-	-	-	-	-
Astoria-Tillamook	*1,023*	-	-	-	-	-	-	-
Newport	*4,722*	-	-	-	-	-	-	-
Coos Bay-Brookings	*2,465*	-	-	-	-	-	-	-
Crescent City-Eureka	*1,498*	+21.8%	+13.3%	+21.8%	+13.3%	+4.8%	+4.8%	-30.2%
Fort Bragg - Bodega Bay	*714*	+46.9%	+36.6%	+46.9%	+36.6%	+26.4%	+26.4%	-15.7%
San Francisco Area	*8,034*	+17.8%	+13.4%	+17.8%	+13.4%	+8.9%	+8.9%	-62.8%
SC – Mo – MB*	*10,711*	+8.1%	+4.1%	+8.1%	+4.1%	-24.7%	-24.7%	-58.0%
SB – LA – SD*	*110,778*	-	-	-	-	-	-	-55.8%
Coastwide Total	*145,552*	+2.0%	+1.4%	+2.0%	+1.4%	-1.1%	-1.1%	-50.6%

Table 4-136. Change in recreational fishery employment impacts (from No Action) by community group (number of jobs).

Community Groups	*No Action*	PA Op1	PA Op2	Alt1 Op1	Alt1 Op2	Alt2 Op1	Alt2 _Op2	Op3 (All Alts)
Puget Sound	-	-	-	-	-	-	-	-
Washington Coast	*155*	-	-	-	-	-	-	-
Astoria-Tillamook	*32*	-	-	-	-	-	-	-
Newport	*139*	-	-	-	-	-	-	-
Coos Bay-Brookings	*68*	-	-	-	-	-	-	-
Crescent City-Eureka	*33*	+7	+4	+7	+4	+2	+2	-10
Fort Bragg - Bodega Bay	*14*	+6	+5	+6	+5	+4	+4	-2
San Francisco Area	*148*	+26	+20	+26	+20	+13	+13	-93
SC – Mo – MB*	*216*	+18	+9	+18	+9	-53	-53	-125
SB – LA – SD*	*2,146*	-	-	-	-	-	-	-1,198
Coastwide Total	*2,952*	+57	+38	+57	+38	-35	-35	-1,428

Table 4-137. Change in recreational fishery employment impacts (from No Action) by community group (percent).

Community Groups	*No Action (jobs)*	PA Op1	PA Op2	Alt1 Op1	Alt1 Op2	Alt2 Op1	Alt2 _Op2	Op3 (All Alts)
Puget Sound	-	-	-	-	-	-	-	-
Washington Coast	*155*	-	-	-	-	-	-	-
Astoria-Tillamook	*32*	-	-	-	-	-	-	-
Newport	*139*	-	-	-	-	-	-	-
Coos Bay-Brookings	*68*	-	-	-	-	-	-	-
Crescent City-Eureka	*33*	+21.8%	+13.3%	+21.8%	+13.3%	+4.8%	+4.8%	-30.2%
Fort Bragg - Bodega Bay	*14*	+46.9%	+36.6%	+46.9%	+36.6%	+26.4%	+26.4%	-15.7%
San Francisco Area	*148*	+17.8%	+13.4%	+17.8%	+13.4%	+8.9%	+8.9%	-62.8%
SC – Mo – MB*	*216*	+8.1%	+4.1%	+8.1%	+4.1%	-24.7%	-24.7%	-58.0%
SB – LA – SD*	*2,146*	-	-	-	-	-	-	-55.8%
Coastwide Total	*2,952*	+1.9%	+1.3%	+1.9%	+1.3%	-1.2%	-1.2%	-48.4%

Table 4-138. Change in combined commercial plus recreational fishery income impacts (from No Action) by community group in 2015 ($1,000).[t]

Community Groups	*No Action*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*2,987*	+850	+850	+850	+559	+559	+559	-64	-64	-64
Washington Coast	*21,690*	+1,507	+1,507	+1,507	+1,149	+1,149	+1,149	-79	-79	-79
Astoria-Tillamook	*30,966*	+7,850	+7,850	+7,850	+3,644	+3,644	+3,644	+99	+99	+99
Newport	*27,053*	+1,571	+1,571	+1,571	+820	+820	+820	-167	-167	-167
Coos Bay-Brookings	*14,429*	+4,168	+4,168	+4,168	+1,648	+1,648	+1,648	-455	-455	-455
Crescent City-Eureka	*7,270*	+3,601	+3,474	+2,823	+1,132	+1,005	+354	+32	+32	-492
Fort Bragg - Bodega Bay	*6,940*	+2,025	+1,952	+1,578	+1,335	+1,262	+888	+27	+27	-274
San Francisco Area	*10,285*	+2,859	+2,504	-3,615	+1,773	+1,418	-4,701	+660	+660	-5,103
SC – Mo - MB	*18,416*	+2,355	+1,920	-4,727	+2,172	+1,737	-4,910	-2,626	-2,626	-6,193
SB – LA - SD	*116,764*	+524	+524	-61,289	+737	+737	-61,076	-197	-197	-62,010
Coastwide Total	*256,801*	+27,311	+26,320	-49,284	+14,970	+13,979	-61,625	-2,770	-2,770	-74,739

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

t Although strictly speaking, the two measures are not directly additive due to the slightly different estimation procedures used, combined income impacts generated by commercial and recreational fishing activities displayed here and in the following tables are provided to facilitate comparison of the alternatives.

Table 4-139. Change in combined commercial plus recreational fishery income impacts (from No Action) by community group in 2015 (percent)[t].

Community Groups	*No Action ($,000)*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*2,987*	+28.5%	+28.5%	+28.5%	+18.7%	+18.7%	+18.7%	-2.1%	-2.1%	-2.1%
Washington Coast	*21,690*	+6.9%	+6.9%	+6.9%	+5.3%	+5.3%	+5.3%	-0.4%	-0.4%	-0.4%
Astoria-Tillamook	*30,966*	+25.4%	+25.4%	+25.4%	+11.8%	+11.8%	+11.8%	+0.3%	+0.3%	+0.3%
Newport	*27,053*	+5.8%	+5.8%	+5.8%	+3.0%	+3.0%	+3.0%	-0.6%	-0.6%	-0.6%
Coos Bay-Brookings	*14,429*	+28.9%	+28.9%	+28.9%	+11.4%	+11.4%	+11.4%	-3.2%	-3.2%	-3.2%
Crescent City-Eureka	*7,270*	+49.5%	+47.8%	+38.8%	+15.6%	+13.8%	+4.9%	+0.4%	+0.4%	-6.8%
Fort Bragg - Bodega Bay	*6,940*	+29.2%	+28.1%	+22.7%	+19.2%	+18.2%	+12.8%	+0.4%	+0.4%	-3.9%
San Francisco Area	*10,285*	+27.8%	+24.3%	-35.1%	+17.2%	+13.8%	-45.7%	+6.4%	+6.4%	-49.6%
SC – Mo - MB	*18,416*	+12.8%	+10.4%	-25.7%	+11.8%	+9.4%	-26.7%	-14.3%	-14.3%	-33.6%
SB – LA - SD	*116,764*	+0.4%	+0.4%	-52.5%	+0.6%	+0.6%	-52.3%	-0.2%	-0.2%	-53.1%
Coastwide Total	*256,801*	+10.6%	+10.2%	-19.2%	+5.8%	+5.4%	-24.0%	-1.1%	-1.1%	-29.1%

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-140. Change in combined commercial plus recreational fishery income impacts (from No Action) by community group in 2016 ($1,000)[t].

Community Groups	*No Action ($,000)*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*2,987*	+1,013	+1,013	+1,013	+725	+725	+725	+92	+92	+92
Washington Coast	*21,690*	+1,807	+1,807	+1,807	+1,482	+1,482	+1,482	+211	+211	+211
Astoria-Tillamook	*30,966*	+8,104	+8,104	+8,104	+3,890	+3,890	+3,890	+273	+273	+273
Newport	*27,053*	+1,909	+1,909	+1,909	+1,163	+1,163	+1,163	+110	+110	+110
Coos Bay-Brookings	*14,429*	+4,703	+4,703	+4,703	+2,183	+2,183	+2,183	-33	-33	-33
Crescent City-Eureka	*7,270*	+3,764	+3,637	+2,986	+1,295	+1,168	+516	+150	+150	-375
Fort Bragg - Bodega Bay	*6,940*	+2,376	+2,303	+1,929	+1,690	+1,617	+1,243	+323	+323	+21
San Francisco Area	*10,285*	+2,925	+2,569	-3,549	+1,841	+1,486	-4,633	+714	+714	-5,049
SC – Mo - MB	*18,416*	+2,841	+2,406	-4,241	+2,667	+2,232	-4,415	-2,164	-2,164	-5,731
SB – LA - SD	*116,764*	+975	+975	-60,839	+1,204	+1,204	-60,609	+239	+239	-61,575
Coastwide Total	*256,801*	+30,418	+29,428	-46,177	+18,139	+17,148	-58,456	-85	-85	-72,055

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-141. Change in combined commercial plus recreational fishery income impacts (from No Action) by community group in 2016 (percent)[t].

Community Groups	*No Action ($,000)*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*2,987*	+33.9%	+33.9%	+33.9%	+24.3%	+24.3%	+24.3%	+3.1%	+3.1%	+3.1%
Washington Coast	*21,690*	+8.3%	+8.3%	+8.3%	+6.8%	+6.8%	+6.8%	+1.0%	+1.0%	+1.0%
Astoria-Tillamook	*30,966*	+26.2%	+26.2%	+26.2%	+12.6%	+12.6%	+12.6%	+0.9%	+0.9%	+0.9%
Newport	*27,053*	+7.1%	+7.1%	+7.1%	+4.3%	+4.3%	+4.3%	+0.4%	+0.4%	+0.4%
Coos Bay-Brookings	*14,429*	+32.6%	+32.6%	+32.6%	+15.1%	+15.1%	+15.1%	-0.2%	-0.2%	-0.2%
Crescent City-Eureka	*7,270*	+51.8%	+50.0%	+41.1%	+17.8%	+16.1%	+7.1%	+2.1%	+2.1%	-5.2%
Fort Bragg - Bodega Bay	*6,940*	+34.2%	+33.2%	+27.8%	+24.3%	+23.3%	+17.9%	+4.6%	+4.6%	+0.3%
San Francisco Area	*10,285*	+28.4%	+25.0%	-34.5%	+17.9%	+14.4%	-45.0%	+6.9%	+6.9%	-49.1%
SC – Mo - MB	*18,416*	+15.4%	+13.1%	-23.0%	+14.5%	+12.1%	-24.0%	-11.7%	-11.7%	-31.1%
SB – LA - SD	*116,764*	+0.8%	+0.8%	-52.1%	+1.0%	+1.0%	-51.9%	+0.2%	+0.2%	-52.7%
Coastwide Total	*256,801*	+11.8%	+11.5%	-18.0%	+7.1%	+6.7%	-22.8%	-0.0%	-0.0%	-28.1%

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-142. Change in combined commercial plus recreational fishery employment impacts (from No Action) by community group in 2015 (jobs)[t].

Community Groups	*No Action*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*44*	+11	+11	+11	+8	+8	+8	-1	-1	-1
Washington Coast	*464*	+26	+26	+26	+21	+21	+21	-2	-2	-2
Astoria-Tillamook	*510*	+114	+114	+114	+55	+55	+55	+3	+3	+3
Newport	*532*	+27	+27	+27	+16	+16	+16	-3	-3	-3
Coos Bay-Brookings	*367*	+84	+84	+84	+39	+39	+39	-15	-15	-15
Crescent City-Eureka	*163*	+69	+66	+52	+26	+23	+9	+3	+3	-8
Fort Bragg - Bodega Bay	*204*	+51	+50	+42	+41	+40	+33	+3	+3	-3
San Francisco Area	*203*	+55	+49	-64	+34	+28	-85	+13	+13	-93
SC – Mo - MB	*491*	+76	+67	-67	+75	+67	-68	-31	-31	-103
SB – LA - SD	*2,315*	+16	+16	-1,182	+20	+20	-1,177	-1	-1	-1,198
Coastwide Total	*5,293*	+529	+510	-957	+336	+316	-1,150	-30	-30	-1,423

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-143. Change in combined commercial plus recreational fishery employment impacts (from No Action) by community group in 2015 (percent)[t].

Community Groups	*No Action (jobs)*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*44*	+25.7%	+25.7%	+25.7%	+17.7%	+17.7%	+17.7%	-2.7%	-2.7%	-2.7%
Washington Coast	*464*	+5.7%	+5.7%	+5.7%	+4.6%	+4.6%	+4.6%	-0.5%	-0.5%	-0.5%
Astoria-Tillamook	*510*	+22.3%	+22.3%	+22.3%	+10.8%	+10.8%	+10.8%	+0.6%	+0.6%	+0.6%
Newport	*532*	+5.1%	+5.1%	+5.1%	+2.9%	+2.9%	+2.9%	-0.5%	-0.5%	-0.5%
Coos Bay-Brookings	*367*	+22.8%	+22.8%	+22.8%	+10.7%	+10.7%	+10.7%	-4.1%	-4.1%	-4.1%
Crescent City-Eureka	*163*	+42.0%	+40.3%	+31.6%	+15.9%	+14.2%	+5.5%	+1.9%	+1.9%	-5.1%
Fort Bragg - Bodega Bay	*204*	+25.0%	+24.4%	+20.9%	+20.2%	+19.5%	+16.0%	+1.4%	+1.4%	-1.5%
San Francisco Area	*203*	+27.2%	+23.9%	-31.7%	+16.8%	+13.6%	-42.1%	+6.6%	+6.6%	-45.8%
SC – Mo - MB	*491*	+15.5%	+13.7%	-13.7%	+15.4%	+13.6%	-13.8%	-6.2%	-6.2%	-20.9%
SB – LA - SD	*2,315*	+0.7%	+0.7%	-51.0%	+0.9%	+0.9%	-50.8%	-0.0%	-0.0%	-51.8%
Coastwide Total	*5,293*	+10.0%	+9.6%	-18.1%	+6.3%	+6.0%	-21.7%	-0.6%	-0.6%	-26.9%

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

t Although strictly speaking, the two measures are not directly additive due to the slightly different estimation procedures used, combined employment impacts generated by commercial and recreational fishing activities displayed here and in the following tables are provided to facilitate comparison of the alternatives.

Table 4-144. Change in combined commercial plus recreational fishery employment impacts (from No Action) by community group in 2016 (jobs)[t].

Community Groups	*No Action (jobs)*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*44*	+14	+14	+14	+11	+11	+11	+1	+1	+1
Washington Coast	*464*	+33	+33	+33	+28	+28	+28	+4	+4	+4
Astoria-Tillamook	*510*	+118	+118	+118	+60	+60	+60	+7	+7	+7
Newport	*532*	+33	+33	+33	+22	+22	+22	+3	+3	+3
Coos Bay-Brookings	*367*	+94	+94	+94	+50	+50	+50	-6	-6	-6
Crescent City-Eureka	*163*	+72	+69	+55	+29	+27	+12	+6	+6	-6
Fort Bragg - Bodega Bay	*204*	+64	+63	+56	+54	+53	+46	+14	+14	+8
San Francisco Area	*203*	+57	+50	-63	+36	+29	-84	+15	+15	-92
SC – Mo - MB	*491*	+88	+79	-55	+88	+79	-55	-19	-19	-91
SB – LA - SD	*2,315*	+25	+25	-1,172	+30	+30	-1,168	+8	+8	-1,189
Coastwide Total	*5,293*	+599	+580	-887	+408	+388	-1,078	+32	+32	-1,362

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-145. Change in combined commercial plus recreational fishery employment impacts (from No Action) by community group in 2016 (percent)[t].

Community Groups	*No Action (jobs)*	PA Op1	PA Op2	PA Op3	Alt1 Op1	Alt1 Op2	Alt1 Op3	Alt2 Op1	Alt2 _Op2	Alt2 _Op3
Puget Sound	*44*	+31.9%	+31.9%	+31.9%	+24.0%	+24.0%	+24.0%	+3.2%	+3.2%	+3.2%
Washington Coast	*464*	+7.1%	+7.1%	+7.1%	+6.1%	+6.1%	+6.1%	+0.9%	+0.9%	+0.9%
Astoria-Tillamook	*510*	+23.2%	+23.2%	+23.2%	+11.7%	+11.7%	+11.7%	+1.3%	+1.3%	+1.3%
Newport	*532*	+6.3%	+6.3%	+6.3%	+4.1%	+4.1%	+4.1%	+0.5%	+0.5%	+0.5%
Coos Bay-Brookings	*367*	+25.7%	+25.7%	+25.7%	+13.6%	+13.6%	+13.6%	-1.7%	-1.7%	-1.7%
Crescent City-Eureka	*163*	+44.1%	+42.5%	+33.8%	+18.0%	+16.3%	+7.6%	+3.6%	+3.6%	-3.4%
Fort Bragg - Bodega Bay	*204*	+31.5%	+30.8%	+27.3%	+26.7%	+26.0%	+22.5%	+6.9%	+6.9%	+4.1%
San Francisco Area	*203*	+27.8%	+24.6%	-31.0%	+17.5%	+14.3%	-41.4%	+7.2%	+7.2%	-45.2%
SC – Mo - MB	*491*	+17.9%	+16.1%	-11.3%	+17.8%	+16.1%	-11.3%	-4.0%	-4.0%	-18.6%
SB – LA - SD	*2,315*	+1.1%	+1.1%	-50.6%	+1.3%	+1.3%	-50.4%	+0.4%	+0.4%	-51.4%
Coastwide Total	*5,293*	+11.3%	+11.0%	-16.7%	+7.7%	+7.3%	-20.4%	+0.6%	+0.6%	-25.7%

Note: SC- Mo –MB: Santa Cruz - Monterey - Morro Bay; SB – LA – SD: Santa Barbara - Los Angeles - San Diego.

Table 4-146. Change in groundfish ex-vessel revenue from baseline 2003-12 average annual revenue (inflation-adjusted $2013) ($ million).

Community Groups	*Baseline*	No Action	2015 PA	2015 Alt1	2015 Alt2	2016 PA	2016 Alt1	2016 Alt2
Puget Sound	*3.4*	*-1.5*	-1.0	-1.2	-1.6	-0.9	-1.1	-1.5
Washington Coast	*14.4*	+4.6	+5.8	+5.6	+4.8	+6.2	+6.1	+5.3
Astoria-Tillamook	*12.8*	+5.7	+10.9	+8.2	+5.8	+11.1	+8.4	+5.9
Newport	*10.5*	+3.7	+4.9	+4.4	+3.6	+5.1	+4.6	+3.8
Coos Bay-Brookings	*9.6*	-0.9	+1.9	+0.3	-1.3	+2.3	+0.7	-1.0
Crescent City-Eureka	*5.9*	-2.4	-0.6	-1.9	-2.4	-0.5	-1.8	-2.3
Fort Bragg - Bodega Bay	*3.9*	+0.2	+1.2	+0.9	+0.1	+1.5	+1.1	+0.3
San Francisco Area	*1.8*	-0.6	+0.1	-0.4	-0.6	+0.1	-0.4	-0.6
Santa Cruz - Monterey - Morro Bay	*5.0*	+1.9	+3.2	+3.1	+1.9	+3.6	+3.5	+2.3
Santa Barbara - Los Angeles - San Diego	*2.7*	+1.7	+2.1	+2.2	+1.5	+2.4	+2.6	+1.9
Shoreside Total	*70.1*	+12.4	+28.4	+21.2	+12.0	+30.9	+23.7	+14.1

Table 4-147. Change in groundfish ex-vessel revenue from baseline 2003-12 average annual revenue (inflation-adjusted $2013) (percent).

Community Groups	*Baseline ($ million)*	No Action	2015 PA	2015 Alt1	2015 Alt2	2016 PA	2016 Alt1	2016 Alt2
Puget Sound	*3.4*	-45.5%	-30.7%	-35.4%	-46.6%	-27.8%	-32.5%	-43.9%
Washington Coast	*14.4*	+32.1%	+40.3%	+39.1%	+33.5%	+43.3%	+42.3%	+36.5%
Astoria-Tillamook	*12.8*	+44.6%	+85.0%	+64.3%	+45.2%	+86.3%	+65.6%	+46.1%
Newport	*10.5*	+35.4%	+46.4%	+41.3%	+34.2%	+48.8%	+43.8%	+36.2%
Coos Bay-Brookings	*9.6*	-9.5%	+19.7%	+2.9%	-13.2%	+23.7%	+6.9%	-10.1%
Crescent City-Eureka	*5.9*	-40.3%	-10.4%	-31.4%	-40.1%	-8.6%	-29.6%	-38.8%
Fort Bragg - Bodega Bay	*3.9*	+5.6%	+31.7%	+22.5%	+2.8%	+38.1%	+29.0%	+8.1%
San Francisco Area	*1.8*	-34.6%	+4.7%	-24.9%	-36.3%	+6.6%	-22.9%	-34.7%
Santa Cruz - Monterey - Morro Bay	*5.0*	+37.1%	+63.1%	+60.6%	+38.3%	+71.5%	+69.2%	+46.3%
Santa Barbara - Los Angeles - San Diego	*2.7*	+61.4%	+75.8%	+81.5%	+56.4%	+87.8%	+93.9%	+68.0%
Shoreside Total	*70.1*	+17.7%	+40.5%	+30.2%	+17.0%	+44.1%	+33.8%	+20.2%

4.3.2.4 Processors

No Action

Under No Action, total purchases of groundfish landings by shoreside processors of $82.6 million are projected. This total includes projected purchases of $28.6 million of whiting, and $54 million in deliveries of combined non-whiting groundfish species. (Note: Average ex-vessel values observed for groundfish deliveries in 2013 are assumed).

The Preferred Alternative

Compared with No Action, under the Preferred Alternative total groundfish purchases by processors are projected to increase by $16 million (19 percent) in 2015 and $18.5 million (22 percent) in 2016. Purchases of whiting are the same as under No Action, while deliveries of combined non-whiting groundfish species increase by 30 percent in 2015 and 34 percent in 2016. These values describe the highest level of non-whiting groundfish and total groundfish purchases among the action alternatives.

Alternative 1

Compared with No Action, under Alternative 1 total groundfish purchases by processors are projected to increase by $8.8 million (11 percent) in 2015 and $11.3 million (14 percent) in 2016. Purchases of whiting are the same as under No Action, while deliveries of combined non-whiting groundfish species increase by 16 percent in 2015 and 21 percent in 2016. These values describe the second highest overall level of non-whiting groundfish and total groundfish purchases among the action alternatives.

Alternative 2

Compared with No Action, under the Alternative 2 total groundfish purchases by processors are projected to decrease by $0.4 million (-1 percent) in 2015 and increase by $1.8 million (2 percent) in 2016. Purchases of whiting are the same as under No Action, while deliveries of combined non-whiting groundfish species decrease by 1 percent in 2015 and increase by 3 percent in 2016. These values describe the lowest overall level of non-whiting groundfish and total groundfish purchases among the action alternatives.

Table 4-148. Change from No Action in shoreside processors' groundfish purchases by species group under the 2015-16 alternatives ($ million).

Alternative:	No Action	2015_PA	2015_Alt1	2015_Alt2	2016_PA	2016_Alt1	2016_Alt2
Whiting	*28.6*	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Non-whiting	*54.0*	+16.0	+8.8	-0.4	+18.5	+11.3	+1.8
TOTAL CHANGE	*82.6*	+16.0	+8.8	-0.4	+18.5	+11.3	+1.8

Table 4-149. Change from No Action in shoreside processors' groundfish purchases by species group under the 2015-16 alternatives (percent).

Alternative:	No Action	2015_PA	2015_Alt1	2015_Alt2	2016_PA	2016_Alt1	2016_Alt2
Whiting	*28.6*	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%	+0.00%
Non-whiting	*54.0*	+29.64%	+16.27%	-0.80%	+34.25%	+20.96%	+3.25%
TOTAL CHANGE	*82.6*	+19.38%	+10.64%	-0.53%	+22.39%	+13.70%	+2.12%

4.3.2.5 Effects on the IFQ Fishery of Alternative ACLs for Widow Rockfish and Pacific Whiting

In addition to the No Action and Preferred ACL alternatives for widow rockfish of 1,500 mt the Council also considered an alternative widow rockfish ACL of 3,000 mt. Results of the 3,000 mt widow rockfish ACL analysis could be applied to any of the action alternatives analyzed above. Widow rockfish are encountered in the Pacific whiting fishery and have also historically been a midwater trawl target species along with yellowtail rockfish. Consequently, in conjunction with the TAC decision that is ultimately adopted for Pacific whiting (in a separate action), the ACL decision for widow rockfish will help determine (1) to what degree the Pacific whiting fisheries, particularly the at-sea catcher-processor and mothership sectors, will be able to harvest their Pacific whiting allocations, and (2) the potential to expand opportunities in the non-whiting midwater trawl fishery for widow and yellowtail rockfish.

Effects of alternative Pacific whiting TACs on the trawl fishery

Table 4-150 shows a range of possible whiting sector allocations derived from an historical analysis of Pacific whiting harvest limits (OY, U.S. TAC) during 2005-2013. Note that during most of this period widow rockfish was being managed under a rebuilding plan. In addition to the 2013 whiting allocation levels assumed in alternatives, four scenarios are shown including the lowest and highest values observed for each whiting sector during the 2005-2013 period, and two additional scenarios, one derived by subtracting 50 percent from the lowest scenario, and another by adding 50 percent to the highest scenario, respectively. These are based on examination of “final” sector allocations during the 2005-2013 period (i.e., after all in-season reallocations) and consequently the potential sector allocations shown do not necessarily adhere to the initial intersector allocation shares of the Pacific whiting commercial harvest guideline specified in the FMP (i.e., at-sea Catcher-Processors 34%, at-sea Motherships 24% and Shorebased IFQ sector 42%; see PFMC 2011). The hypothetical whiting sector allocations shown are used to (1) illustrate associated impacts on whiting sector ex-vessel revenues (i.e., the equivalent of what would be paid to catcher vessel operators upon delivery to the processors), and (2) estimate potential ex-vessel revenue impacts generated by the shoreside midwater trawl fishery for widow and yellowtail rockfish.

Shoreside sector Pacific whiting allocations shown in Table 4-150 under the alternative U.S. TAC scenarios range from 20,369 mt to 147,446 mt. The highest and lowest final allocations for the shoreside sector were 98,297 mt which occurred in 2013 and 40,738 mt in 2009, respectively. By comparison, the allocation assumed for the shoreside sector under the alternatives is 85,697 mt, the original shoreside sector allocation in 2013.

Allocations under the alternative TACs for the whiting mothership sector range from 12,017 mt to 87,131 mt. The highest and lowest final allocations for the sector were 58,087 mt in 2008 and 24,034 mt in 2009, respectively. The allocation assumed for the mothership sector under the alternatives is 48,969 mt, the original mothership sector allocation in 2013.

Allocations under the alternative TACs for the catcher-processor sector range from 17,688 mt to 173,684 mt. The highest and lowest final allocations for the sector were 115,789 mt recorded in 2008 and 35,376 mt in 2009, respectively. By comparison, the allocation for the catcher-processor sector assumed under the alternatives is 69,373 mt, the original catcher-processor sector allocation in 2013.

Table 4-151 shows the potential whiting sector ex-vessel revenues associated with the range of Pacific whiting TAC alternatives shown in Table 4-150. Estimated potential revenues under the alternatives are also shown for comparison. Revenues are projected by assuming all sectors take their entire allocation delivered at average 2013 shoreside ex-vessel prices. Ex-vessel revenues for the catcher-processor sector are imputed to represent the equivalent value for the volume of whiting harvested by catcher-processors.

Table 4-151 shows potential ex-vessel revenues for the three combined, non-Tribal commercial whiting sectors ranging from $13.3 million to $108.6 million, compared with a projected level of $54.3 million under the integrated alternatives. Potential mothership sector revenues under the whiting TAC scenarios are shown to range from $3.2 million to $23.2 million compared with a projected level of $12.8 million under the alternatives. Catcher-processor sector (equivalent) revenues under the whiting TAC scenarios range from $4.7 million to $46.2 million, compared with $18.5 million projected under the alternatives.

Shoreside sector revenues under the whiting TAC scenarios range from $5.4 million to $39.2 million compared with $22.8 million projected under the alternatives. Based on patterns observed in the 2013 fishery, about 44 percent of shoreside whiting ex-vessel revenues is projected to derive from landings delivered to Newport, with Astoria projected to receive about 34 percent, and ports on the Washington coast receiving about 21 percent of total shoreside Pacific whiting sector ex-vessel revenues.

Effects of alternative widow rockfish ACLs on the trawl fishery

As mentioned above, the widow rockfish ACL will partially determine to what extent the shoreside trawl sector is able to conduct a midwater trawl fishery targeting on widow and yellowtail rockfish. Each commercial whiting sector will leverage its available widow rockfish (and the other bycatch species) to maximize Pacific whiting catch up to the sector's allocation. Having assured that the bycatch requirements of the Pacific whiting harvest are satisfied, additional widow rockfish quota available to the shoreside trawl sector will likely be used in the midwater fishery for widow rockfish and yellowtail rockfish.

Table 4-152 shows potential Pacific whiting catch by the three non-Tribal commercial whiting sectors under the different widow rockfish ACL and intersector allocation options and two sets of assumed widow rockfish bycatch rates: (1) the average widow rockfish bycatch rate over 2005-2011 (during which period widow rockfish was being managed under a rebuilding plan), and (2) the maximum annual bycatch rate observed during that period. Unshaded cells in Table 4-152 indicate scenarios where the widow rockfish ACL is not likely to constrain Pacific whiting harvest even under the "Highest plus 50 percent" Pacific whiting TAC option for that sector shown in Table 4-150. Conversely the shaded cells indicate scenarios where under the assumed widow rockfish ACL and bycatch rate the sector may be unable to harvest up to its "Highest plus 50 percent" Pacific whiting TAC option.[57]

A key point to note here is that under the higher assumed widow rockfish bycatch rate, the mothership and catcher-processor sectors may become limited by widow rockfish bycatch under both of the widow rockfish ACL alternatives. However under the average assumed 2005-2011 widow rockfish bycatch rates, no sector appears to be potentially limited by widow rockfish bycatch under either widow rockfish ACL alternative. The difference in bycatch rates observed between the sectors is thought to be primarily due to the different areas and times of year in which the sectors' fisheries usually occur.

Another implication of this analysis is that Table 4-152 indicates the shoreside whiting sector appears not to be limited by widow rockfish bycatch under either widow rockfish ACL alternative. Assuming adequate widow bycatch has been allotted to take the shoreside sector's "Highest plus 50 percent" whiting allocation, Table 4-153 calculates potential maximum harvest and ex-vessel revenue in a directed widow rockfish-yellowtail rockfish fishery under the widow rockfish ACL alternatives. Table 4-153 shows that assuming the average 2001 widow-yellowtail encounter (landing) rate and 2013 ex-vessel

[57] In is important to note that in recent years, largely due to the effectiveness of avoidance measures, widow rockfish bycatch has not imposed a constraint on the ability of the Tribal or non-tribal whiting fisheries to harvest their sector allocations of Pacific whiting.

prices, combined landings of widow plus yellowtail rockfish in a directed fishery may have an ex-vessel value between approximately $1.2 million and $1.6 million under the 1,500 mt widow ACL alternative, and between $3.9 million and $4.3 million under the 3,000 mt widow ACL alternative, depending on the assumed bycatch rate.

By way of comparison, PacFIN landings data show that the widow-yellowtail midwater trawl fishery in 2001 landed approximately 1,700 mt of widow rockfish and 1,500 mt of yellowtail rockfish. At an average ex-vessel price of about $1,000 per metric ton, the total ex-vessel value of these landings was approximately $3.7 million. Landings from that fishery were widely distributed in ports north of 40°10' N. latitude. The greatest share (35 percent) were landed in Astoria, with 15 percent landed in Newport, 15 percent on the Washington coast, 13 percent in Puget Sound ports, 6 percent in Brookings, 6 percent in Eureka, 5 percent in Coos Bay, and 3 percent in Crescent City.

Landings data from the midwater IFQ fishery in more recent years may indicate a much lower widow rockfish encounter rate than was evident in 2001 (Table 3-6). In 2001 the ratio of yellowtail rockfish landings to widow rockfish landings was approximately 0.85:1 (1,471 mt yellowtail to 1,729 mt widow). In 2013 the same ratio in an admittedly much smaller fishery was 1.8:1 (391 mt yellowtail to 214 mt widow). Using the 2013 landings ratio in place of the 2001 statistic implies that potential yellowtail rockfish landings and associated ex-vessel revenue in the midwater fishery may be more than double the amounts shown in Table 4-153.

Table 4-150. Range of potential Pacific whiting allocations by sector based on actual annual 2005-2013 final sector allocations compared with values projected under the alternatives (mt).*

	Shoreside Sector		Mothership Sector		Catcher-Processor Sector		Total implied combined commercial whiting sectors' TAC (mt)
ACL Scenario	**mt**	**year**	**mt**	**year**	**mt**	**year**	
Lowest minus 50%	20,369	-	12,017	-	17,688	-	50,074
Lowest	40,738	(2009)	24,034	(2009)	35,376	(2009)	100,148
Highest	98,297	(2013)	58,087	(2008)	115,789	(2008)	272,173
Highest plus 50%	147,446	-	87,131	-	173,684	-	408,260
2013 (Assumed under the Alternatives)	85,697	(2013)	48,969	(2013)	69,373	(2013)	204,039

* Based on examination of "final" sector allocations each year during the period (i.e., after all in-season reallocations). Note that the potential sector allocations shown do not necessarily adhere to intersector allocation shares in the FMP.

Table 4-151. Potential Pacific whiting sector ex-vessel revenues under the range of Pacific whiting sector allocations compared with values projected under the alternatives ($ million)*

HG Scenario	Shoreside Sector	Mothership Sector	Catcher-Processor Sector	Commercial Whiting Sectors Total
Lowest minus 50%	5.4	3.2	4.7	13.3
Lowest	10.8	6.4	9.4	26.6
Highest	26.2	15.5	30.8	72.4
Highest plus 50%	39.2	23.2	46.2	108.6
2013 Original (Assumed under the Alternatives)	22.8	13.0	18.5	54.3

* Assuming average 2013 shoreside ex-vessel prices and all sectors take their entire allocations.

Ex-vessel revenues for the catcher-processor sector represent the equivalent value of raw whiting harvested.

Table 4-152. Projected potential whiting catch at the average and maximum widow bycatch rates for whiting sectors during 2005-2011.*

Widow ACL Alt. (mt)	Widow Allocation Option	Projected potential whiting catch (mt) at the average widow bycatch rate			Projected potential whiting catch (mt) at the highest widow bycatch rate		
		Shoreside	MS	CP	Shoreside	MS	CP
1,500	No Action	741,282	122,534	356,860	373,244	78,601	171,152
3,000	No Action	1,759,416	122,534	356,860	885,885	78,601	171,152

*Highlighted cells show projected maximum potential whiting catch levels that are lower than the "Highest plus 50%" whiting HG, indicating a potential widow rockfish bycatch constraint under that scenario.

Table 4-153. Potential residual widow and yellowtail rockfish harvest by the shoreside trawl sector after assumed "Highest plus 50%" whiting harvest guideline has been taken.*

Widow ACL Alt. (mt)	Widow Allocation Alternative	Using average 2005-2011 whiting-per-widow bycatch rate			Using maximum 2005-2011 whiting-per-widow bycatch rate		
		Widow mt	Yellowtail mt	Revenue $,000	Widow mt	Yellowtail mt	Revenue $,000
1,500	No Action	796	678	$1,589	601	512	$1,200
3,000	No Action	2,161	1,839	$4,314	1,966	1,673	$3,925

*Note: Assumes average and highest whiting-per-widow bycatch rates observed during 2005-2011, average yellowtail-per-widow landings rates observed in 2001, and 2013 widow and yellowtail rockfish ex-vessel prices.

4.3.2.6 Impacts of alternative ACLs for Dover sole

Under the individual quota program Dover sole has become one of the primary targets of the shorebased trawl fleet. In testimony to the Council, industry representatives have argued that raising the ACL for Dover sole above the No Action level of 25,000 mt would increase vessel QP use caps for the stock and could help attract larger volume retail and food service outlets. The 50,000 mt ACL for Dover sole under the current preferred alternative would result in a commercial fishery harvest guideline of 48,406 mt and an assumed allocation of approximately 45,981 mt to the shorebased IFQ sector.

To the extent markets are able to absorb more Dover sole, a higher ACL may result in greater harvest levels and revenue. However at some point participants may not have sufficient QP for co-occurring target species (thornyheads, sablefish, etc.) and constraining overfished species that are caught with Dover sole, thus limiting harvesters' ability to freely target Dover sole.

From 2003 to 2012 historical catch of Dover sole ranged from a high of 12,475 mt in 2009 to a low of 7,134 mt in 2012. Over the same period the ACL ranged from a high of 25,000 mt in 2011 and 2012 to a low of 7,440 mt at the beginning of the time series. The highest catch level (12,475 mt in 2009) occurred under an ACL of 16,500 mt (Figure 4-32).

Figure 4-33 compares trends over the 2003-2012 time period in ex-vessel prices ($/lb) and ACL attainment (catch/ACL). The figure shows the ACL attainment share fluctuating starting from a very high level when the ACL was relatively low prior to 2007 to attainment levels around 30 percent in 2011 and 2012. It is noteworthy that the lowest attainment levels in the time series occurred under IFQ management, however it is not clear what factors contributed to the recent apparently declining trend in Dover sole catch and ACL attainment since 2009. It may also be noteworthy that current dollar average ex-vessel prices (total revenue / total landings) for Dover sole were the highest for the time series in the most recent years (2011 and 2012), having recovered from their lowest levels recorded during relatively higher harvests in 2009 and 2010. In inflation-adjusted terms, average Dover sole ex-vessel prices have been fairly flat and were slightly lower in 2012 than at the beginning of the time series in 2002.

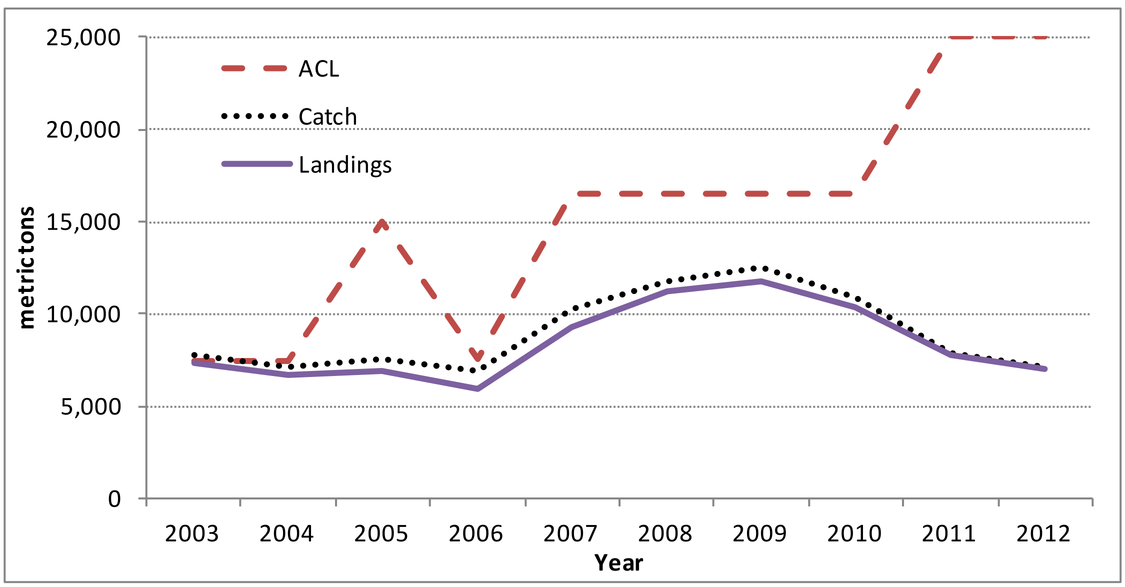


Figure 4-32. ACLs, catch and landings for Dover sole: 2003-2012

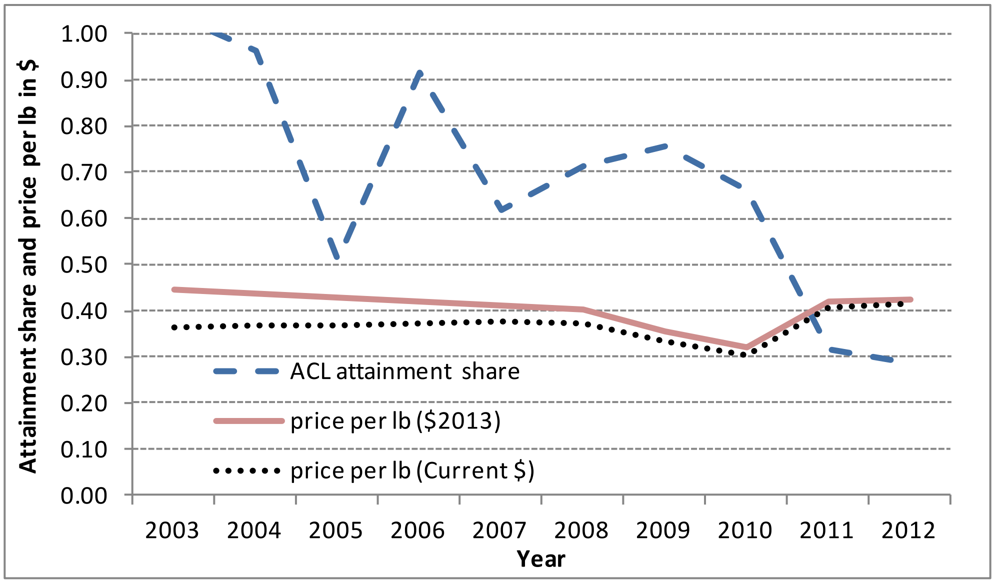


Figure 4-33. Attainment share (catch/ACL) and price per pound in current and inflation-adjusted $2013 for Dover sole: 2003-2012

4.3.2.7 Implications of attainment assumptions for Dover sole and widow rockfish on IFQ sector revenues and community impacts

Revenue and income impacts for IFQ sector fisheries were generally modeled assuming historic average 2011-2013 attainment rates (total QPs debited / sector allocation) would apply under the 2015-16 alternatives. On average during 2011-2013, approximately 35 percent of the IFQ sector allocation of Dover sole and approximately 43 percent of the IFQ sector allocation of widow rockfish were debited as quota ponds caught. Applying these percentages to the IFQ sector allocations under the Preferred Alternative (Dover sole 45,981 mt, and widow rockfish 1,457 mt) resulted in estimated catch of about 15,700 mt of Dover sole and about 600 mt of widow rockfish. In addition, approximately 2,450 mt of yellowtail rockfish are projected to be landed under the preferred alternative by the IFQ sector. Assuming average 2013 ex-vessel prices per mt of $970 for Dover sole, $1,050 for widow rockfish and $1,110 for yellowtail rockfish, these landings would generate ex-vessel values of approximately $15 million for Dover sole, $0.6 million for widow rockfish and $2.7 million for yellowtail rockfish.

However if larger shares of the IFQ sector allocations for these species were able to be caught and landed at the same exvessel price levels, then ex-vessel values would be correspondingly higher. As a polar case, if virtually the entire IFQ sector allocations of 45,981 mt for Dover sole and 1,457 mt for widow rockfish were able to be landed at the average 2013 ex-vessel prices, then ex-vessel revenues of approximately $44 million for Dover sole and $1.5 million for widow rockfish would be realized. Increased landings of widow rockfish in the midwater fishery would also leverage increased landings of yellowtail rockfish. Applying the 2013 landings ratio of 1.8 mt of yellowtail rockfish per mt of widow rockfish implies that the additional 857 mt of widow landings (1,457 - 600) would be accompanied by up to 1,500 mt of additional yellowtail rockfish landings. Valued at the average 2013 ex-vessel price for yellowtail rockfish, these landings would result in an additional $1.7 million in yellowtail rockfish ex-vessel revenue.

Note that these calculations ignore the possible effects of decreased ex-vessel prices with increasing harvests and difficulties associated with catch of other co-occurring species. The likely increases in catch of overfished species and co-occurring target species (other than yellowtail rockfish) are not accounted for in these simple calculations. It is uncertain whether existing allocations of constraining overfished species or target species such as sablefish would be sufficient to allow attainment of the entire IFQ sector allocation of Dover sole, or to what degree harvesters would prioritize using relatively scarce and valuable sablefish quota to leverage increased harvests of Dover sole.

Most of the potential increases in ex-vessel revenue and associated income and employment impacts resulting from increased landings of Dover sole, widow rockfish and yellowtail rockfish ex-vessel would accrue to port areas with involvement in trawl IFQ fisheries. Based on 2013 landings patterns, the three port areas with the highest involvement in the shorebased whiting fishery are Newport (45 percent), Astoria (34 percent) and Washington Coast (Westport: 21 percent). The seven port areas with greatest involvement in non-whiting trawl IFQ fisheries are Astoria (37 percent), Coos Bay (16 percent), Eureka (10 percent), Newport (9 percent), Fort Bragg (8 percent), Brookings (6 percent) and Washington Coast (Westport: 6 percent).

4.3.2.8 New Management Measures for Commercial Fisheries

4.3.2.9 New Management Measures for Recreational Fisheries

4.4 Impacts of 2015-2016 Harvest Specifications and Management Measures on Essential Fish Habitat

4.4.1 Impact Mechanism

Setting harvest specifications does not directly affect essential fish habitat (EFH). Furthermore, an analysis of groundfish trawl logbook data does not reveal any clear relationship between catch limits and fishing effort (see Appendix A). As discussed in Section 3.3.3.3, fishing effort in the shoreside trawl fishery has declined substantially since 2010 while catch generally increased. The effort is likely a function if the introduction of IFQ management and related changes in fishery operations. Section 3.2.3 reports participation trends in groundfish fixed gear and trawl fisheries during the baseline period. Non-nearshore fishery participation has remained relatively stable while nearshore fishery participation has declined. The trend in effective fishing effort is not directly related to participation, but it is unlikely that fishing effort increased during the baseline period, based on information on participation presented in Section 3.2.3 and the analysis of trawl logbook data presented in Section 3.3.3.3. Alternative harvest specifications proposed for the 2015-2016 biennial period are indistinguishable with respect to the effect on EFH. To the degree that the amount and spatio-temporal distribution of gear-specific fishing effort does not change from historical patterns, adverse impacts to EFH from the groundfish fishery are likely to be equivalent to the historical impacts described in Section 3.3, which serves as a proxy for describing the impacts of the No Action Alternative (summarized below).

The proposed action does indirectly mitigate adverse impacts to EFH from fishing through the use of time/area closures. As discussed in Sections 3.3 and 4.4, Groundfish Conservation Areas (GCAs), established as top-down measures to reduce bycatch of overfish species, have an ancillary mitigating impact on the adverse impacts of groundfish fisheries on EFH by prohibiting fishing within these areas.[58] If an area is closed for an extended period of time, the EFH within it may recover from these adverse impacts. Estimates of recovery times for EFH are shown in Table 3-24 by habitat and gear type causing

[58] Other closed areas, principally EFH Conservation Areas, were established with the objective of mitigating such impacts or (in the case of MPAs) addressing a variety of objectives closely related to habitat protection. However, establishing or modifying these areas is not part of the proposed action.

the impact. These range from less than a year to decades. Although the maximum recovery time shown in the table is 56 years (the upper end of the range of recovery times for offshore biogenic habitat impacted by trawl gear), estimates range into centuries for some deepwater coral species.

4.4.2 NMFS Implementation of Council Recommendation on Trawl RCA in 2014

Under the action alternatives the trawl RCA boundaries would be changed to 100 to 150 fathoms year round in the area north of 40°10’ N lat. to 48°10’ N lat. (the RCA south of this latitude already has 100-150 fm boundaries). As discussed in Section 3.3, the Council originally proposed this change in April 2013 as an inseason action. NMFS prepared an environmental assessment (EA) to evaluate the impacts to EFH of this proposal (NMFS 2014b). The Council reviewed a draft of the EA at their September 2013 meeting and reiterated the proposed change. In April 2014 NMFS published a final rule (79 FR 21639) that partially implemented the Council proposal but established the seaward boundary between 40°10’ N lat. and 45°46’ N lat. at 200 fathoms.[59] This configuration thus represents No Action with respect to the trawl RCA. The difference between the No Action Alternative and the action alternatives is therefore only the area between the 150 fm depth contour and 200 fm seaward boundary between 40°10’ N lat. and 45°46’ N lat.

The preamble to the final rule identifies several reasons for the decision not to open the aforementioned portion of the trawl RCA. An overarching reason is that “there is insufficient record to conclude that the seaward boundary modification … minimizes adverse effects on groundfish EFH caused by fishing to the extent practicable.” NMFS notes that the area has been closed to bottom trawling since 2004 and “benethic habitats may have, to some extent, recovered from previous groundfish bottom trawling impacts.” NMFS also cites the Council’s ongoing 5-year review of groundfish EFH identification and related mitigated measures implemented by Amendment 19 to FMP. As part of this process proposals have come to light for new EFH conservation areas within this area. For this reason, NMFS concluded that opening this area would be “premature.” In response to a comment NMFS provides still another reason for keeping this portion of the RCA in place: “…it may have greater conservation value than portions of the actual ‘core’ RCA (between the 100 fm and 150 fm lines…)” which would remain closed under the Council’s proposal.

4.4.3 Summary of the Impact of the Alternatives on Essential Fish Habitat

4.4.3.1 The No Action Alternative

Under No Action the harvest specifications and management measures in place in 2014 would continue in effect, although inseason action could be taken to adjust routine management measures. As noted above, the characterization of the environmental baseline in Section 3.3 is the best available summary of the impact in the future, because there are no models or methodology available to estimate the amount and spatial distribution of fishing effort, and thus effects on EFH, resulting from the proposed action. Using information about the environmental baseline, the following possible effects are noted:

- Based on historical trends, fishing effort in the bottom trawl portion of the shoreside IFQ fishery is not likely to increase. Bottom trawl effort fell substantially with the implementation of IFQ management (see Figure 3-22). Bottom trawl gear has greater adverse impacts to groundfish EFH compared to other gear types.
- A portion of the shoreside IFQ fishery is using fixed gear to catch their IFQ. Fixed gear has less adverse impact on groundfish EFH compared to bottom trawl. Hard substrate (rocky habitat) is

[59] During November through February (bimonthly periods 6 and 1) the modified 200 fathom line is implemented. These modifications allow access to areas where petrale sole are abundant.

more accessible to fixed gear but recovery times are shorter for fixed gear even in comparison to bottom trawl gear for soft substrate, which is generally rated to recover faster from the adverse impacts of fishing.

- In 2014 NMFS partially implemented a Council recommendation to reduce the size of the trawl RCA between 40°10' N lat. and 48°10' N lat. The environmental baseline now includes the trawl activity in these open areas for the remainder of 2014. Under No Action, trawl fishing would continue to be permitted in these areas.

No Action: The current trawl RCA configuration, including the partial implementation of the Council action to open additional area between trawl RCA between 40°10' N lat. and 48°10' N lat.

4.4.3.2 The Preferred Alternative

As discussed in Section 4.4.1, a correlation between the size of target species ACLs and bottom trawl fishing effort estimated from logbook data could not find a correlation. At some of level of magnitude, it is reasonable to conclude that fishing opportunity, dictated overall by ACLs and mediated by sector allocations and related management measures, affects fishing effort. A crude way of representing the difference between Alternative 1 and No Action is the difference between the sum of all the ACLs under each alternative. The sum of Alternative 1 ACLs for 2015 (not including Pacific whiting) is 44,736 mt greater than No Action, a 53% increase. Put another way, out of the 38 stocks for which ACLs are established and a comparison can be made with No Action, 25 show an increase from No Action.[60] However, 25,000 mt of this difference in the ACL is represented by the increase in the Dover sole ACL; as discussed in Section 4.3.2.6, there is not enough historical evidence to demonstrate that this increase would be accompanied by a comparable increase in catch. The sum of the non-whiting ACLs for 2015, 129,060 mt, is larger than summed values for any year during the baseline period when the largest value was 119,371 mt. (It is important to bear in mind that the stock definitions for which individual ACLs are set have changed over time. Thus these sums are not exactly comparable, but at this gross scale the changes in the recent past have probably not by themselves substantially affected fishery behavior.) While no conclusion can be made about how ACLs and resulting fishing opportunity may affect the distribution of fishing effort, it is reasonable to conclude that fishing effort is more likely to increase than to decrease.

Under the Preferred Alternative, the Council reiterates its previous recommendation on changing the trawl RCA boundary. Because of NMFS action in 2014, the effect of this recommendation would be to open the area from 150 fm to 200 fm between 40°10' N lat. and 45°46' N lat. This would have adverse impacts to EFH that had fully recovered from the past effects of bottom trawl in this area.

4.4.3.3 Alternative 1

Under No Action there are 10 stocks where the ACL is set equal to the ABC and a P* value less than 0.45 is used. Under Alternative 1 the P* value used is 0.45 in all cases, indicating a policy change from No Action (however, six of these stocks, have ACLs set for geographic subdivisions of a coastwide value so effectively the P* policy choice only comes into play in seven cases). Otherwise, ACLs are expected to increase in cases where spawning stock abundance is increasing. The sum of the 2015 ACLs under Alternative 1 is 106,733 mt; the main difference from the Preferred Alternative is that the No Action ACL of 25,000 mt would apply under Alternative 1 rather than the Preferred alternative ACL of 50,000 mt.

[60] Because spiny dogfish is removed from the Other Fish complex, which has further changes through the designation of EC species, only 38 out of 40 ACLs for the 2015-2016 biennium can be compared.

The Council recommendation to change the trawl RCA boundary from 150 fm to 200 fm between 40°10' N lat. and 45°46' N lat. would apply under this alternative. With no information demonstrating that a substantial change in fishing effort is likely, and management measures with mitigating effects on the adverse impacts of fishing the same as No Action, it is reasonable to conclude that the impacts of Alternative 1 would not be discernibly different from the effects under No Action.

4.4.3.4 Alternative 2

Under No Action there are 25 stocks where the ACL is set equal to the ABC based on a P* value. Under Alternative 2 the P* value used is 0.25 in all cases, indicating a policy change from No Action (however, six of these stocks, have ACLs set for geographic subdivisions of a coastwide value so effectively the P* policy choice comes into play in 22 cases). . The sum of the 2015 ACLs under Alternative 2 is 82,512 mt, which is 1,814 mt less than the sum of No Action ACLs. At a gross level, this suggests that fishing opportunity, fishing effort, and resulting adverse impacts on EFH is not likely to increase compared to No Action.

The Council recommendation to change the trawl RCA boundary from 150 fm to 200 fm between 40°10' N lat. and 45°46' N lat. would under this alternative. With no information demonstrating that a substantial change in fishing effort is likely, and management measures with mitigating effects on the adverse impacts of fishing the same as No Action, it is reasonable to conclude that the impacts of Alternative 2 would not be discernibly different from the effects under No Action.

4.5 Impacts of 2015-2016 Harvest Specifications and Management Measures on the California Current Ecosystem

As discussed in Section 4.12, Kaplan (2014, reproduced in Appendix A) used the Atlantis California Current Ecosystem Model to evaluate the harvest policies proposed in the Amendment 24 alternatives to simulate and evaluate food web impacts of groundfish fisheries. As discussed by Kaplan, direct and indirect impacts only begin to manifest themselves over the long term (he used a simulation period of 30 years). While the 2015-2016 alternatives are similar are broadly similar to the Amendment 24 Alternatives used to evaluate long-term impacts, they would only be relevant with respect to ecosystem impacts if they were kept in place for a longer time period than 2 years. However, the whole purpose of the biennial process is to adaptively adjust harvest specifications and management measures in light of new information about the status of stocks. The Council may also take into account broader effects, such as indirect and cumulative ecosystem effects when it biennial considers adjustments to harvest specifications and management measures. Starting in 2012, the Council has been receiving annual reports from NOAA's California Current Integrated Ecosystem Assessment Program to support such considerations.

The Atlantis simulation compared groundfish removals to a recent average catch benchmark to evaluate a broad range of potential harvest policies encompassing the alternatives considered in this EIS. Only at very high catch levels relative to historic catch would substantial indirect (food web) effects be manifested.[61] However, within the Atlantis model these harvest levels led to substantial depletion of groundfish stocks. The policy framework and biennial process allows continual adjustment in reaction to new information. It is highly likely that if the 2015-2016 harvest specifications were found to contribute to an increasing depletion trend for a stock harvest policies would be changed in response during a subsequent biennial period.

[61] It is important to keep in mind that the evaluation is relative to baseline conditions. Section 3.2.3 reviews another Atlantis simulation (Kaplan, *et al.* 2012) that evaluated food web effects of fisheries relative to an unfished state.

For information on the impacts to the CCE of setting harvest specifications see Section 4.12.

4.6 Impacts of 2015-2016 Harvest Specifications and Management Measures on Protected Species

Setting harvest specifications does not directly affect protected species. Furthermore, an analysis of groundfish trawl logbook data does not reveal any clear relationship between catch limits and fishing effort (see Appendix A). As discussed in Section 3.3.3.3, fishing effort in the shoreside trawl fishery has declined substantially since 2010 while catch generally increased. Equivalent information is unavailable for fixed gear fisheries. Section 3.2.3 reports participation trends in groundfish fixed gear and trawl fisheries during the baseline period. Non-nearshore fishery participation has remained relatively stable while nearshore fishery participation has declined. The trend in effective fishing effort is not directly related to participation, but it is unlikely that fishing effort increased during the baseline period. Alternative harvest specifications proposed for the 2015-2016 biennial period are indistinguishable with respect to the effect on protected species. To the degree that the amount and spatio-temporal distribution of gear-specific fishing effort does not change from historical patterns, adverse impacts to protected species from the groundfish fishery are likely to be equivalent to the historical impacts described in Section 3.5, which serves as a proxy for describing the impacts of the No Action Alternative.

NMFS has prepared Incidental Take Statements for species listed under the ESA taken in groundfish fisheries. A Biological Opinion for salmonids was prepared in 1999 and supplemented in 2006. Based on these Opinions the expected level of take the Pacific whiting fishery is 11,000 Chinook salmon per year and 9,000 Chinook salmon in the bottom trawl fishery (NMFS 2006). Bycatch of other salmonid species is modest so no specified threshold was established for any other salmonid.

A Biological Opinion for take of other listed species by the groundfish fishery was prepared in 2012 (NMFS 2012a). NMFS PRD initially found that of the listed species occurring in the ESA action area, the continued operation of the groundfish fishery could adversely impact the eulachon southern DPS, southern DPS of green sturgeon, humpback whales, Stellar sea lions, and leatherback sea turtles. The eastern Stellar sea lion DPS was subsequently delisted. Section 3.5.2.2 describes the ITS from this Biological Opinion. At this time there is no information to indicate the fishery has changed in a way such that these ITS levels are likely to be exceeded during the next biennial period. Under the terms and conditions in the BO NMFS established a Pacific Coast Groundfish and Endangered Species Workgroup (PCGW) in cooperation with the USFWS and the Council. The PCGW held its second meeting in February 2014. If new information shows that the levels specified in the ITS have been exceeded NMFS will reinitiate consultation and develop any necessary mitigation measures through that process.

The USFWS initiated a Section 7 consultation with NMFS for species in its area of responsibility. USFWS concurred with NMFS's conclusion (NMFS 2012b) that operation of the Pacific Coast groundfish fishery is not likely to adversely affect marbled murrelet, California least tern, southern sea otter, bull trout or bull trout critical habitat. T herefore, the Section 7 consultation and Biological Opinion focused on the effects of the fishery on short-tailed albatross. Prior to the conclusion of the consultation the Council was notified that USFWS would include in the terms and conditions that NMFS establish regulations requiring the use of streamer lines on commercial groundfish longline vessels 55 feet in length or greater. The current biological opinion (USFWS 2012) was published on November 21, 2012. In November 2013, the Council took final action to recommend a regulatory package to implement the streamer line requirement (USFWS 2012). The final rule implementing these requirements is pending.

Section 3.5.3 summarizes available information on marine mammals protected by the MMPA but not listed under the ESA. Estimates of total human-caused serious injury / mortality are below the PBR for all these stocks (Carretta, *et al.* 2013). The West Coast Groundfish Observer Program reports observed interactions with marine mammals (Jannot, *et al.* 2011). These data suggest that mortality of non-ESA listed marine mammal stocks occurring in the fishery management area caused by the operation of the Pacific Coast groundfish fishery will not prevent these stocks from reaching their optimum sustainable population level. There is no information to indicate that continued operation of the fishery in the 2015-2016 biennial period will lead to an increase in serious injury / mortality of non-ESA-listed marine mammals.

Section 3.5.4 reviews information on impacts of the groundfish fishery on seabirds not listed under the ESA. Of the species observed taken in the groundfish fishery (Jannot, *et al.* 2011) the black-footed albatross is listed as Vulnerable on the IUCN Red List and the sooty shearwater is listed as Vulnerable and the northern fulmar is listed as Near Threatened (note that these are global assessments and regional population status may differ). As shown in Table 3-36, groundfish fisheries are estimated to take a maximum of 93.5 black-footed albatrosses annually and 1.7 northern fulmars. There is no information to indicate that continued operation of the fishery in the 2015-2016 biennial period will lead to an increase in the take of non-ESA-listed seabirds.

4.6.1 Summary of the Impacts of the Alternatives

No Action Alternative: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

Preferred Alternative: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

Alternative 1: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

Alternative 2: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

4.7 Impacts of 2015-2016 Harvest Specifications and Management Measures on Non-groundfish

Section 3.6 describes non-groundfish species caught in groundfish fisheries based on WCGOP estimates (Bellman, *et al.* 2013). Non-groundfish catch in groundfish sectors varies between 1.2% and 5.0% during the baseline period. There is no correlation between total catch and non-groundfish catch for these years. Therefore, there it is not possible to predict how non-groundfish catch will vary among the alternatives. It is reasonable to conclude that across all the alternatives non-groundfish catch would be in the historical range. Tribal shoreside and at-sea whiting sectors accounted for 38% of non-groundfish catch. Management measures for these sectors are not directly established as part of the proposed action. Instead, the Federal government, through the Council process, reaches an agreement on the level of catch that will occur in the tribes' usual and accustomed fishing grounds. Non-groundfish catch declined in the shorebased IFQ/trawl sector, which account for the largest proportion of non-groundfish catch in commercial sectors at 28%, over the baseline period from 7.7% (2,240 mt) in 2003 to 3.4% (809 mt) in 2011. The drop in 2011 could be an ancillary effect of trawl rationalization if changes in fishing strategies has an indirect effect on non-groundfish catch. Gear switching could be a factor, because fixed gear fisheries have lower bycatch of non-groundfish. The shorebased IFQ sector is subject to IBQ for Pacific halibut, which is effective in controlling bycatch mortality of this commercially important species

4.7.1 Summary of the Impacts of the Alternatives

No Action Alternative: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

Preferred Alternative: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

Alternative 1: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

Alternative 2: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

4.8 Biological Impacts of Alternative Long Term Biennial Harvest Specifications on Groundfish Stocks

This section evaluates the predicted biological impacts of alternative long term harvest specifications on a select list of groundfish stocks. The focus of this section are on those overfished stocks currently managed under rebuilding plans, the economically most important target stocks that are the backbone of the current fishery, and those stocks and stock complexes that were historically important targets of the west coast groundfish fishery. This evaluation notes the projected depletion trends under the range of scenarios modeled. The results of this analysis are presented by taxon and, for rockfish, further stratified by depth strata (i.e., nearshore, shelf, and slope).

The long term analysis in this EIS used projections of spawning stock depletion, spawning stock biomass, and total biomass of key assessed groundfish stocks through 2024 under a wide range of catch streams or harvest control rules, as well as across the states of nature that captured the key axes of uncertainty in stock assessments. An important caveat in the analysis is that the base case state of nature in these projections is the most probable. The Terms of Reference for stock assessments directs the states of nature modeled in assessment decision tables be developed as stochastically as possible with the base case state of nature being the median or most probable case (i.e., 50% likelihood) and the low and high states of nature bracketing the base case having half the probability (i.e., 25% likelihood) as the base case. In all cases, the highest catch stream modeled is the harvest control rule of ACL = ABC under a P* of 0.45; the highest catch streams are from the high state of nature models under this harvest control rule. The lowest catch streams, depending on the stock, are modeled using either the harvest control rule ACL =

ABC under a P* of 0.25, the 2014 ACL scenario, or under the "recent year average catch" scenario. The lowest catch streams are from the low state of nature models under one of these harvest control rule scenarios.

The states of nature developed in groundfish stock assessments can best be thought of as bracketing the key axes of uncertainty that affect stock productivity. Stock assessments vary by how many of the key population dynamics parameters are estimated. The more parameters that are estimated, the more the true uncertainty in the assessment is characterized. However, no assessments attempt to estimate all parameters that describe stock dynamics. For example, those assessments that are done in Stock Synthesis (the assessment platform used for the majority of current groundfish stock assessments) will often try to estimate steepness of the stock-recruitment function (h) or the instantaneous rate of natural mortality (M), but seldom both parameters. Both h and M are measures of relative stock productivity (high h and high M are indicators of strong stock productivity) and their estimates are confounded (that is, assumptions or priors used to estimate one of these parameters will affect the estimate of the other). Therefore, when one of these parameters is freely estimated, the other is usually assumed and fixed in the assessment. In this case, the fixed parameter is usually what is varied to determine the states of nature in the assessment. The high state of nature is therefore indicative of an "optimistic" assumption that affects high stock productivity and the low state of nature indicates a more "pessimistic" lower productivity assumption.

It is important to note that all biomass projections are deterministic in that future recruitment and total removals (i.e., total catch), as well as the fixed parameters in the assessment, are assumed. Decision tables in assessments that show variable future catch streams by state of nature also explore the implications of using a catch stream that is projected to be sustainable for the base case model (i.e., future biomass is projected to remain above B_{MSY}) for the other states of nature to address the question, "what is predicted to happen if the alternative state of nature is the actual one for the stock?". However, the purpose of this analysis is to probe a broader range of biomasses and catches for select groundfish stocks to better posit how these outcomes affect the stocks and the fishery. The highest and lowest biomasses and catches in this analysis are highly unlikely and any case where all these stocks are in equilibrium at these high or low biomasses is implausible.

Since the main objective of this long term impact analysis is to specifically discuss impacts at the extremes of plausibility (i.e., analyzing the highest and lowest catch streams using the high and low states of nature models), this analysis does not map directly to the 2015-2016 alternatives analyzed in this EIS. However, when linking this long term impact analysis with the 2015-2016 alternatives analyzed in this EIS, the base case model is always assumed since that is the most probable assessment model. In all cases, Alternative 1 is the ACL = ABC using a P* of 0.45 and Alternative 2 is the ACL = ABC using a P* of 0.25 (in both cases the appropriate precautionary reduction to the ACL, either the 40-10 or the 25-5 rule, is made when the stock is projected to be below the B_{MSY} target). The No Action Alternative is the 2014 ACL and the Preferred Alternative varies by stock.

4.8.1 Long Term Impacts of Assessed Flatfish Species

Of all the assessed flatfish species, only the projections for rex sole were not available in time for this analysis.

The proxy biomass reference points that direct management of assessed flatfish species are a target biomass (B_{MSY}) depletion ratio of 0.25 (depletions at or above this threshold indicate a healthy stock) and a Minimum Stock Size Threshold (MSST) of 0.125 (depletions below this threshold indicate an overfished stock). Depletions between the B_{MSY} threshold and the MSST indicate stocks in the precautionary zone. The default ACL harvest control rule for flatfish in the precautionary zone is to implement the “25-5” rule which is a reduction in the ACL from the ABC (see (PFMC 2014) for more details).

Most of the flatfish species are not caught at levels commensurate with high attainment of ACLs, with the exception of petrale sole, which is an important trawl target. Therefore, the high catch streams for these species under even the base case models are unlikely. Flatfish species managed in the FMP are mostly trawl-dominant (i.e., on average, 90% or more of the catch occurs in the trawl fishery), with the exception of Pacific sanddabs and starry flounder, which are a significant species in trawl and recreational fisheries. Given the dominance of flatfish as a trawl species, catch monitoring uncertainty is low. Therefore, there is very low risk of depleting flatfish stocks through overfishing.

4.8.1.1 Arrowtooth Flounder

The modeled catch scenarios for arrowtooth flounder range from 3,088 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 37,915 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-154). Projected arrowtooth depletions under all states of nature are sustainable assuming the respective states of nature, except maintaining the 2014 ACL under the low state of nature is projected to drive depletion just below B_{MSY} by the end of the projection period (Figure 4-34, Figure 4-35, and Figure 4-36). All the 2015-2016 alternatives are sustainable under the base case model (Figure 4-34).

Table 4-154. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for arrowtooth flounder.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	5,758
	ABC Removals (P* = 0.25; Alt. 2)	6,364
	ABC Removals (P* = 0.4; Pref. Alt.)	7,125
	ABC Removals (P* = 0.45; Alt. 1)	7,307
	Recent Year Average Total Catch Removals	3,088
High	2014 ACL	5,758
	ABC Removals (P* = 0.25)	33,968
	ABC Removals (P* = 0.4)	37,184
	ABC Removals (P* = 0.45)	37,915
	Recent Year Average Total Catch Removals	3,088
Low	2014 ACL	5,758
	ABC Removals (P* = 0.25)	4,001
	ABC Removals (P* = 0.4)	4,624
	ABC Removals (P* = 0.45)	4,789
	Recent Year Average Total Catch Removals	3,088

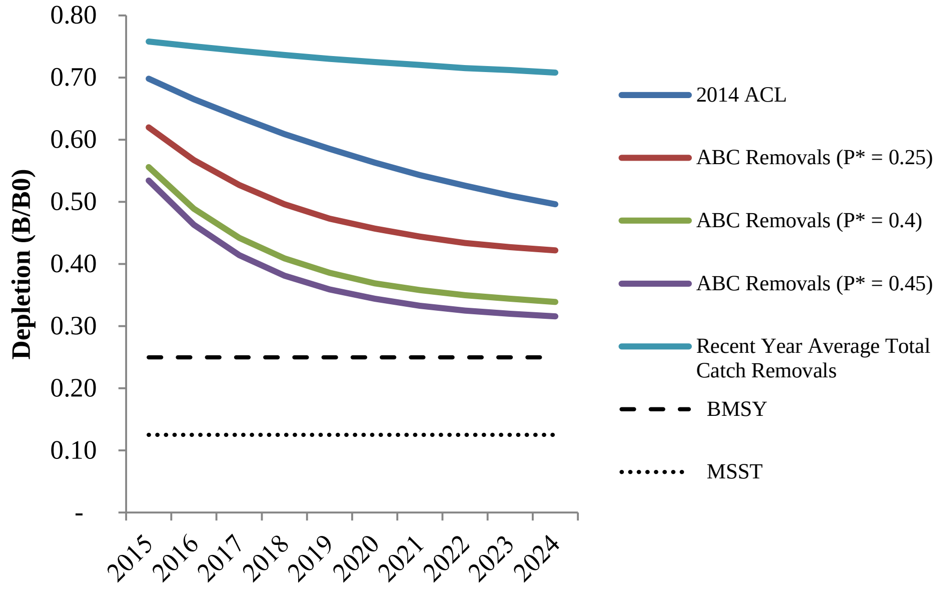


Figure 4-34. Projected depletion under alternative catch streams under the base case state of nature model for arrowtooth flounder.

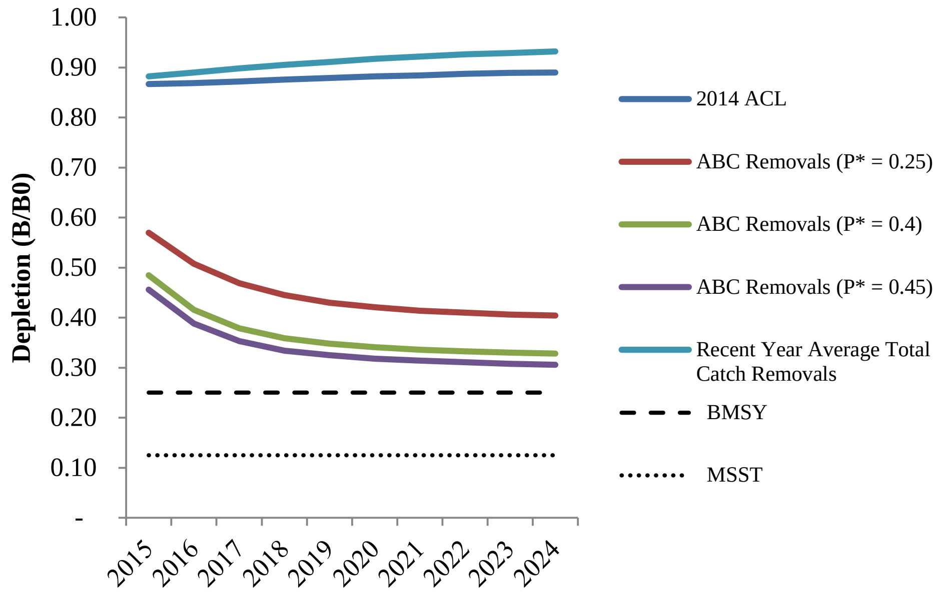


Figure 4-35. Projected depletion under alternative catch streams under the high state of nature model for arrowtooth flounder.

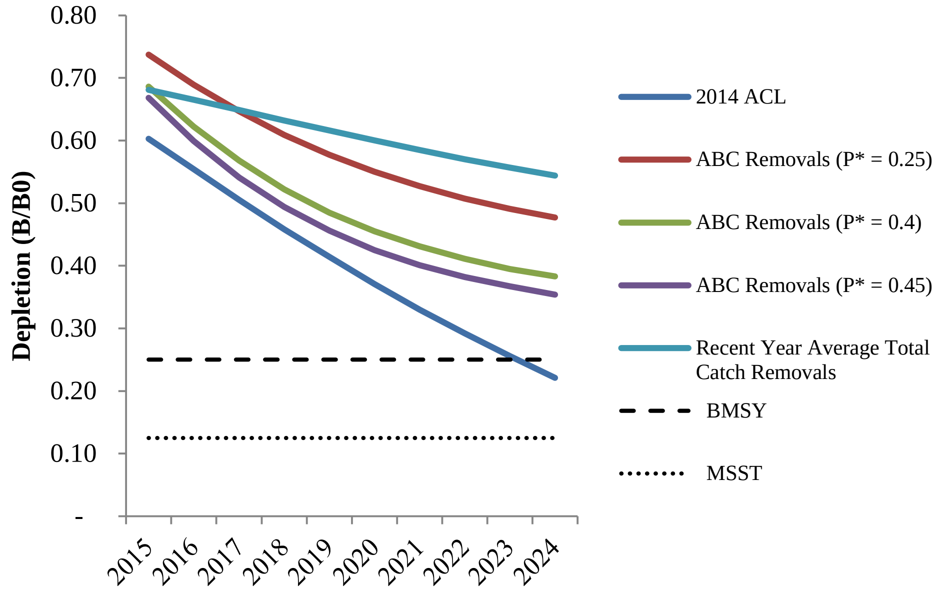


Figure 4-36. Projected depletion under alternative catch streams under the low state of nature model for arrowtooth flounder.

4.8.1.2 Dover Sole

The modeled catch scenarios for Dover sole range from 7,551 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 91,249 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-155). Projected Dover sole depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-37, Figure 4-38, and Figure 4-39). While the preferred Dover sole alternative of a 50,000 mt constant catch has not been projected or modeled in this long term analysis, the total removals and biomass trajectory assuming full attainment of the ACL in the next ten years is very similar to the Alternative 2 scenario (ABC Removals using a P* of 0.25) under the base case model in Figure 4-37.

Table 4-155. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for Dover sole.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	25,000
	ABC Removals (P* = 0.25; Alt. 2)	50,630
	ABC Removals (P* = 0.45; Alt. 1)	56,611
	Recent Year Average Total Catch Removals	7,551
High	2014 ACL	25,000
	ABC Removals (P* = 0.25)	81,641
	ABC Removals (P* = 0.45)	91,249
	Recent Year Average Total Catch Removals	7,551
Low	2014 ACL	25,000
	ABC Removals (P* = 0.25)	34,880

	ABC Removals (P* = 0.45) Recent Year Average Total Catch Removals	39,069 7,551

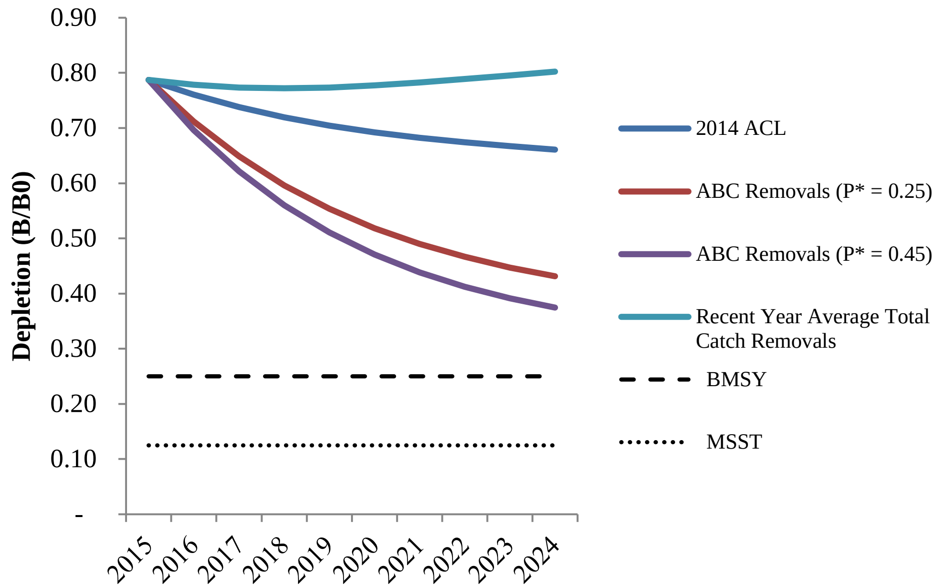


Figure 4-37. Projected depletion under alternative catch streams under the base case state of nature model for Dover sole.

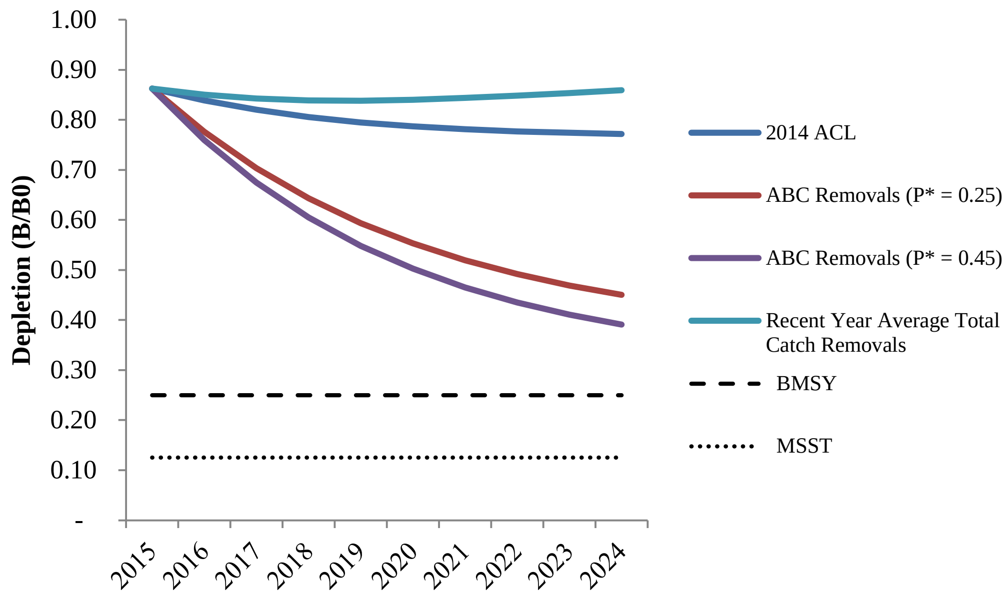


Figure 4-38. Projected depletion under alternative catch streams under the high state of nature model for Dover sole.

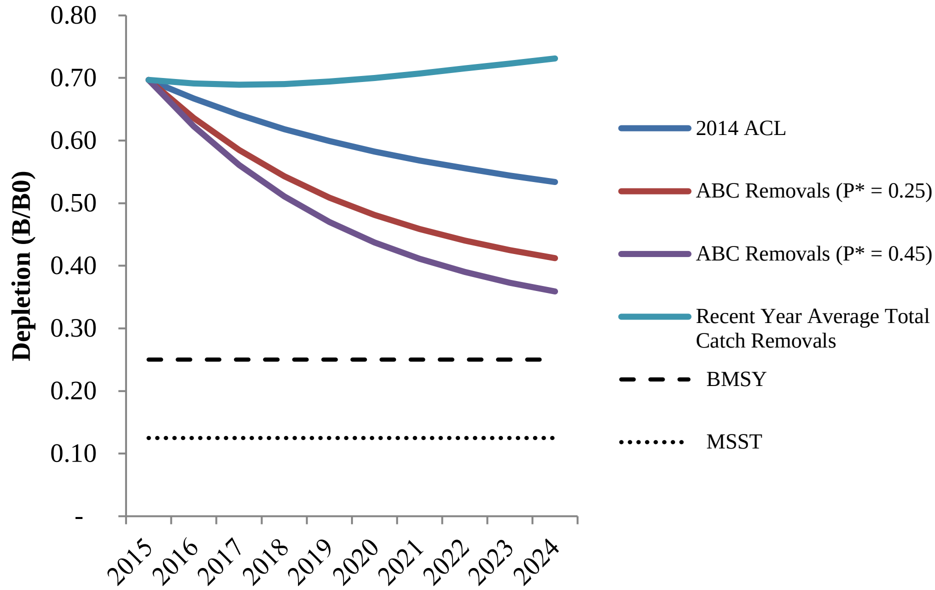


Figure 4-39. Projected depletion under alternative catch streams under the low state of nature model for Dover sole.

4.8.1.3 English Sole

The modeled catch scenarios for English sole range from 207 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 7,461 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-156). Projected English sole depletions under all catch scenarios and states of nature are predicted to be sustainable, except maintaining the 2014 ACL is predicted to drive the stock down below the B_{MSY} target into the precautionary zone under the base case and low state of nature models (Figure 4-40, Figure 4-41, and Figure 4-42).

Table 4-156. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for English sole.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	5,645
	ABC Removals (P* = 0.25; Alt. 2)	4,423
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	5,479
	Recent Year Average Total Catch Removals	207
High	2014 ACL	5,645
	ABC Removals (P* = 0.25)	6,011
	ABC Removals (P* = 0.45)	7,461
	Recent Year Average Total Catch Removals	207
Low	2014 ACL	5,645
	ABC Removals (P* = 0.25)	3,585

	ABC Removals (P* = 0.45) Recent Year Average Total Catch Removals	4,447 207

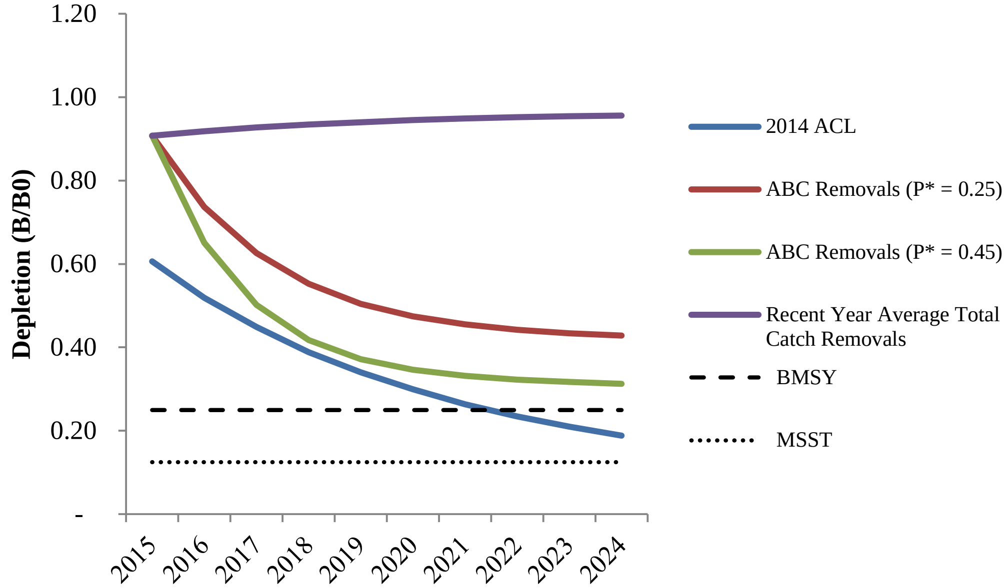


Figure 4-40. Projected depletion under alternative catch streams under the base case state of nature model for English sole.

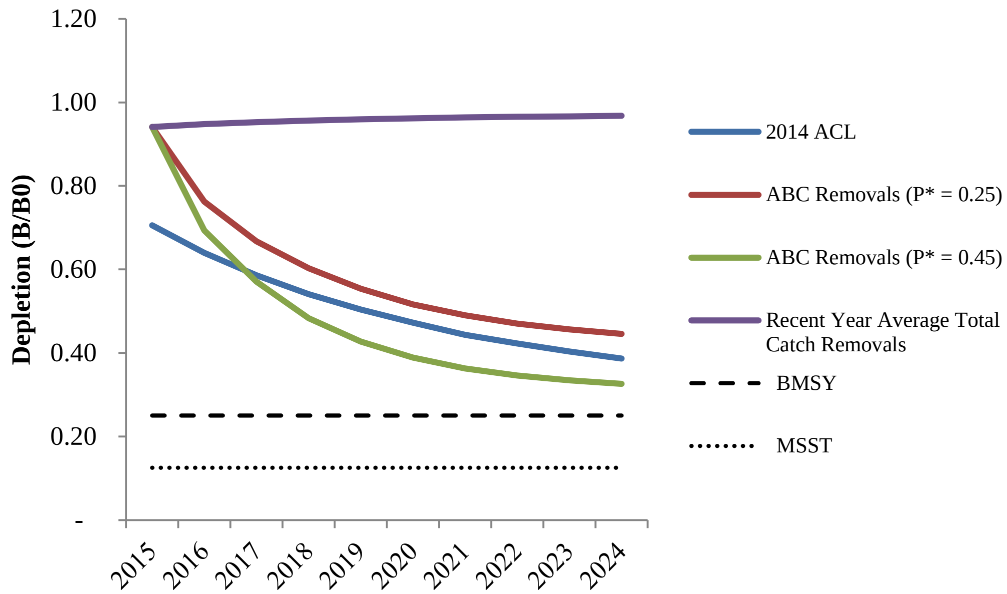


Figure 4-41. Projected depletion under alternative catch streams under the high state of nature model for English sole.

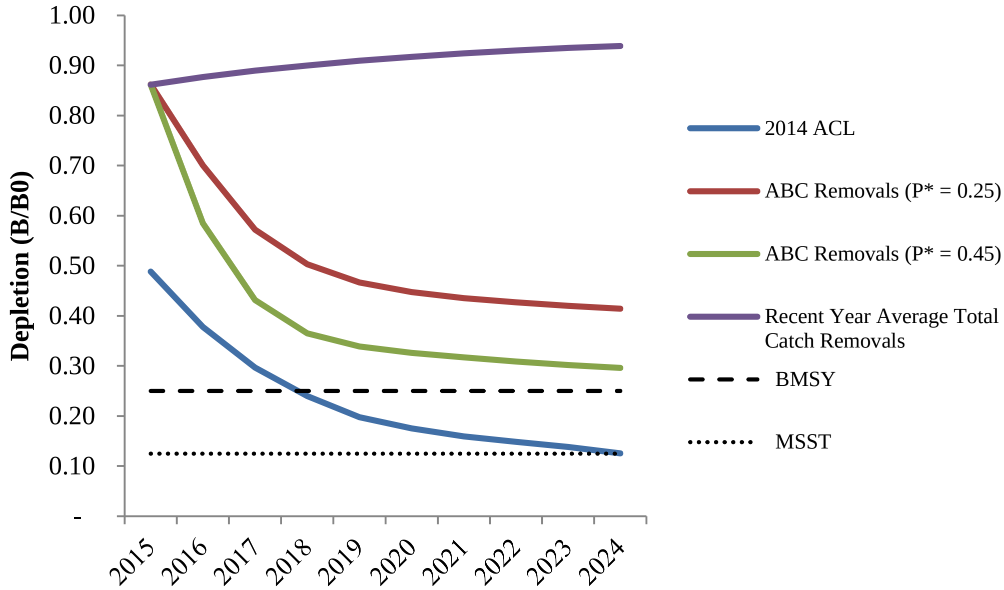


Figure 4-42. Projected depletion under alternative catch streams under the low state of nature model for English sole.

4.8.1.4 Petrale Sole

The modeled catch scenarios for petrale sole range from 939 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 3,170 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-157). Projected petrale sole depletions under all states of nature are sustainable assuming the respective states of nature, except the stock is estimated to be less than the target B_{MSY} depletion level in the beginning of the projection period under the base case and low state of nature models (Figure 4-43, Figure 4-44, and Figure 4-45).

Table 4-157. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for petrale sole.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2,652
	ABC Removals (P* = 0.25; Alt. 2)	2,522
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	2,771
	Recent Year Average Total Catch Removals	939
High	2014 ACL	2,652
	ABC Removals (P* = 0.25)	2,919
	ABC Removals (P* = 0.45)	3,170
	Recent Year Average Total Catch Removals	939
Low	2014 ACL	2,652
	ABC Removals (P* = 0.25)	2,191
	ABC Removals (P* = 0.45)	2,439
	Recent Year Average Total Catch Removals	939

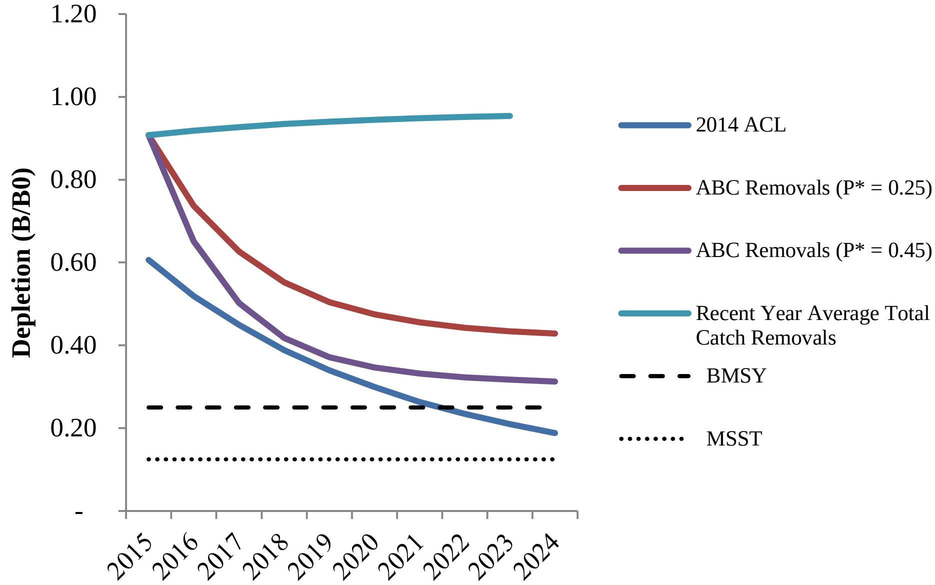


Figure 4-43. Projected depletion under alternative catch streams under the base case state of nature model for petrale sole.

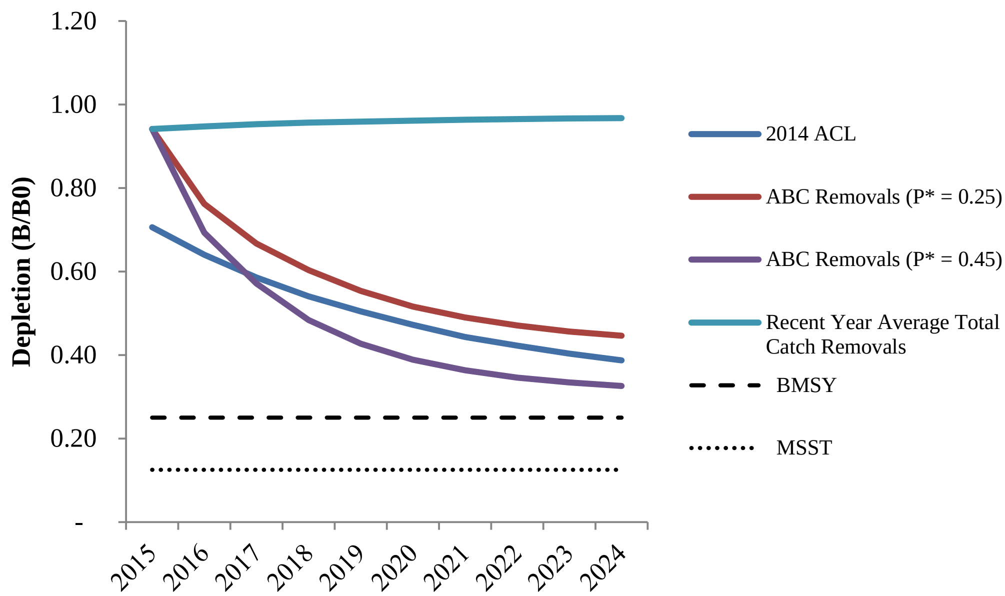


Figure 4-44. Projected depletion under alternative catch streams under the high state of nature model for petrale sole.

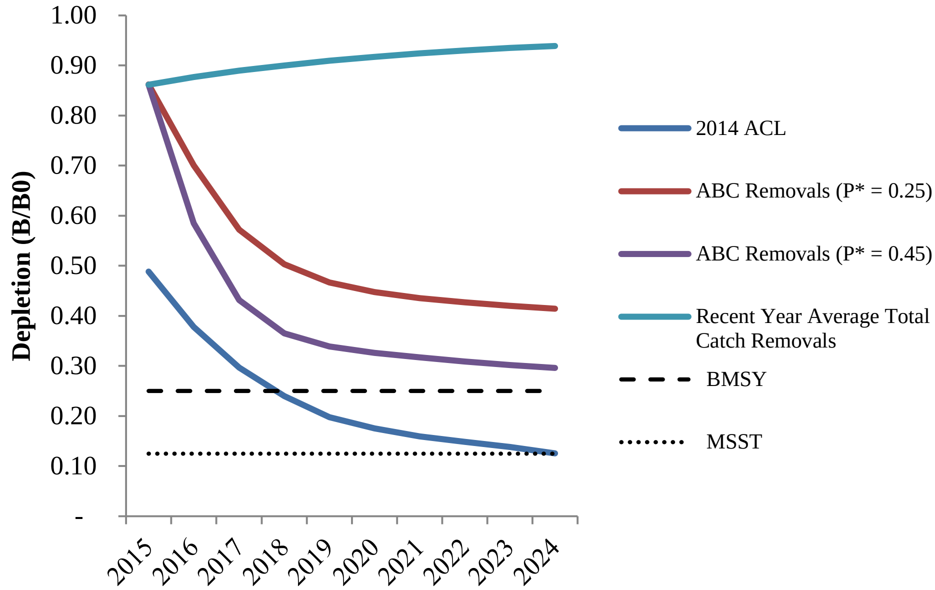


Figure 4-45. Projected depletion under alternative catch streams under the low state of nature model for petrale sole.

4.8.2 Long Term Impacts of Assessed Nearshore Rockfish Species

Of the assessed nearshore rockfish species, long term projections were not provided in time for brown, China, and copper rockfish nor for California scorpionfish. Nearshore rockfish are dominant in the non-trawl fisheries (both commercial and recreational) and therefore have a higher catch monitoring uncertainty than trawl-dominant species. The assessments are also generally more uncertain since there are no fishery-independent indices of abundance (i.e., no nearshore surveys) informing abundance trends. Most nearshore rockfish assessments rely on fishery CPUE indices and the fisheries compositional data (i.e., age and length data from sampled fisheries) to inform stock status and dynamics. Therefore, there is considerably more uncertainty in the long term projections for nearshore rockfish than for the other species analyzed in this EIS.

4.8.2.1 Black Rockfish in California and Oregon

The modeled catch scenarios for southern black rockfish off California and Oregon range from 554 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 2,032 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-158). Projected southern black rockfish depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-46, Figure 4-47, and Figure 4-48). Note the default harvest control rule of 1,000 mt/year cannot be accommodated under the low state of nature due to a lack of exploitable biomass at that level of harvest (Table 4-158 and Figure 4-48).

Table 4-158. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for black rockfish in California and Oregon.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	1,044
	ABC Removals (P* = 0.45; Alt. 1)	1,220
	ACL Removals (1,000 mt constant catch; No Action Alt.; Pref. Alt.)	1,000
	Recent Year Average Total Catch Removals	554
High	ABC Removals (P* = 0.25)	1,739
	ABC Removals (P* = 0.45)	2,032
	ACL Removals (1,000 mt constant catch)	1,000
	Recent Year Average Total Catch Removals	554
Low	ABC Removals (P* = 0.25)	715
	ABC Removals (P* = 0.45)	836
	Recent Year Average Total Catch Removals	554

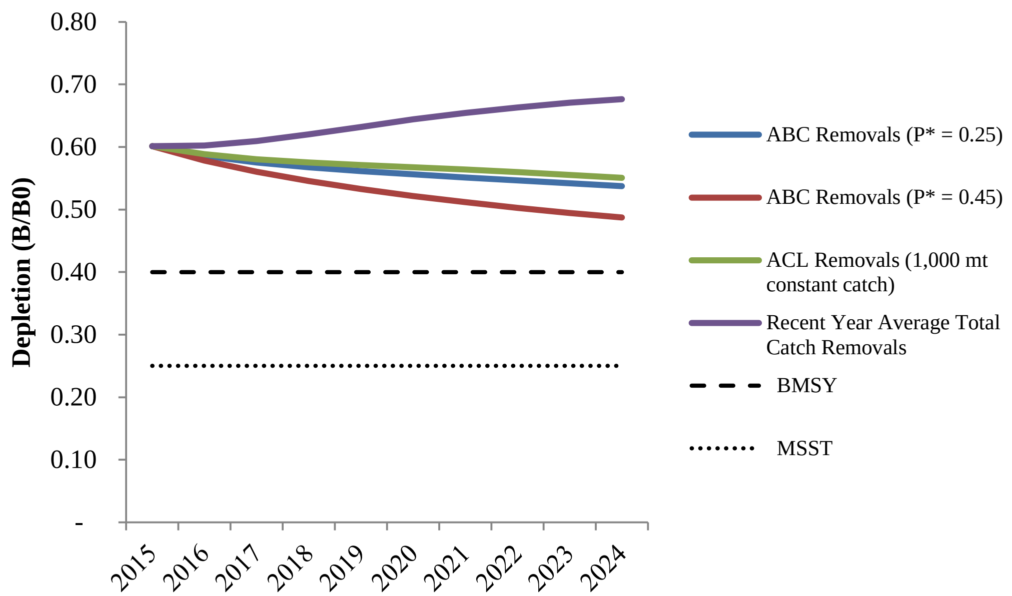


Figure 4-46. Projected depletion under alternative catch streams under the base case state of nature model for black rockfish in California and Oregon.

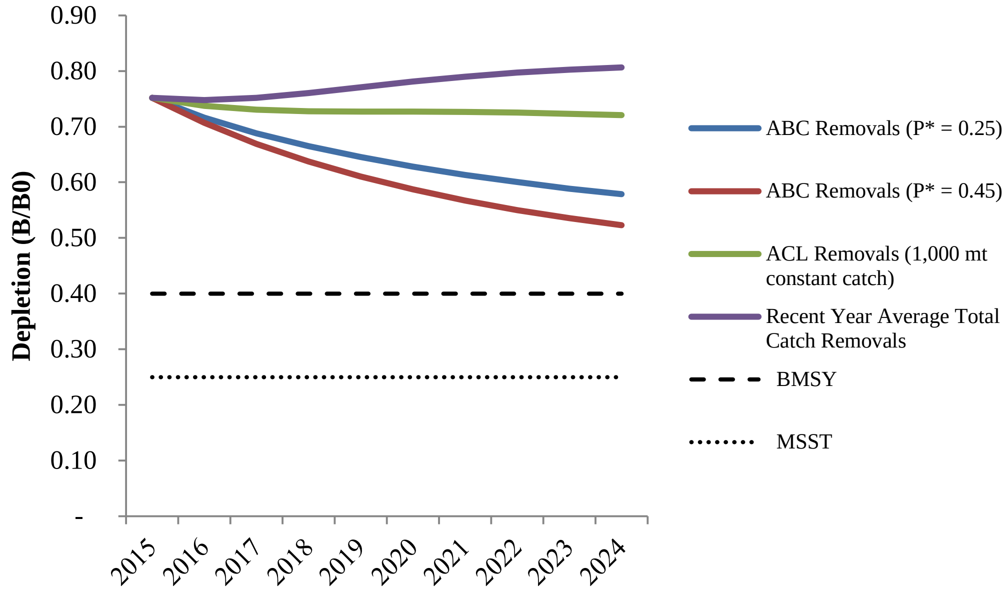


Figure 4-47. Projected depletion under alternative catch streams under the high state of nature model for black rockfish in California and Oregon.

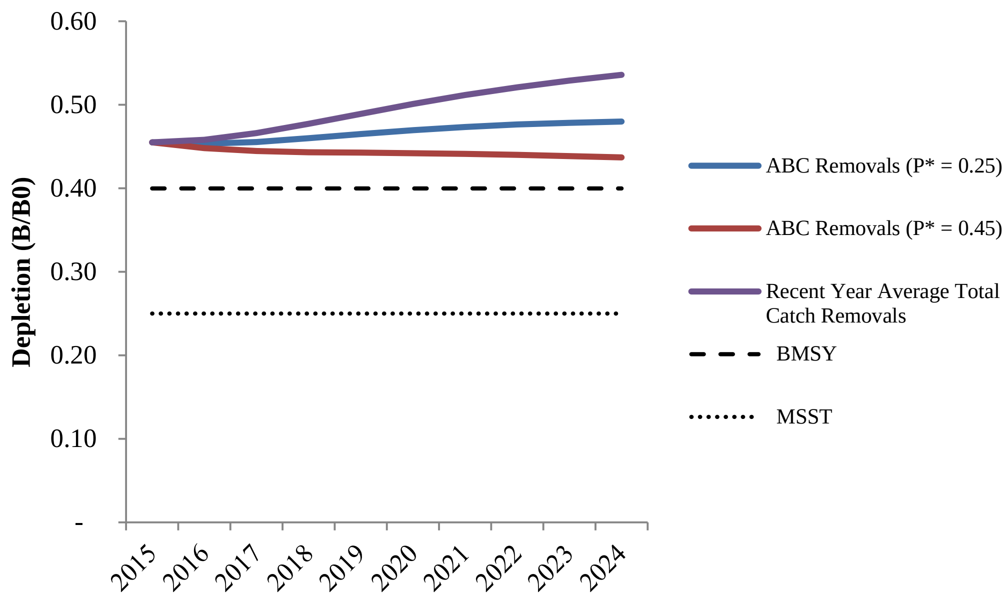


Figure 4-48. Projected depletion under alternative catch streams under the low state of nature model for black rockfish in California and Oregon.

4.8.2.2 Black Rockfish in Washington

The modeled catch scenarios for northern black rockfish off Washington range from 134 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 592 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-159). Projected northern black rockfish depletions under the base case and high states of nature are sustainable assuming the respective states of nature (Figure 4-49 and Figure 4-50). All of these catch scenarios are under the B_{MSY} target under the low state of nature (Figure 4-51). The stock is estimated to be currently overfished under the low state of nature but projected to increase in abundance under all the catch scenarios except the constant catch of the 2014 ACL, which drives the stock to a lower abundance during the projection period (Figure 4-51).

Table 4-159. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for black rockfish in Washington.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	409
	ABC Removals (P* = 0.25; Alt. 2)	325
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	381
	ACL Removals (40-10 rule)	395
	Recent Year Average Total Catch Removals	219
High	2014 ACL	409
	ABC Removals (P* = 0.25)	488
	ABC Removals (P* = 0.45)	572
	ACL Removals (40-10 rule)	592
	Recent Year Average Total Catch Removals	219
Low	2014 ACL	409
	ABC Removals (P* = 0.25)	134
	ABC Removals (P* = 0.45)	155
	ACL Removals (40-10 rule)	160
	Recent Year Average Total Catch Removals	219

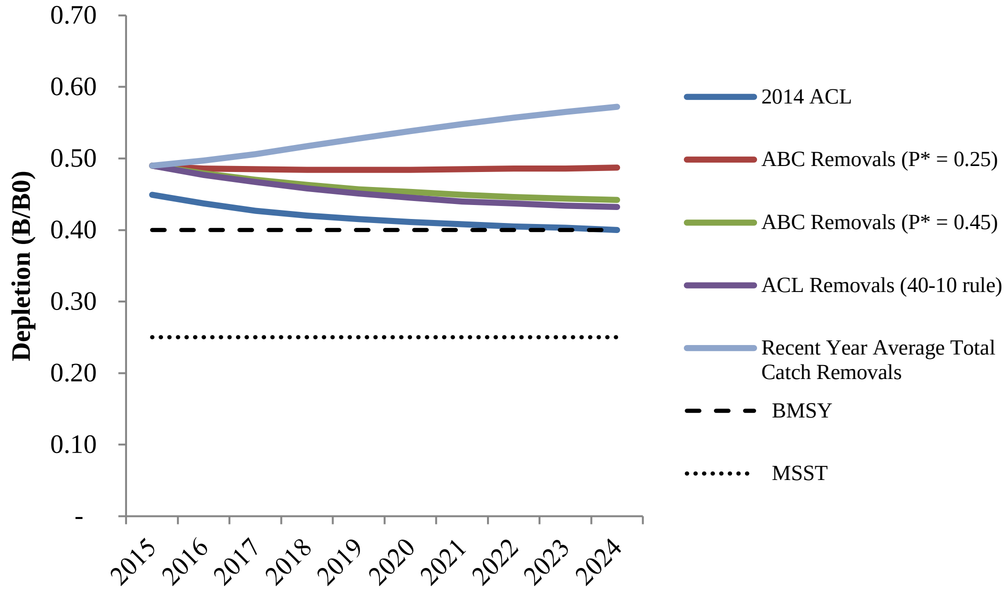


Figure 4-49. Projected depletion under alternative catch streams under the base case state of nature model for black rockfish in Washington.

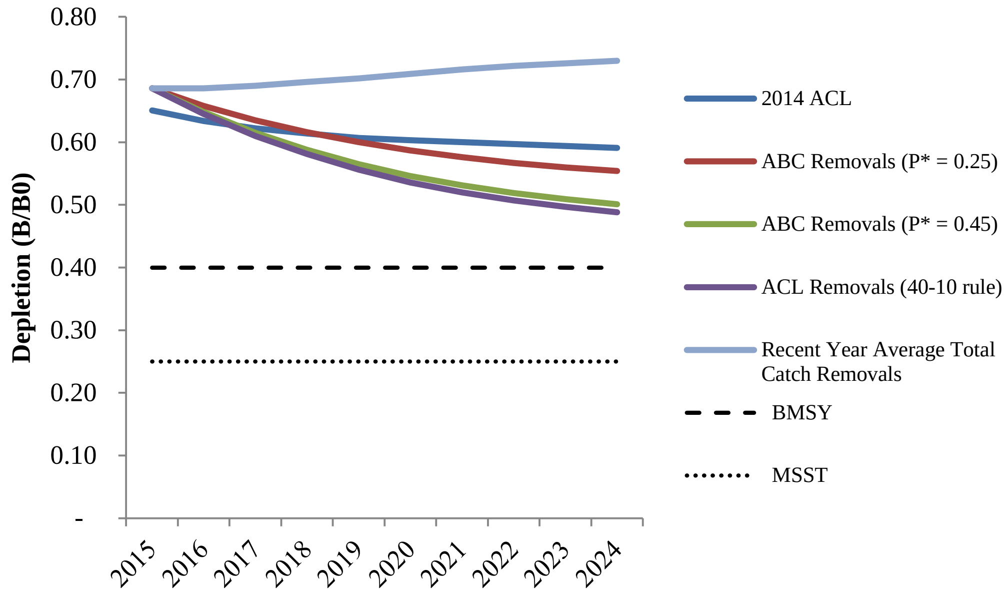


Figure 4-50. Projected depletion under alternative catch streams under the high state of nature model for black rockfish in Washington.

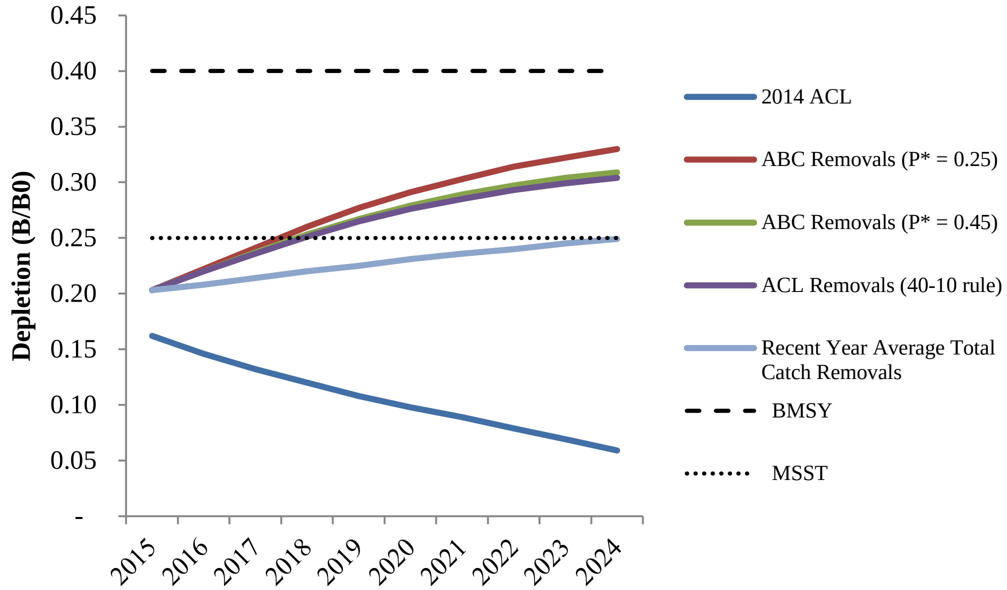


Figure 4-51. Projected depletion under alternative catch streams under the low state of nature model for black rockfish in Washington.

4.8.2.3 Gopher Rockfish South of 40º10' N lat.

The average annual catch of gopher rockfish in 2015-2024 varies between 77 mt (the ABC removals using a P* of 0.25 for the low state of nature) to 229 mt (the 2014 ACL) (Table 4-160). The 2014 gopher ACL contribution projected forward is not predicted to be sustainable under any of the states of nature and is predicted to drive the stock to an overfished condition under the base case and low state of nature models (Figure 4-52, Figure 4-53, and Figure 4-54). However, all the other catch scenarios are predicted to be sustainable under all the states of nature. The most likely projection is the recent year average total catch removals under the base case since access to gopher rockfish will likely be constrained by limits imposed on the entire Southern Nearshore Rockfish complex.

Table 4-160. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for gopher rockfish south of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	229
	ABC Removals (P* = 0.25; Alt. 2)	139
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	156
	Recent Year Average Total Catch Removals	81
High	2014 ACL	229
	ABC Removals (P* = 0.25)	170
	ABC Removals (P* = 0.45)	191
	Recent Year Average Total Catch Removals	81
Low	2014 ACL	229
	ABC Removals (P* = 0.25)	77

	ABC Removals (P* = 0.45)	86
	Recent Year Average Total Catch Removals	81

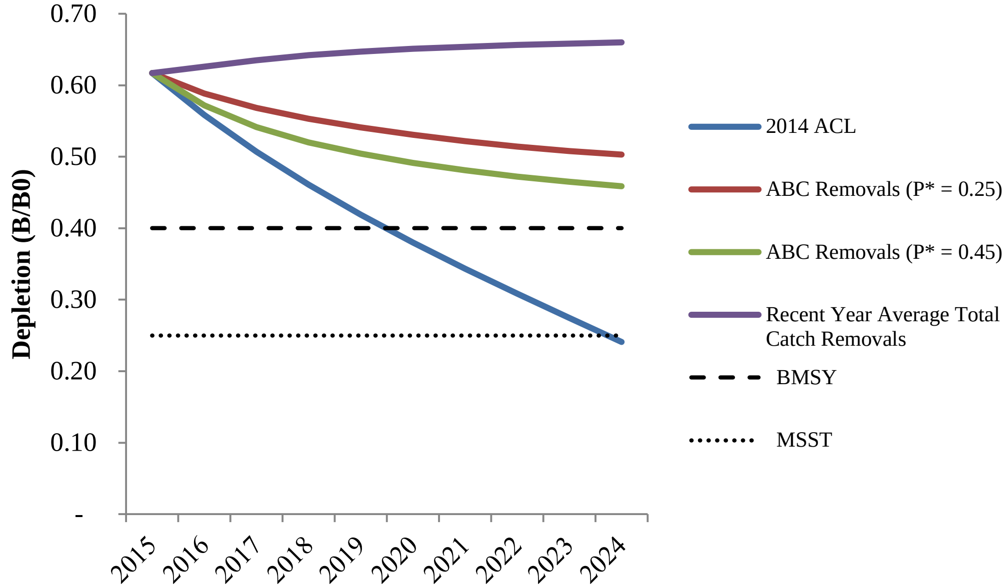


Figure 4-52. Projected depletion under alternative catch streams under the base case state of nature model for gopher rockfish south of 40º10' N lat.

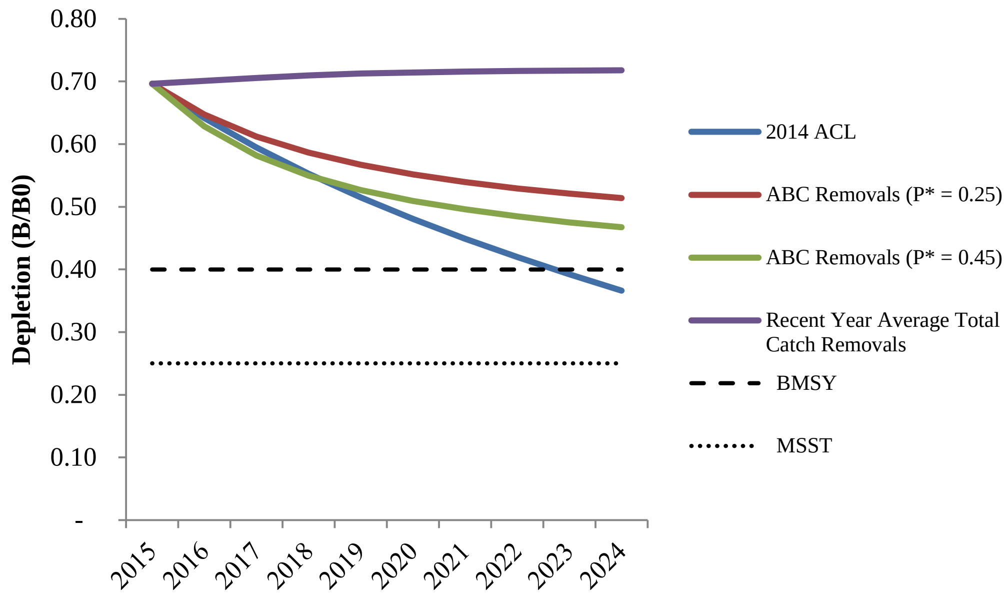


Figure 4-53. Projected depletion under alternative catch streams under the high state of nature model for gopher rockfish south of 40º10' N lat.

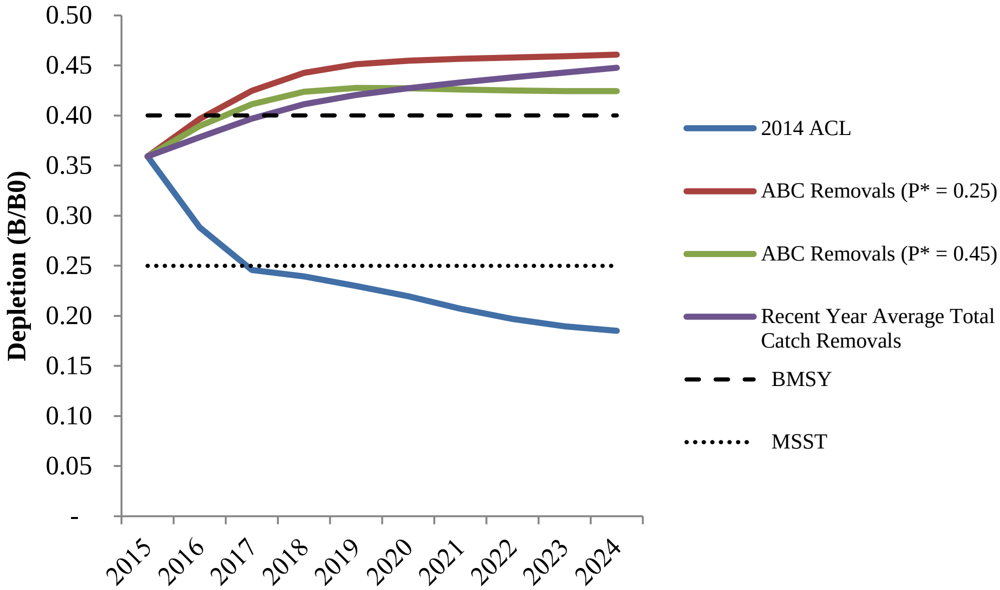


Figure 4-54. Projected depletion under alternative catch streams under the low state of nature model for gopher rockfish south of 40º10' N lat.

4.8.3 Long Term Impacts of Assessed Shelf Rockfish Species

Of the assessed shelf rockfish species, only the greenspotted rockfish projections were not provided in time for this analysis. Shelf rockfish are caught by both the trawl and fixed gear sectors, although there is some variation between species on their relative selectivities to different gears. For instance, greenstriped rockfish, while not targeted in any fishery, tend to be more readily caught in trawl gears than fixed gears. Catch monitoring precision therefore varies by species based on their relative gear selectivity with more certain catch estimation for those species dominant to the trawl fishery given the 100% observer coverage for those fleets. Current overfishing risks are low for shelf rockfish in general and have been since implementation of RCAs over ten years ago.

4.8.3.1 Bocaccio South of 40º10' N lat.

The modeled catch scenarios for bocaccio south of 40º10' N lat. range from 150 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,431 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-161). Projected bocaccio depletions under the base case and high states of nature are sustainable assuming the respective states of nature (Figure 4-55 and Figure 4-56). All of these catch scenarios are in the precautionary zone under the B_{MSY} target at the beginning of the projection period under the low state of nature (Figure 4-57). The stock is estimated to undergo rebuilding under the low state of nature with all catch scenarios. All catch scenarios under the low state of nature except the ABC removals (under both P*s of 0.45 and 0.25) are predicted to be over the B_{MSY} target by the end of the projection period (Figure 4-57).

Table 4-161. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for bocaccio south of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	338
	ABC Removals (P* = 0.25; Alt. 2)	1,127
	ABC Removals (P* = 0.45; Alt. 1)	1,314
	Recent Year Average Total Catch Removals	150
	ACL Removals (SPR = 77.7%; Pref. Alt.)	563
High	2014 ACL	338
	ABC Removals (P* = 0.25)	1,225
	ABC Removals (P* = 0.45)	1,431
	Recent Year Average Total Catch Removals	150
	ACL Removals (SPR = 77.7%)	609
Low	2014 ACL	338
	ABC Removals (P* = 0.25)	729
	ABC Removals (P* = 0.45)	839
	Recent Year Average Total Catch Removals	150
	ACL Removals (SPR = 77.7%)	383

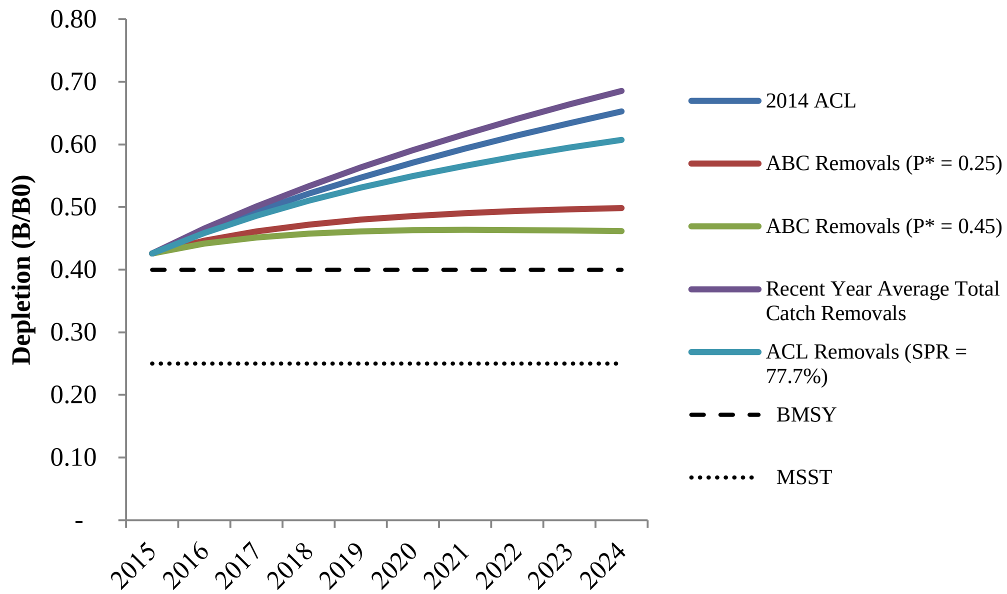


Figure 4-55. Projected depletion under alternative catch streams under the base case state of nature model for bocaccio south of 40º10' N lat.

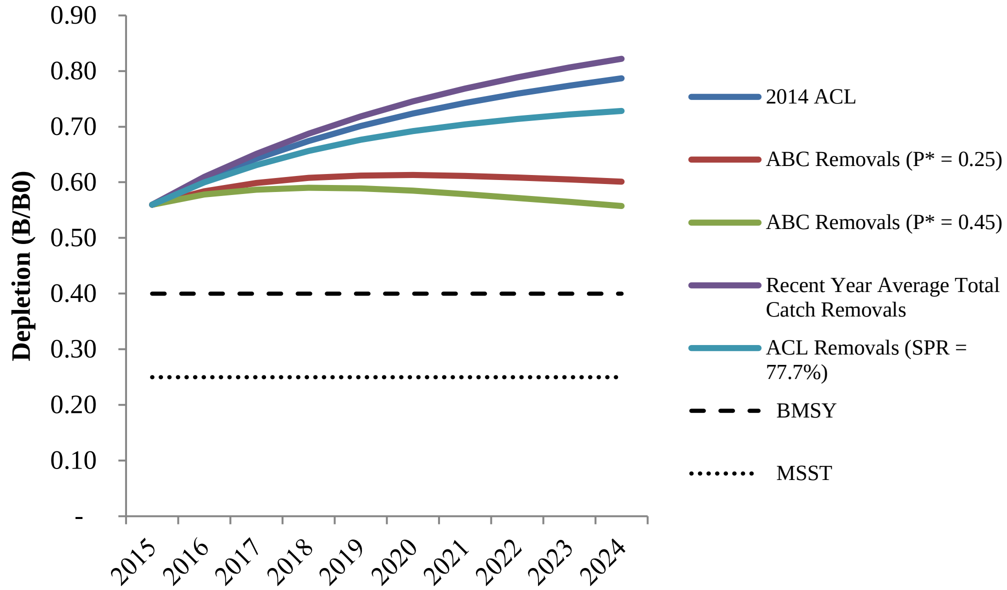


Figure 4-56. Projected depletion under alternative catch streams under the high state of nature model for bocaccio south of 40º10’ N lat.

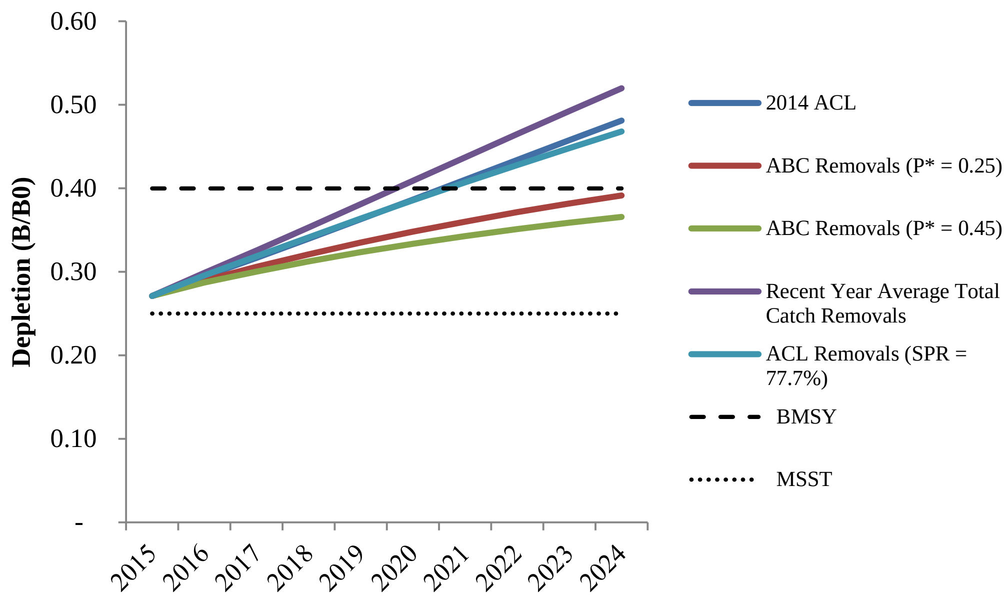


Figure 4-57. Projected depletion under alternative catch streams under the low state of nature model for bocaccio south of 40º10’ N lat.

4.8.3.2 Canary Rockfish

The modeled catch scenarios for canary rockfish range from 47 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,337 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-162). Projected canary rockfish depletions for all catch scenarios under the base case state of nature are shown to be in the precautionary zone and are predicted to rebuild but not by the end of the projection period (Figure 4-58). Projected canary depletions for all catch scenarios under the high state of nature are sustainable (Figure 4-59). Projected canary depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-60).

Table 4-162. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for canary rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	119
	ABC Removals (P* = 0.25; Alt. 2)	556
	ABC Removals (P* = 0.45; Alt. 1)	652
	ACL Removals (SPR = 88.7%; Pref. Alt.)	145
	Recent Year Average Total Catch Removals	47
High	2014 ACL	119
	ABC Removals (P* = 0.25)	1,130
	ABC Removals (P* = 0.45)	1,337
	ACL Removals (SPR = 88.7%)	248
	Recent Year Average Total Catch Removals	47
Low	2014 ACL	119
	ACL Removals (SPR = 88.7%)	38
	Recent Year Average Total Catch Removals	47

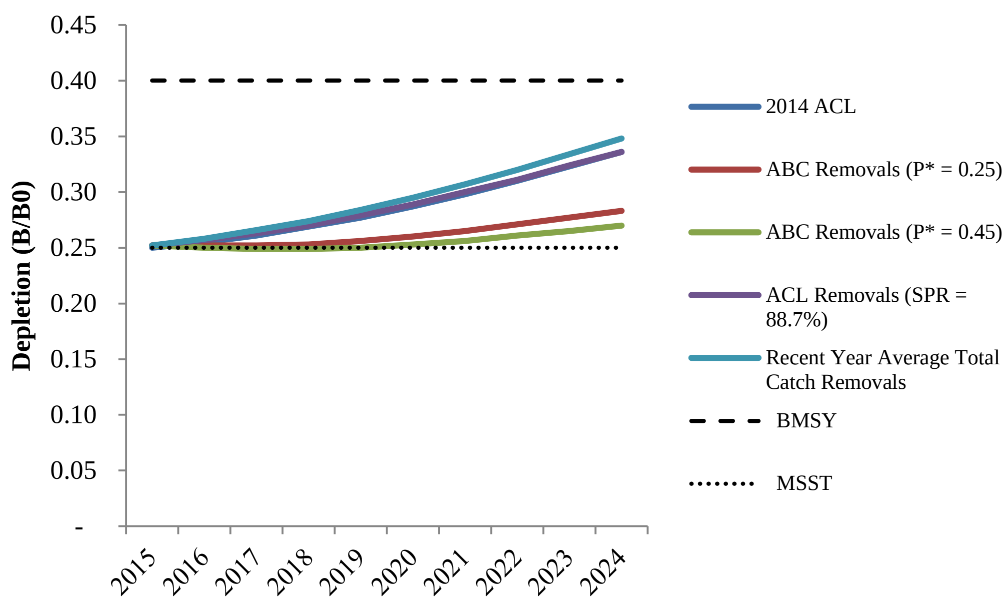


Figure 4-58. Projected depletion under alternative catch streams under the base case state of nature model for canary rockfish.

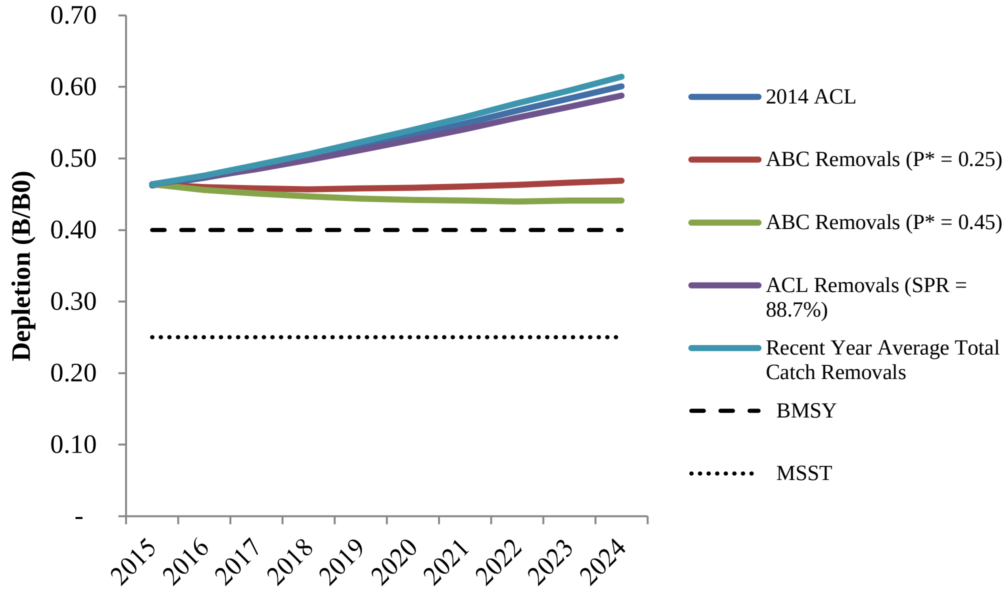


Figure 4-59. Projected depletion under alternative catch streams under the high state of nature model for canary rockfish.

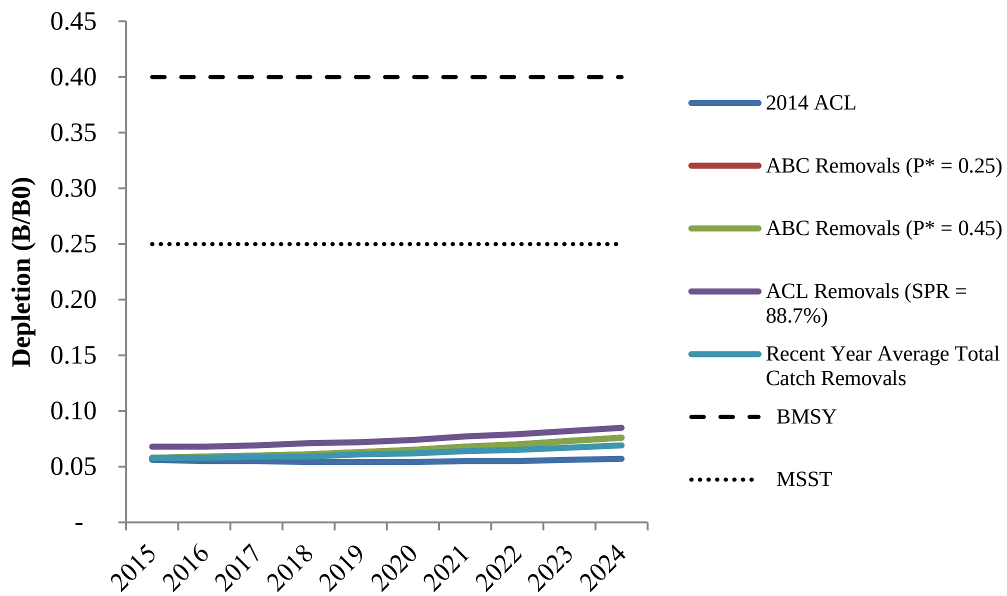


Figure 4-60. Projected depletion under alternative catch streams under the low state of nature model for canary rockfish.

4.8.3.3 Chilipepper Rockfish

The modeled catch scenarios for chilipepper range from 330 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 2,252 mt based on the ACL = ABC with a P* of 0.45

catch scenario under the high state of nature (Table 4-163). Projected chilipepper depletions under all states of nature are sustainable during the projection period assuming the respective states of nature except for the ABC removals at a P* of 0.45 under the low state of nature, which causes the stock to drop below the B_{MSY} threshold into the precautionary zone (Figure 4-61, Figure 4-62, and Figure 4-63).

Table 4-163. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for chilipepper rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	1,618
	ABC Removals (P* = 0.25; Alt. 2)	1,922
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	2,216
	Recent Year Average Total Catch Removals	330
High	2014 ACL	1,618
	ABC Removals (P* = 0.25)	1,950
	ABC Removals (P* = 0.45)	2,252
	Recent Year Average Total Catch Removals	330
Low	2014 ACL	1,618
	ABC Removals (P* = 0.25)	1,532
	ABC Removals (P* = 0.45)	1,747
	Recent Year Average Total Catch Removals	330

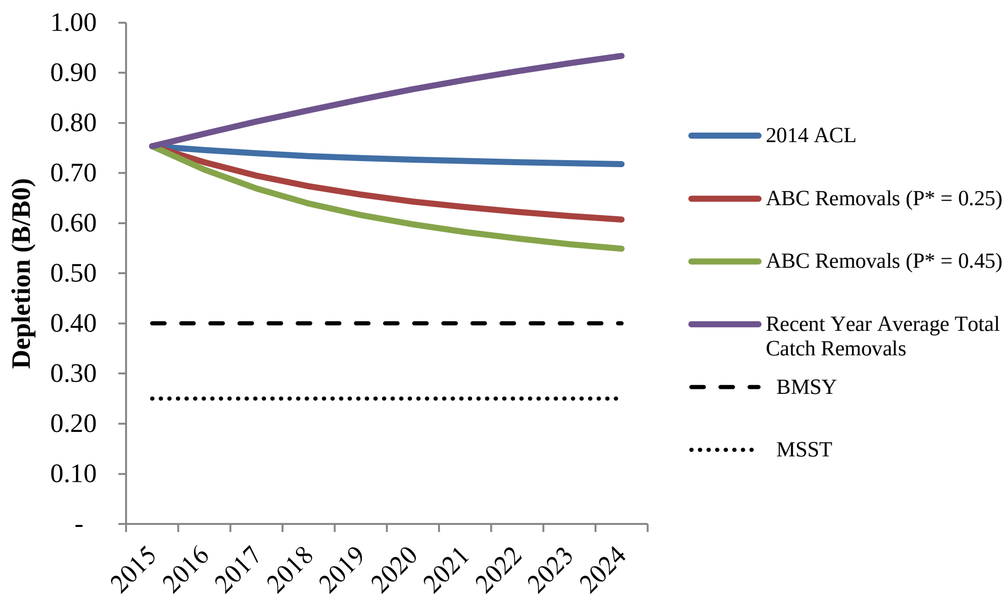


Figure 4-61. Projected depletion under alternative catch streams under the base case state of nature model for chilipepper rockfish.

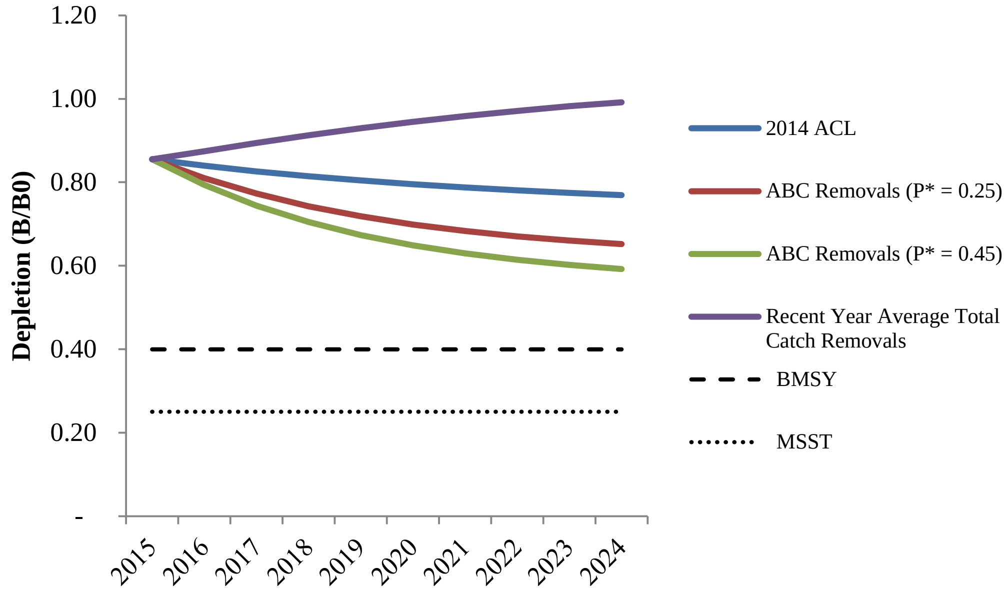


Figure 4-62. Projected depletion under alternative catch streams under the high state of nature model for chilipepper rockfish.

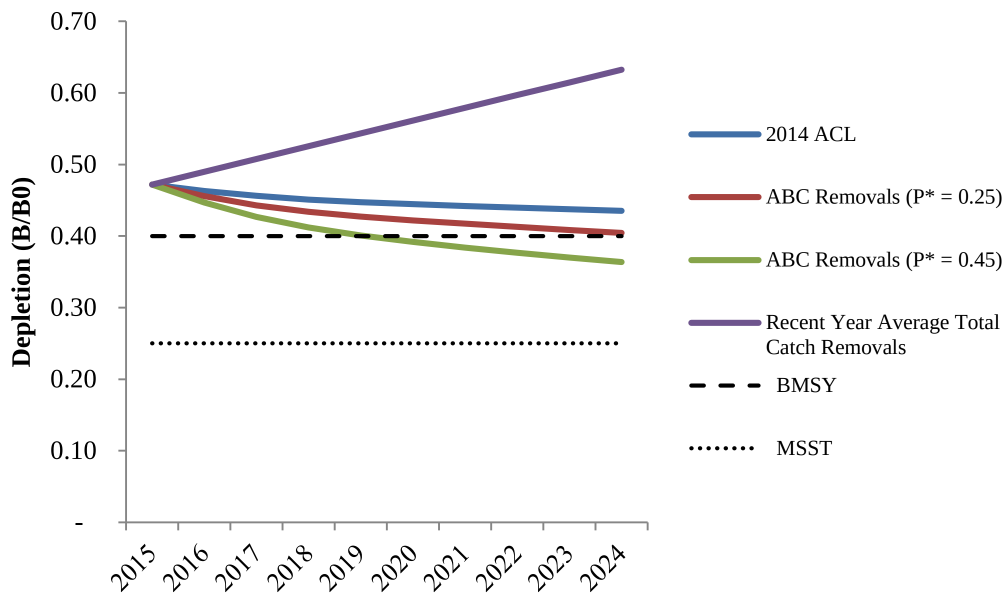


Figure 4-63. Projected depletion under alternative catch streams under the low state of nature model for chilipepper rockfish.

4.8.3.4 Cowcod

While the management unit for the cowcod stock managed under the rebuilding plan is for the population south of 40º10’ N lat., the long term projections analyzed in this section are only for the assessed population south of Pt. Conception at 34º27' N lat. The range of average annual cowcod catch contributions in 2015-2024 from the Southern California Bight across the catch scenarios analyzed and states of nature modeled in the 2013 assessment is 1-93 mt (Table 4-164). The stock is projected to rebuild under the base case scenario for all catch scenarios except the highest one (ACL = ABC using a P* of 0.45), where the biomass trends to a slightly lower depletion (Figure 4-64). All the ABC removal scenarios are predicted to keep the stock in the precautionary zone, while the lower catch scenarios (i.e., 2014 ACL, ACL removal using an SPR rate of 82.7% (or equivalent exploitation fraction[62]), and recent year average total catch removals) are predicted to rebuild the stock within the next ten years. The stock is estimated to be healthy with all catch scenarios being sustainable under the high state of nature (Figure 4-65). In contrast, the estimated depletion under the low state of nature is below the MSST with a slightly increasing trend under all catch scenarios (Figure 4-66). None of the catch scenarios under the low state of nature are predicted to rebuild the stock within ten years, although the lower catch streams up to the ABC removals using a P* of 0.25 are predicted to increase biomass above the MSST within ten years.

Table 4-164. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for cowcod south of 34º27' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2
	ABC Removals (P* = 0.25; Alt. 2)	35
	ABC Removals (P* = 0.4)	46
	ABC Removals (P* = 0.45; Alt. 1)	49
	ACL Removals (SPR = 82.7% in Conception area; Pref. Alt.)	9
	Recent Year Average Total Catch Removals	1
High	2014 ACL	2
	ABC Removals (P* = 0.25)	68
	ABC Removals (P* = 0.4)	86
	ABC Removals (P* = 0.45)	93
	ACL Removals (SPR = 82.7% in Conception area)	12
	Recent Year Average Total Catch Removals	1
Low	2014 ACL	2
	ABC Removals (P* = 0.25)	15
	ABC Removals (P* = 0.4)	21
	ABC Removals (P* = 0.45)	22
	ACL Removals (SPR = 82.7% in Conception area)	6
	Recent Year Average Total Catch Removals	1

[62] The 2013 cowcod assessment was conducted in an XDB-SRA platform which does not accommodate SPR harvest rates. Therefore, the 2013 cowcod rebuilding analysis calculated an equivalent exploitation fraction of allowable harvest/age 11+ biomass to the status quo SPR harvest rate of 82.7% (E = 0.007) to project impacts.

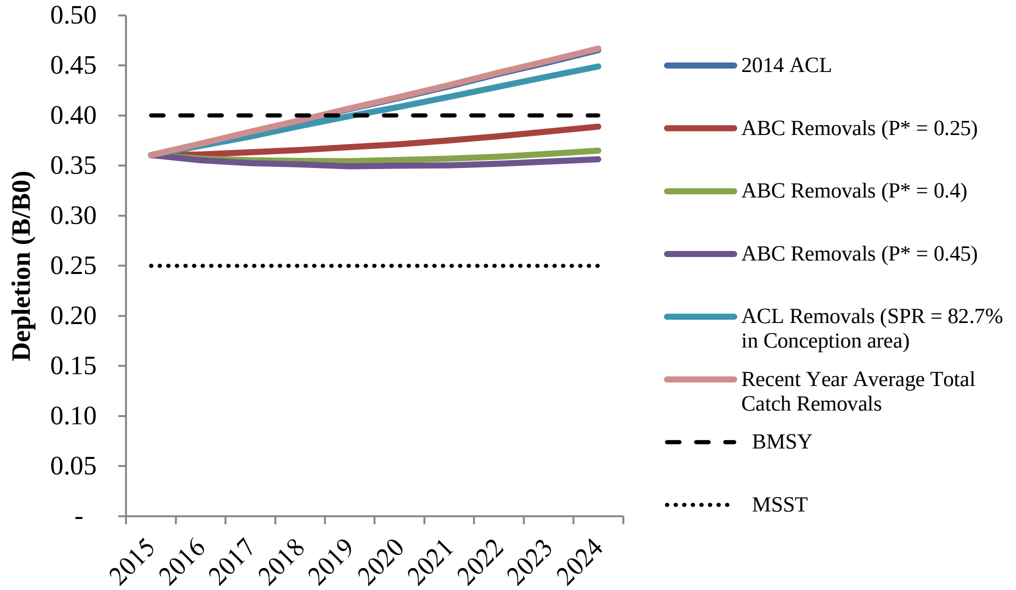


Figure 4-64. Projected depletion under alternative catch streams under the base case state of nature model for cowcod south of 34º27' N lat.

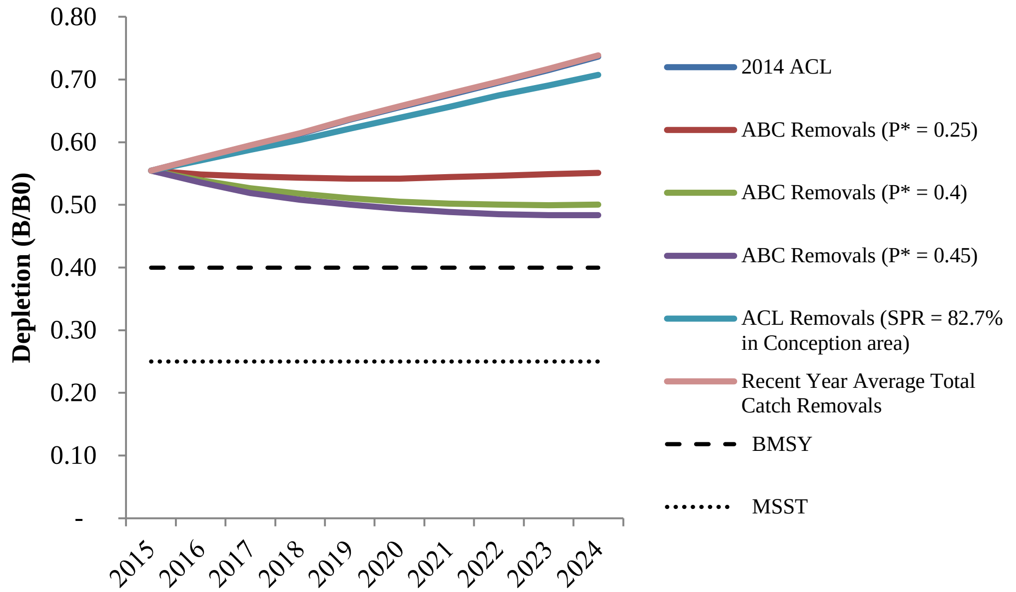


Figure 4-65. Projected depletion under alternative catch streams under the high state of nature model for cowcod south of 34º27' N lat.

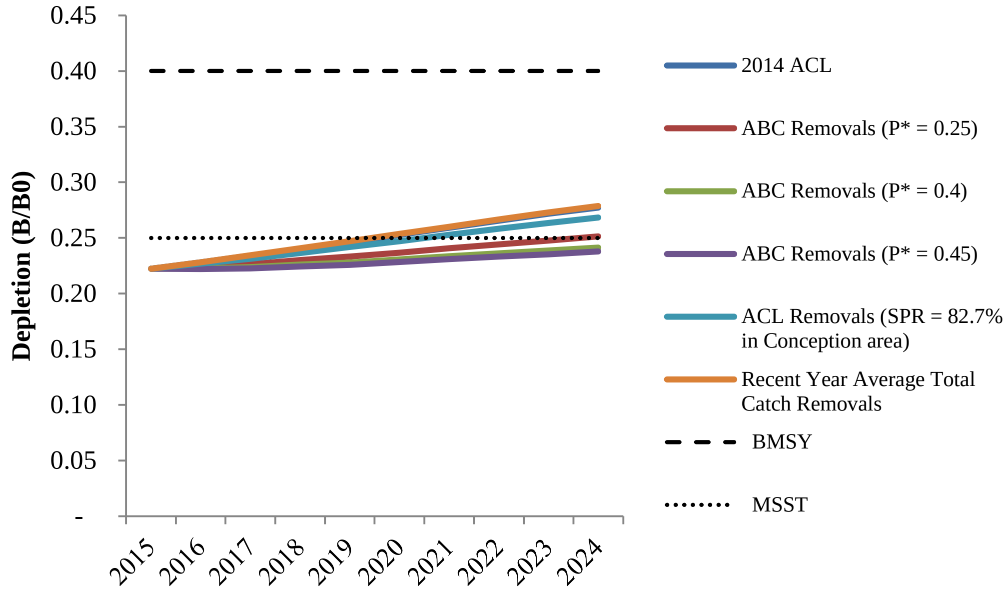


Figure 4-66. Projected depletion under alternative catch streams under the low state of nature model for cowcod south of 34º27' N lat.

4.8.3.5 Greenstriped Rockfish

The modeled catch scenarios for greenstriped rockfish range from 21 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 10,211 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-165). Projected greenstriped depletions under all catch scenarios and states of nature are predicted to be sustainable (Figure 4-67, Figure 4-68, and Figure 4-69). The most likely trajectory for greenstriped is the recent year average total catch scenario under the base case model since greenstriped are not targeted and do not tend to aggregate, which might otherwise cause sporadically high catches.

Table 4-165. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for greenstriped rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	857
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	1,201
	Recent Year Average Total Catch Removals	21
High	ABC Removals (P* = 0.25)	7,365
	ABC Removals (P* = 0.45)	10,211
	Recent Year Average Total Catch Removals	21
Low	ABC Removals (P* = 0.25)	156
	ABC Removals (P* = 0.45)	221
	Recent Year Average Total Catch Removals	21

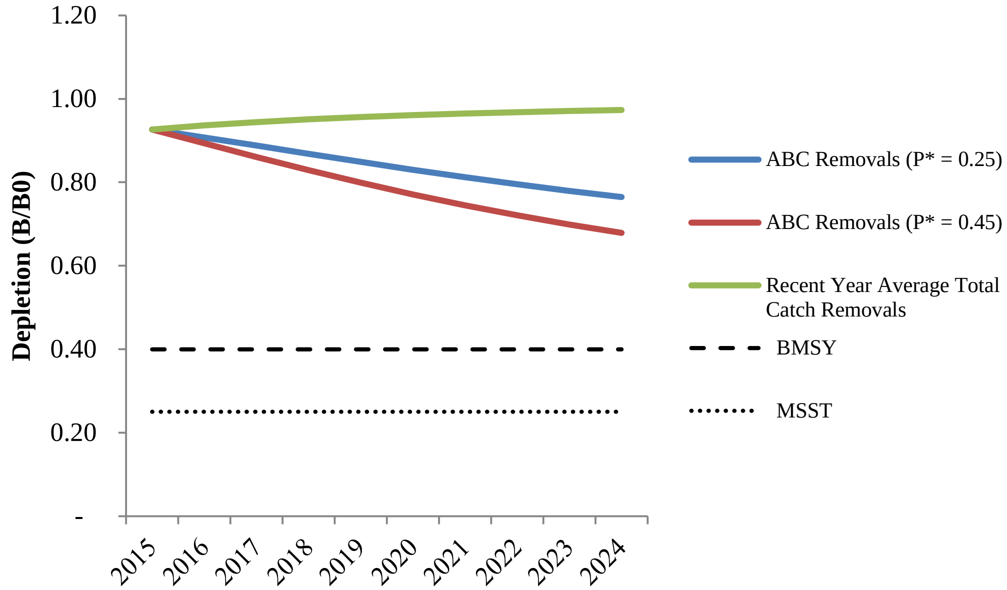


Figure 4-67. Projected depletion under alternative catch streams under the base case state of nature model for greenstriped rockfish.

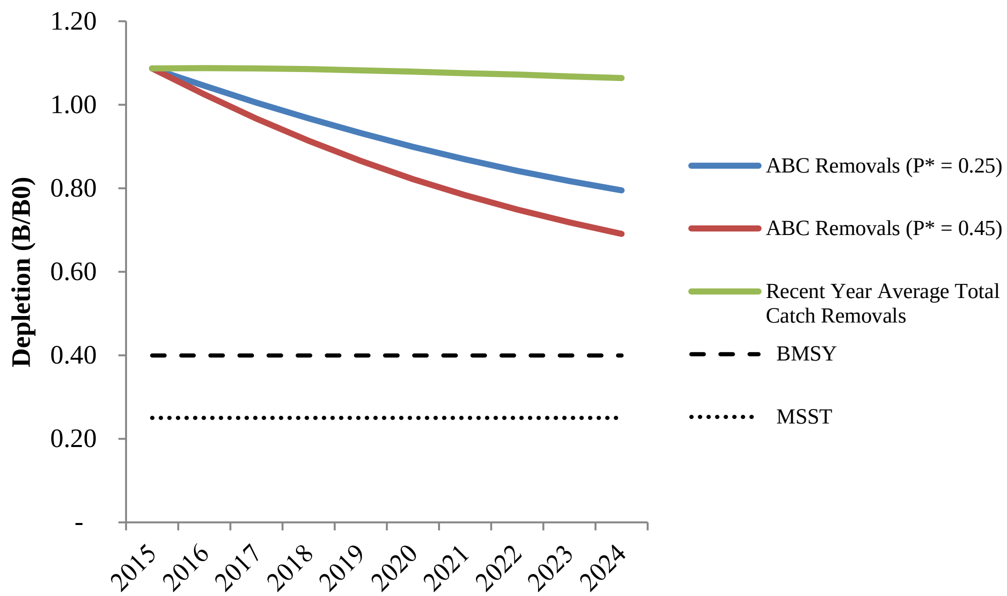


Figure 4-68. Projected depletion under alternative catch streams under the high state of nature model for greenstriped rockfish.

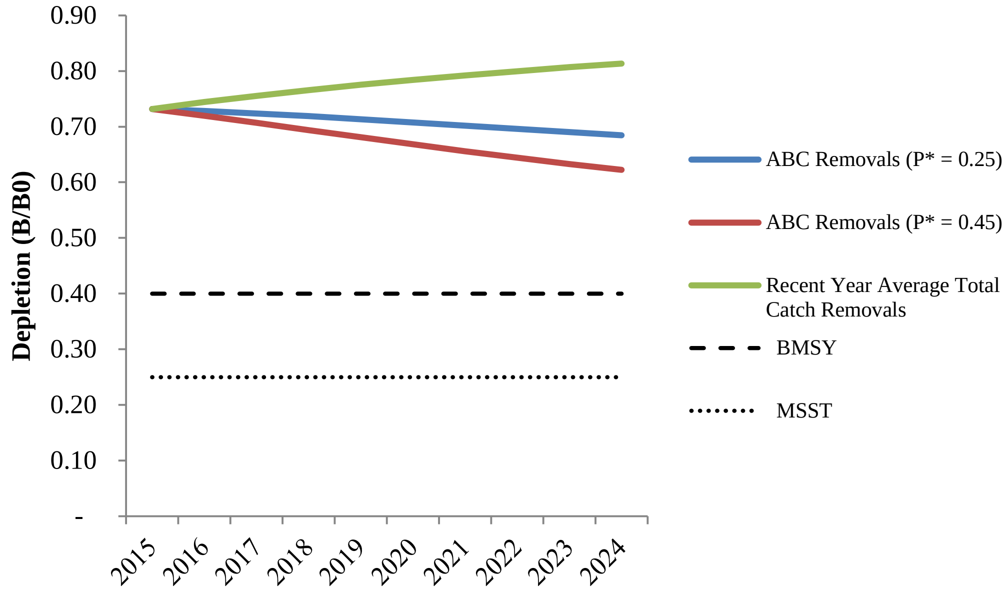


Figure 4-69. Projected depletion under alternative catch streams under the low state of nature model for greenstriped rockfish.

4.8.3.6 Widow Rockfish

The modeled catch scenarios for widow rockfish range from 247 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 4,648 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-166). Projected widow depletions under the base case and high states of nature are sustainable during the projection period assuming the respective states of nature (Figure 4-70 and Figure 4-71). Projected widow depletions under the low state of nature keeps the stock in the precautionary zone during the projection period (Figure 4-72). All the catch scenarios except the 3,000 mt constant catch scenario under the low state of nature predict some stock rebuilding. The 3,000 mt constant catch scenario under the low state of nature is predicted to reach an asymptote at the MSST during the projection period (Figure 4-72).

Table 4-166. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for widow rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	3,709
	ABC Removals (P* = 0.45; Alt. 1)	4,402
	Recent Year Average Total Catch Removals	247
	ACL Removals (1,500 mt constant catch; No Action Alt.)	1,500
	ACL Removals (3,000 mt constant catch)	3,000
High	ABC Removals (P* = 0.25)	3,915
	ABC Removals (P* = 0.45)	4,648
	Recent Year Average Total Catch Removals	247
	ACL Removals (1,500 mt constant catch)	1,500
	ACL Removals (3,000 mt constant catch)	3,000
Low	ABC Removals (P* = 0.25)	2,131
	ABC Removals (P* = 0.45)	2,493
	Recent Year Average Total Catch Removals	247
	ACL Removals (1,500 mt constant catch)	1,500
	ACL Removals (3,000 mt constant catch)	3,000

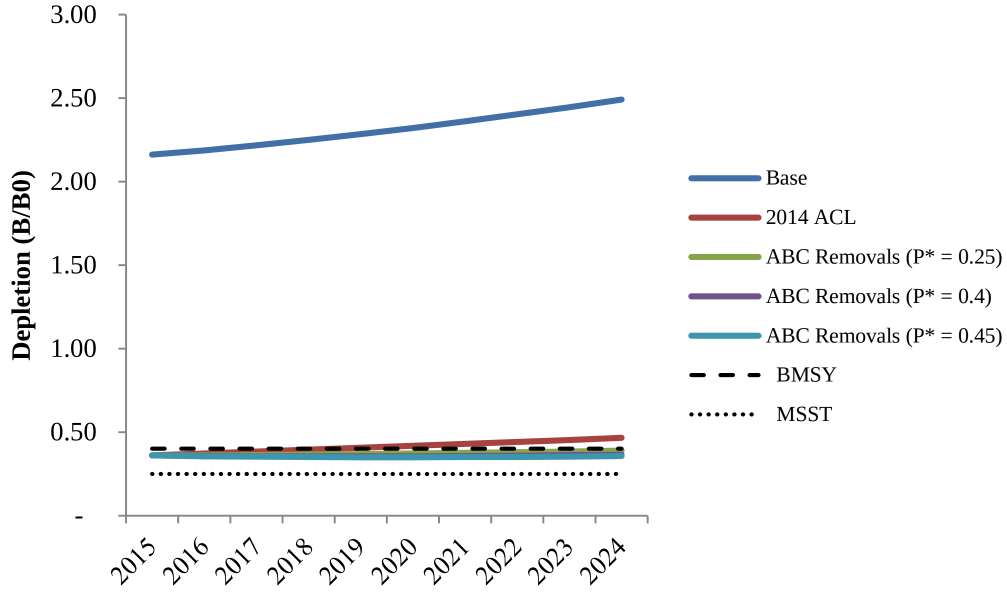


Figure 4-70. Projected depletion under alternative catch streams under the base case state of nature model for widow rockfish.

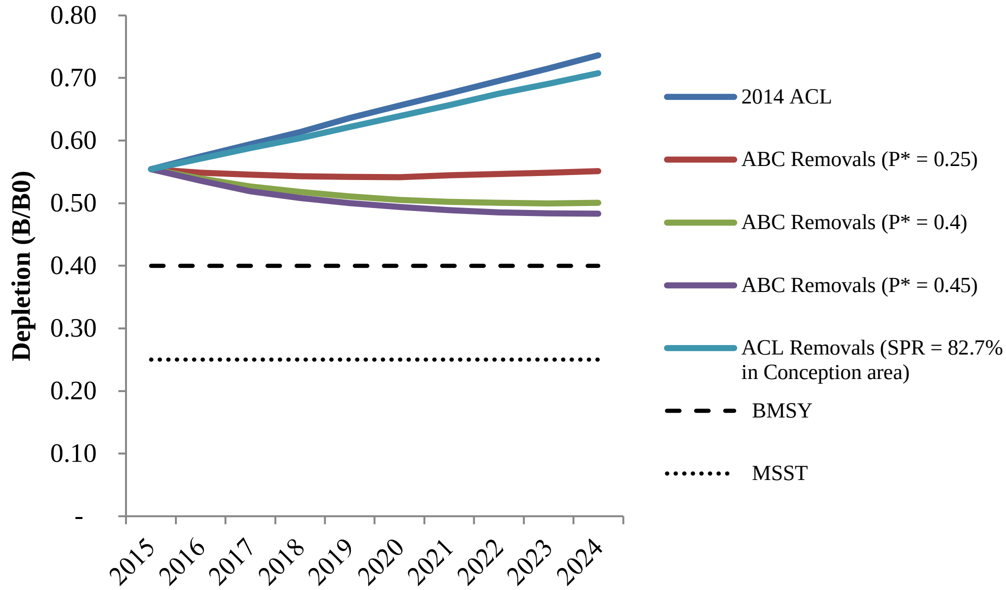


Figure 4-71. Projected depletion under alternative catch streams under the high state of nature model for widow rockfish.

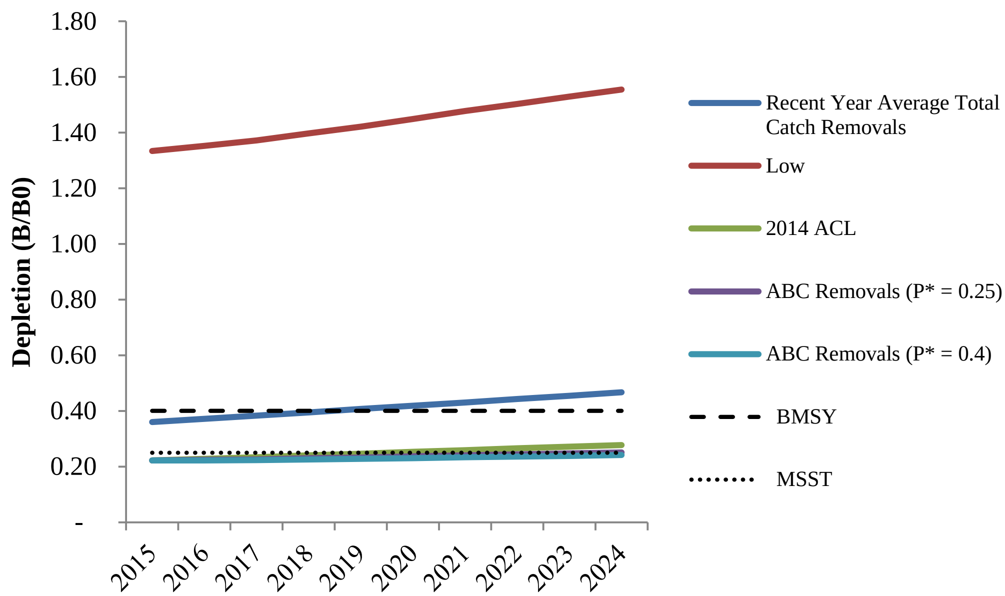


Figure 4-72. Projected depletion under alternative catch streams under the low state of nature model for widow rockfish.

4.8.3.7 Yelloweye Rockfish

The modeled catch scenarios for yelloweye rockfish range from 10 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 76 mt based on the ACL = ABC with a

P* of 0.45 catch scenario under the high state of nature (Table 4-167). Projected yelloweye rockfish depletions for all catch scenarios under the base case state of nature are predicted to undergo rebuilding and increase in abundance from below the MSST into the precautionary zone during the projection period (Figure 4-73). Projected yelloweye depletions for all catch scenarios under the high state of nature are predicted to keep the stock in the precautionary zone during the projection period (Figure 4-74). Projected yelloweye depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-75).

Table 4-167. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for yelloweye rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	18
	ABC Removals (P* = 0.25; Alt. 2)	29
	ABC Removals (P* = 0.45; Alt. 1)	41
	ACL Removals (SPR = 76%; Pref. Alt.)	19
	Recent Year Average Total Catch Removals	10
High	2014 ACL	18
	ABC Removals (P* = 0.25)	54
	ABC Removals (P* = 0.45)	76
	ACL Removals (SPR = 76%)	33
	Recent Year Average Total Catch Removals	10
Low	2014 ACL	18
	ABC Removals (P* = 0.25)	17
	ABC Removals (P* = 0.45)	24
	ACL Removals (SPR = 76%)	12
	Recent Year Average Total Catch Removals	10

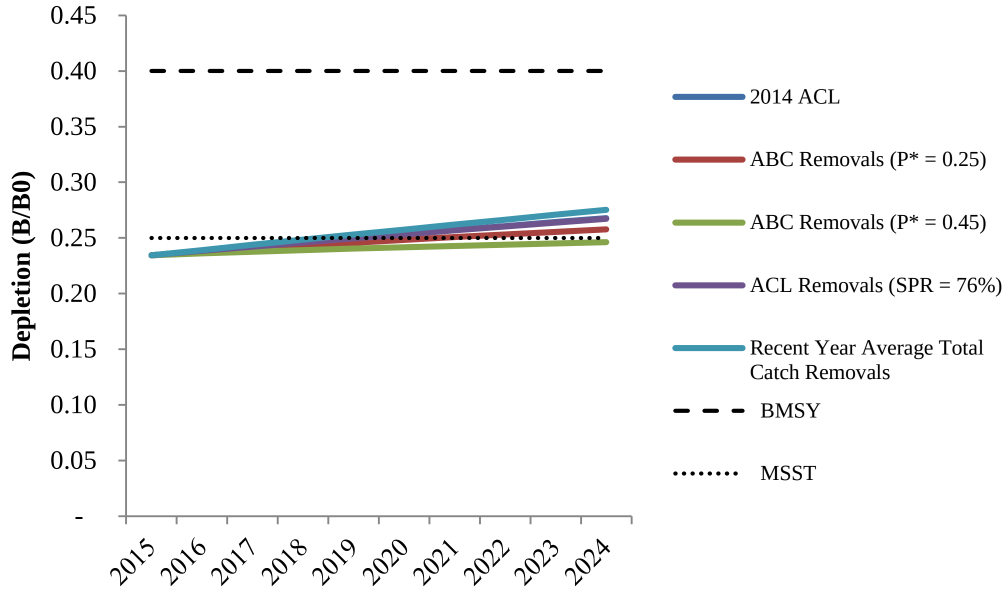


Figure 4-73. Projected depletion under alternative catch streams under the base case state of nature model for yelloweye rockfish.

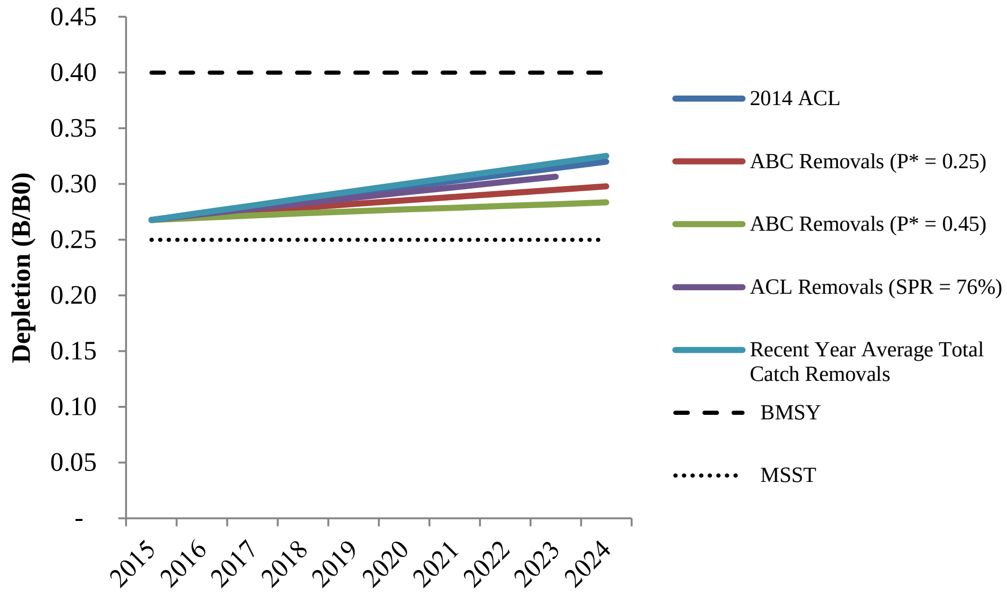


Figure 4-74. Projected depletion under alternative catch streams under the high state of nature model for yelloweye rockfish.

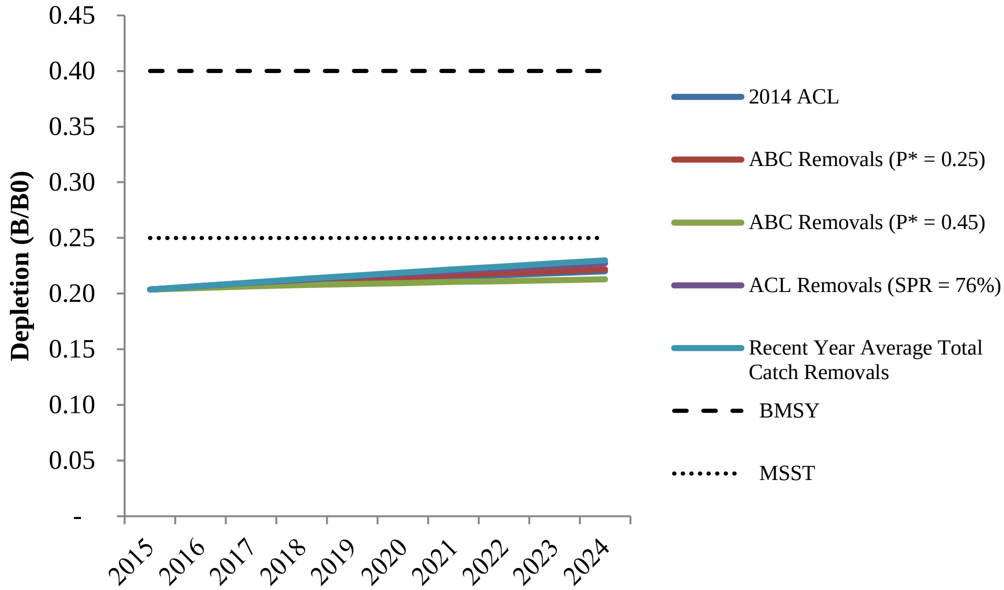


Figure 4-75. Projected depletion under alternative catch streams under the low state of nature model for yelloweye rockfish.

4.8.3.8 Yellowtail Rockfish North of 40º10' N lat.

The modeled catch scenarios for yellowtail rockfish north of 40º10' N lat. range from 1,551 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 9,805 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-168). Projected yellowtail rockfish depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-76, Figure 4-77, and Figure 4-78).

Table 4-168. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for yellowtail rockfish north of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	4,382
	ABC Removals (P* = 0.25; Alt. 2)	3,251
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	5,603
	Recent Year Average Total Catch Removals	1,551
High	2014 ACL	4,382
	ABC Removals (P* = 0.25)	5,745
	ABC Removals (P* = 0.45)	9,805
	Recent Year Average Total Catch Removals	1,551
Low	2014 ACL	4,382
	ABC Removals (P* = 0.25)	2,050
	ABC Removals (P* = 0.45)	3,571
	Recent Year Average Total Catch Removals	1,551

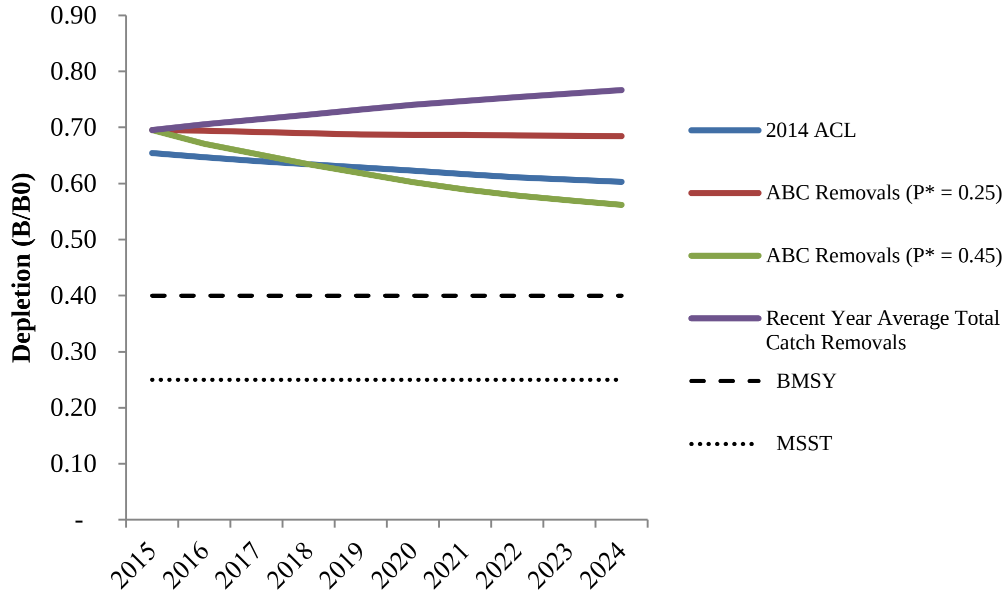


Figure 4-76. Projected depletion under alternative catch streams under the base case state of nature model for yellowtail rockfish north of 40º10’ N lat.

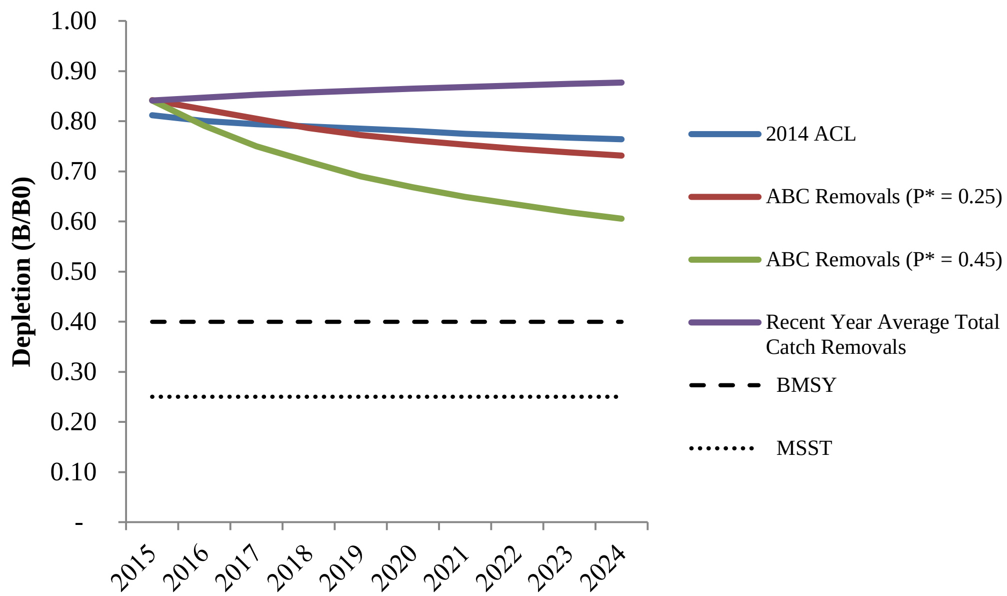


Figure 4-77. Projected depletion under alternative catch streams under the high state of nature model for yellowtail rockfish north of 40º10’ N lat.

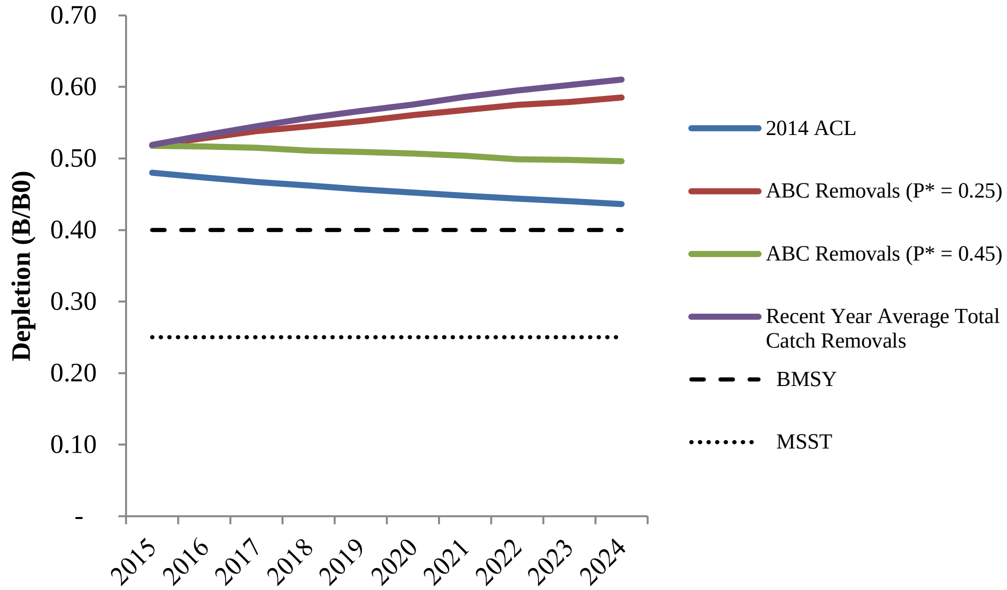


Figure 4-78. Projected depletion under alternative catch streams under the low state of nature model for yellowtail rockfish north of 40º10’ N lat.

4.8.4 Long Term Impacts of Assessed Slope Rockfish Species

4.8.4.1 Aurora Rockfish

The modeled catch scenarios for aurora rockfish range from 34 mt per year based on the 2014 ACL contribution (based on a data-poor OFL that preceded the OFL estimated from the 2013 assessment and a 16.6% ABC deduction from the OFL based on the stock then being categorized as a cat. 3 stock under a P* of 0.45) to an annual average catch in 2015-2024 of 144 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-169). Projected aurora rockfish depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-79, Figure 4-80, and Figure 4-81).

Table 4-169. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for aurora rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL contribution (No Action Alt.)	34
	ABC Removals (P* = 0.25; Alt. 2)	72
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	87
	Recent Year Average Total Catch Removals	46
High	2014 ACL contribution	34
	ABC Removals (P* = 0.25)	118
	ABC Removals (P* = 0.45)	144
	Recent Year Average Total Catch Removals	46
Low	2014 ACL contribution	34
	ABC Removals (P* = 0.25)	46
	ABC Removals (P* = 0.45)	55
	Recent Year Average Total Catch Removals	46

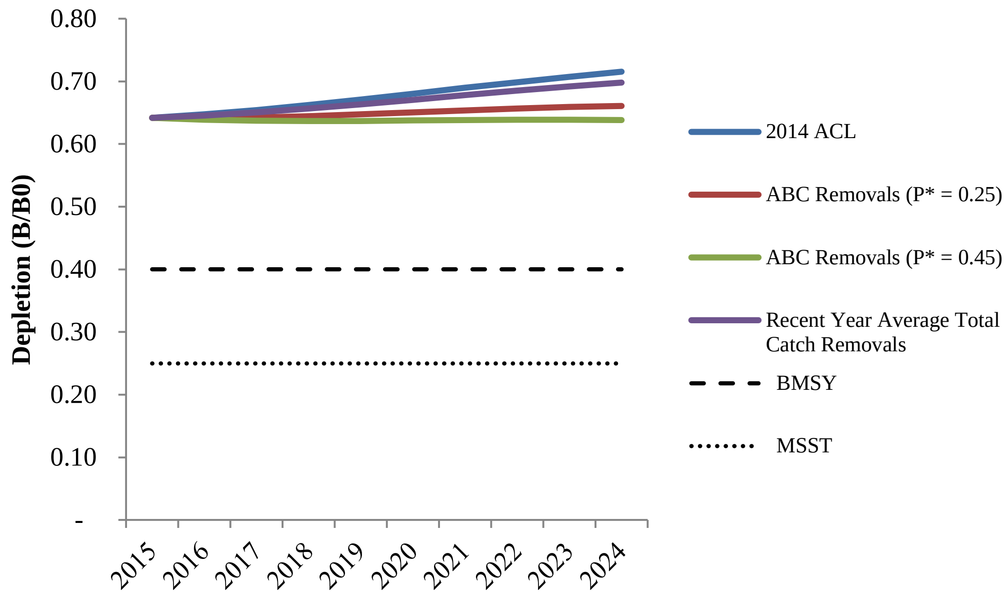


Figure 4-79. Projected depletion under alternative catch streams under the base case state of nature model for aurora rockfish.

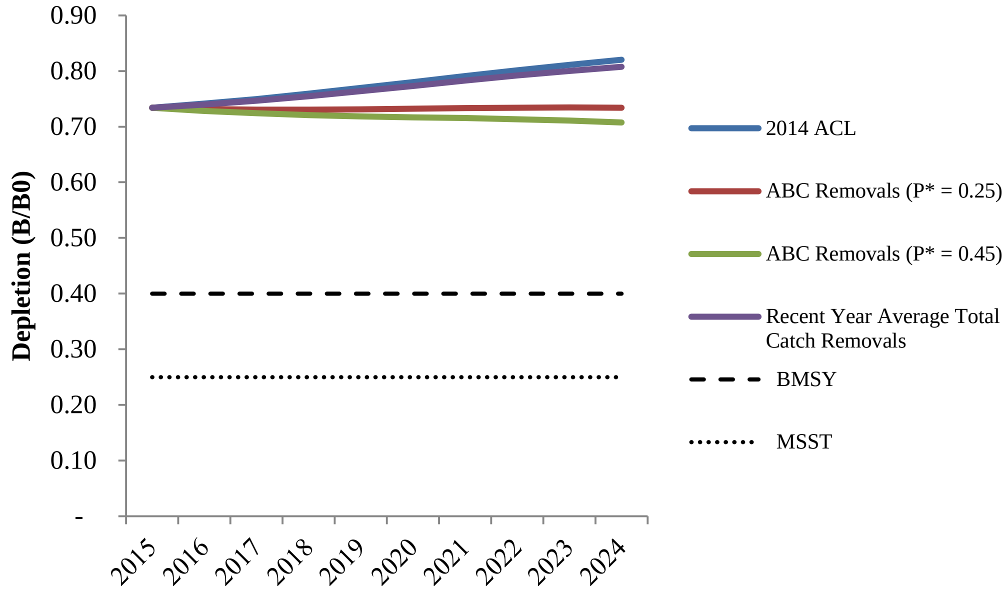
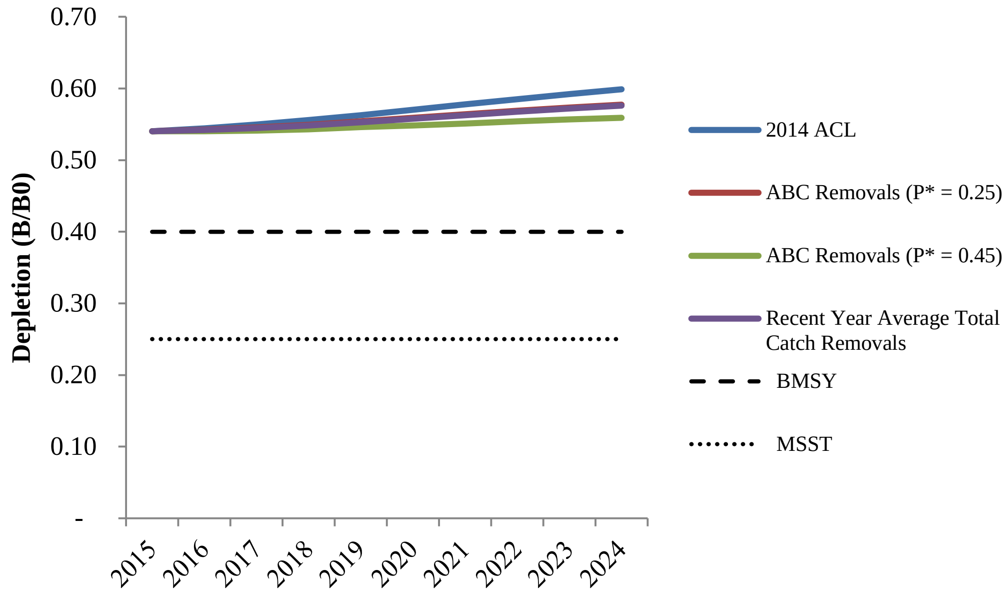


Figure 4-80. Projected depletion under alternative catch streams under the high state of nature model for aurora rockfish.



4.8.4.2 Blackgill Rockfish South of 40º10' N lat.

The modeled catch scenarios for blackgill rockfish south of 40º10' N lat. range from an annual average catch of 55 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 224 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-170). Projected blackgill rockfish depletions under the base case state of nature for all catch scenarios keep the stock within the precautionary zone during the projection period except for the ABC removals under a P* of 0.25, where the depletion is projected to rebuild to the B_{MSY} threshold by the end of the projection period (Figure 4-81). Projected blackgill rockfish depletions under the high state of nature are sustainable for all catch scenarios (Figure 4-82). Projected blackgill rockfish depletions under the low state of nature for all catch scenarios are predicted to rebuild from below the MSST into the precautionary zone during the projection period (Figure 4-83).

Table 4-170. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for blackgill rockfish south of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL contribution (No Action Alt.	110
	ABC Removals (P* = 0.25; Alt. 2)	93
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	131
	Recent Year Average Total Catch Removals	173
High	2014 ACL contribution	110
	ABC Removals (P* = 0.25)	159
	ABC Removals (P* = 0.45)	224
	Recent Year Average Total Catch Removals	173
Low	2014 ACL contribution	110
	ABC Removals (P* = 0.25)	55
	ABC Removals (P* = 0.45)	78
	Recent Year Average Total Catch Removals	173

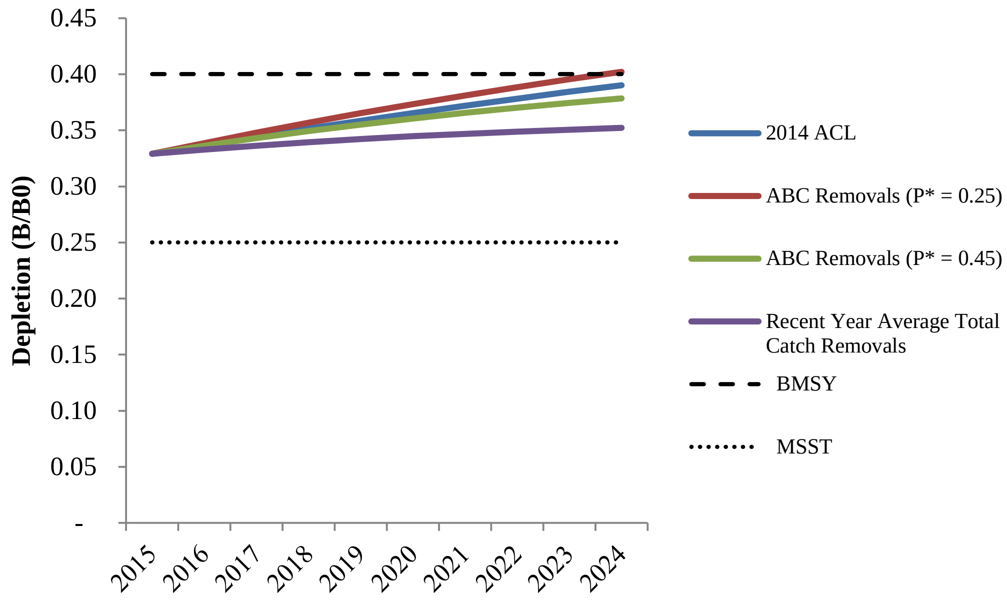


Figure 4-81. Projected depletion under alternative catch streams under the base case state of nature model for blackgill rockfish south of 40º10' N lat.

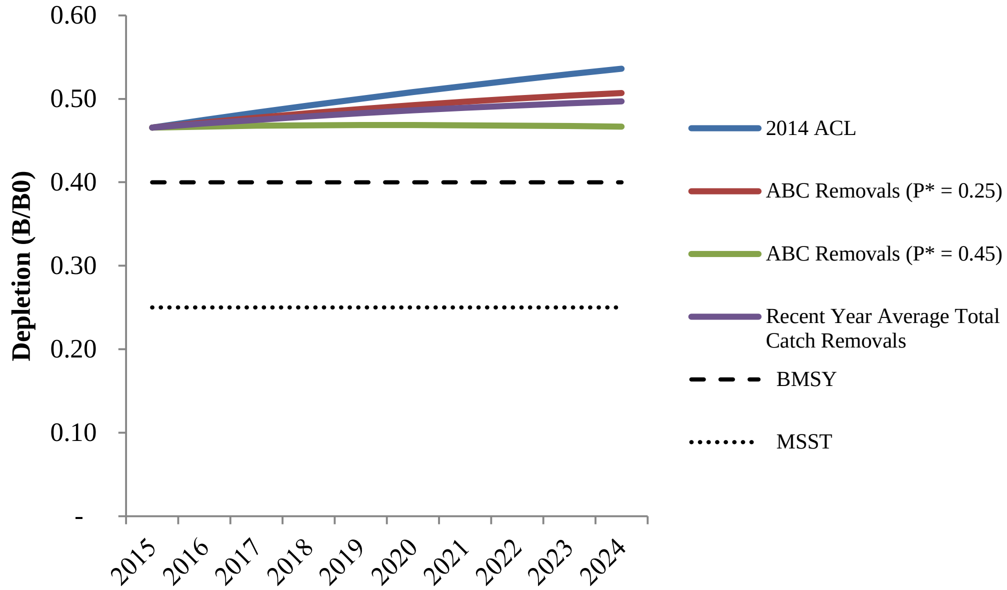


Figure 4-82. Projected depletion under alternative catch streams under the high state of nature model for blackgill rockfish south of 40°10' N lat.

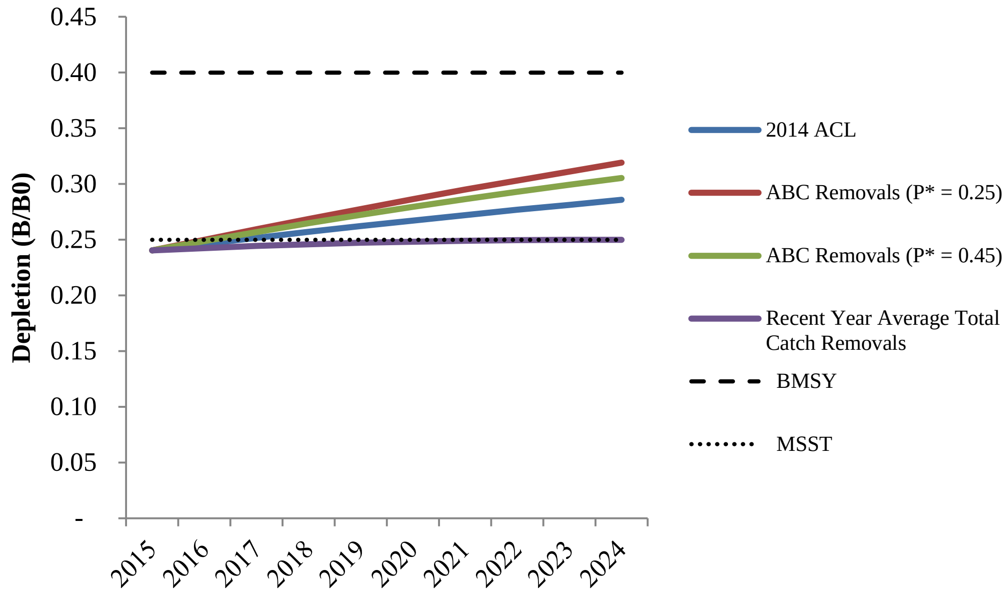


Figure 4-83. Projected depletion under alternative catch streams under the low state of nature model for blackgill rockfish south of 40°10' N lat.

4.8.4.3 Darkblotched Rockfish

The modeled catch scenarios for darkblotched rockfish range from an annual average catch of 108 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 2,003 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-171). Projected darkblotched rockfish depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-84 and Figure 4-85). Projected darkblotched rockfish depletions under the low state of nature for all catch scenarios are predicted to rebuild from below the MSST into the precautionary zone during the projection period (Figure 4-86).

Table 4-171. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for darkblotched rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	330
	ABC Removals (P* = 0.25; Alt. 2)	484
	ABC Removals (P* = 0.45; Alt. 1)	575
	ACL Removals (SPR = 64.9%; Pref. Alt.)	349
	Recent Year Average Total Catch Removals	108
High	2014 ACL	330
	ABC Removals (P* = 0.25)	1,702
	ABC Removals (P* = 0.45)	2,003
	ACL Removals (SPR = 64.9%)	1,253
	Recent Year Average Total Catch Removals	108
Low	2014 ACL	330
	ABC Removals (P* = 0.25)	168
	ABC Removals (P* = 0.45)	200
	ACL Removals (SPR = 64.9%)	121
	Recent Year Average Total Catch Removals	108

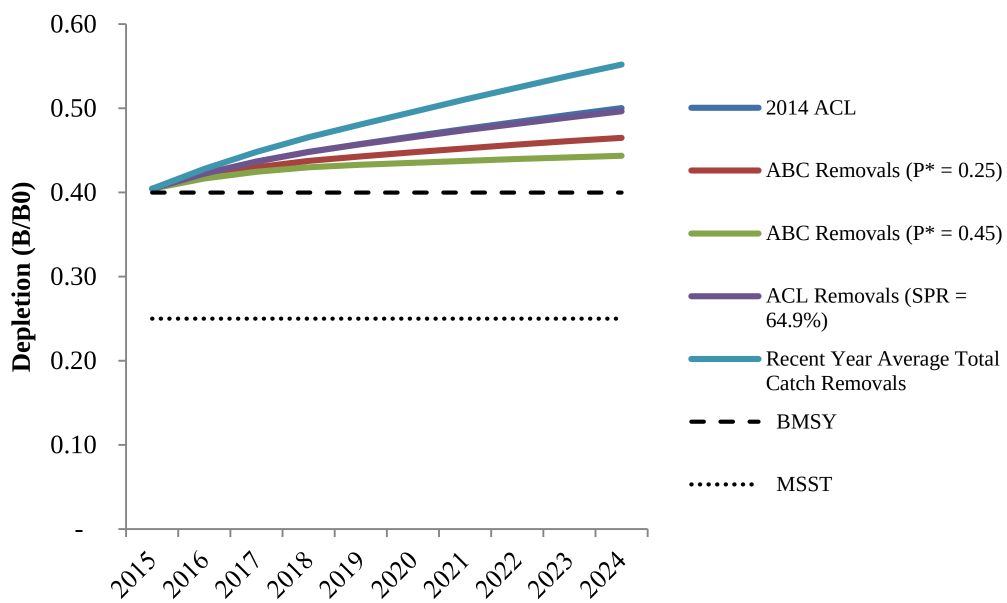


Figure 4-84. Projected depletion under alternative catch streams under the base case state of nature model for darkblotched rockfish.

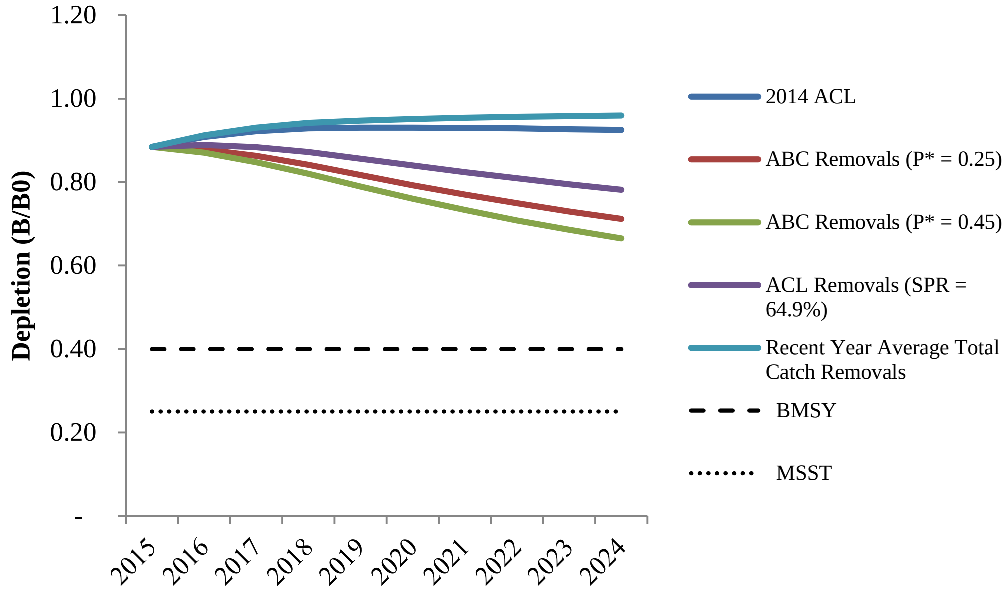


Figure 4-85. Projected depletion under alternative catch streams under the high state of nature model for darkblotched rockfish.

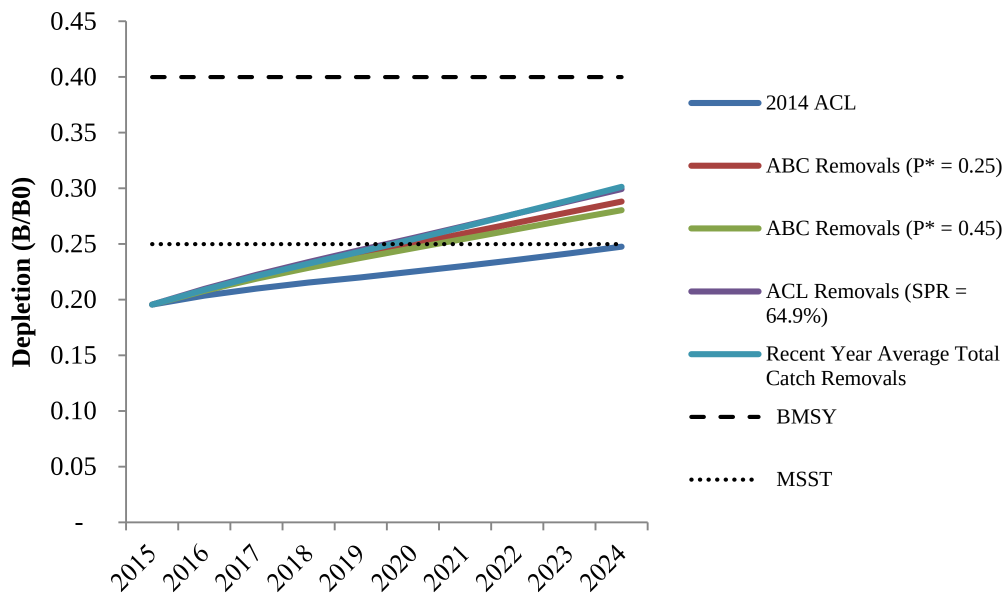


Figure 4-86. Projected depletion under alternative catch streams under the low state of nature model for darkblotched rockfish.

4.8.4.4 Longspine Thornyheads

The modeled catch scenarios for longspine thornyheads range from an annual average catch of 942 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 6,620 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-172). Projected longspine thornyhead depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-87, Figure 4-88, and Figure 4-89).

Table 4-172. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for longspine thornyheads.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2,305
	ABC Removals (P* = 0.25; Alt. 2)	2,683
	ABC Removals (P* = 0.4; Pref. Alt.)	3,395
	ABC Removals (P* = 0.45; Alt. 1)	3,631
	Recent Year Average Total Catch Removals	942
High	2014 ACL	2,305
	ABC Removals (P* = 0.25)	4,904
	ABC Removals (P* = 0.4)	6,192
	ABC Removals (P* = 0.45)	6,620
	Recent Year Average Total Catch Removals	942
Low	2014 ACL	2,305
	ABC Removals (P* = 0.25)	1,732
	ABC Removals (P* = 0.4)	2,195
	ABC Removals (P* = 0.45)	2,349
	Recent Year Average Total Catch Removals	942

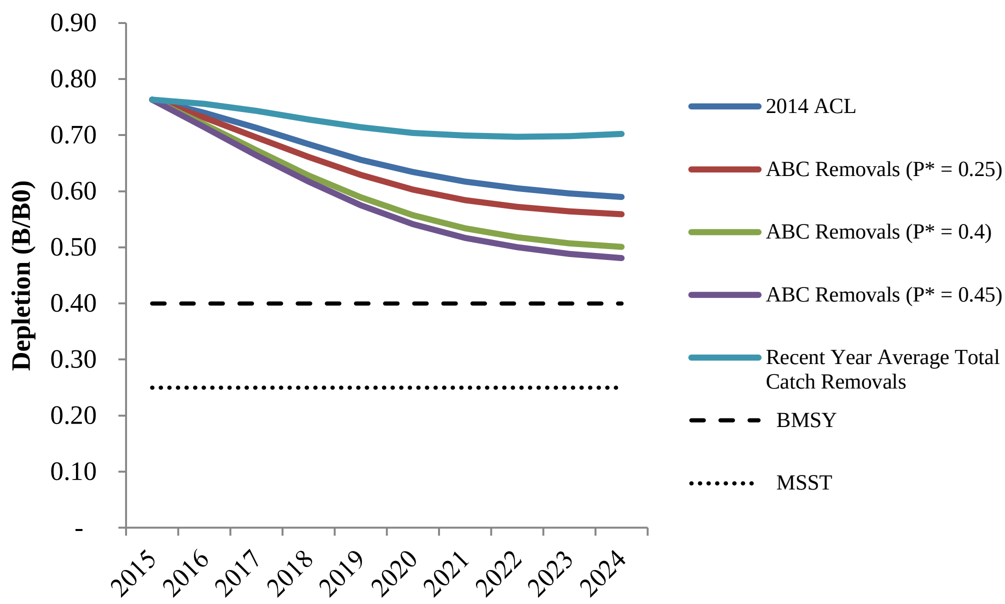


Figure 4-87. Projected depletion under alternative catch streams under the base case state of nature model for longspine thornyheads.

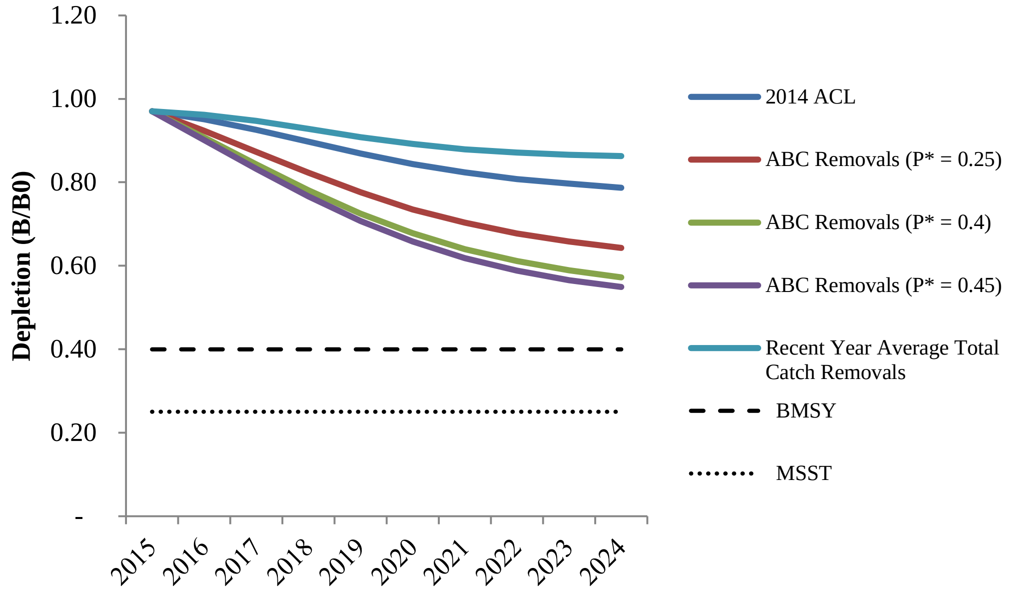


Figure 4-88. Projected depletion under alternative catch streams under the high state of nature model for longspine thornyheads.

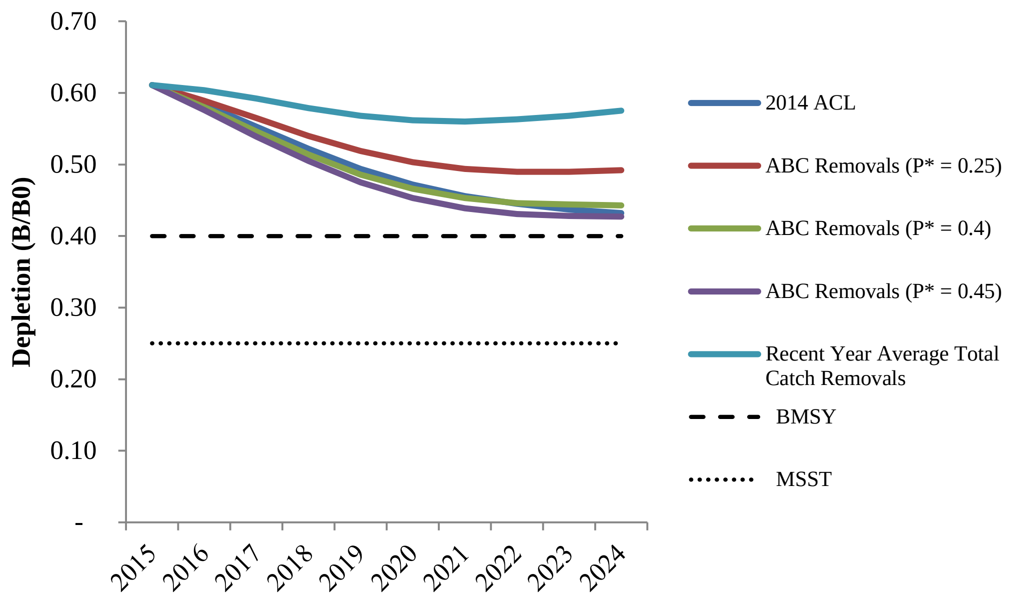


Figure 4-89. Projected depletion under alternative catch streams under the low state of nature model for longspine thornyheads.

4.8.4.5 Pacific Ocean Perch

The modeled catch scenarios for Pacific ocean perch range from 59 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,805 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-173). Projected POP depletions for all catch scenarios except the ABC removals (both the P* of 0.25 and 0.45 scenarios) under the base case state of nature are predicted to undergo rebuilding and increase in abundance from below the MSST into the precautionary zone during the projection period; the ABC removal scenarios keep the stock below the MSST during the projection period (Figure 4-90). Projected POP depletions for all catch scenarios under the high state of nature are predicted to be sustainable during the projection period (Figure 4-91). Projected POP depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-92).

Table 4-173. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for Pacific ocean perch.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	153
	ABC Removals (P* = 0.25; Alt. 2)	560
	ABC Removals (P* = 0.45; Alt. 1)	662
	ACL Removals (SPR = 86.4%; Pref. Alt.)	180
	Recent Year Average Total Catch Removals	59
High	2014 ACL	153
	ABC Removals (P* = 0.25)	1,517
	ABC Removals (P* = 0.45)	1,805
	ACL Removals (SPR = 86.4%)	371
	Recent Year Average Total Catch Removals	59
Low	2014 ACL	153
	ABC Removals (P* = 0.25)	189
	ABC Removals (P* = 0.45)	224
	ACL Removals (SPR = 86.4%)	110
	Recent Year Average Total Catch Removals	59

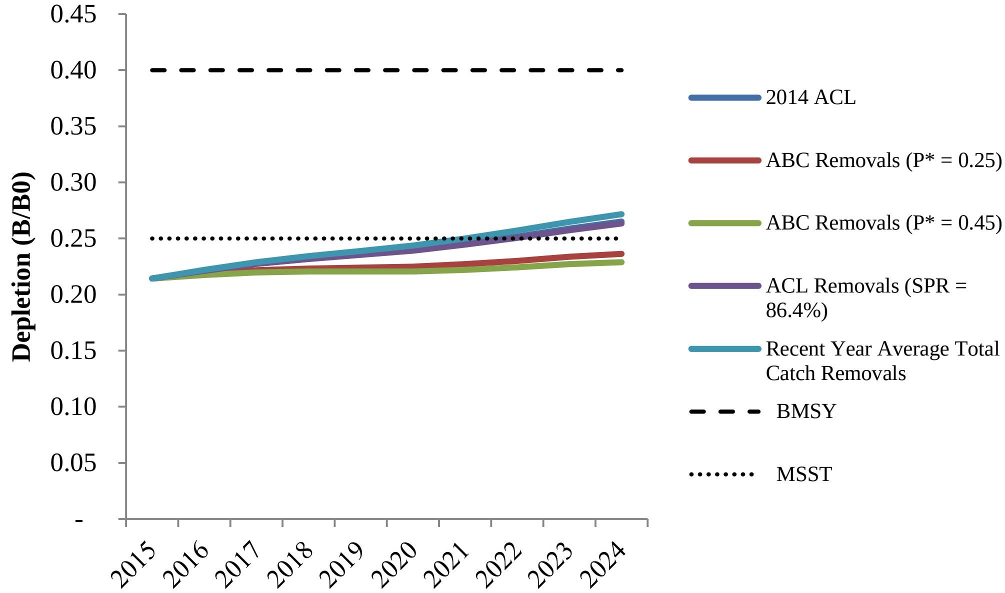


Figure 4-90. Projected depletion under alternative catch streams under the base case state of nature model for Pacific ocean perch.

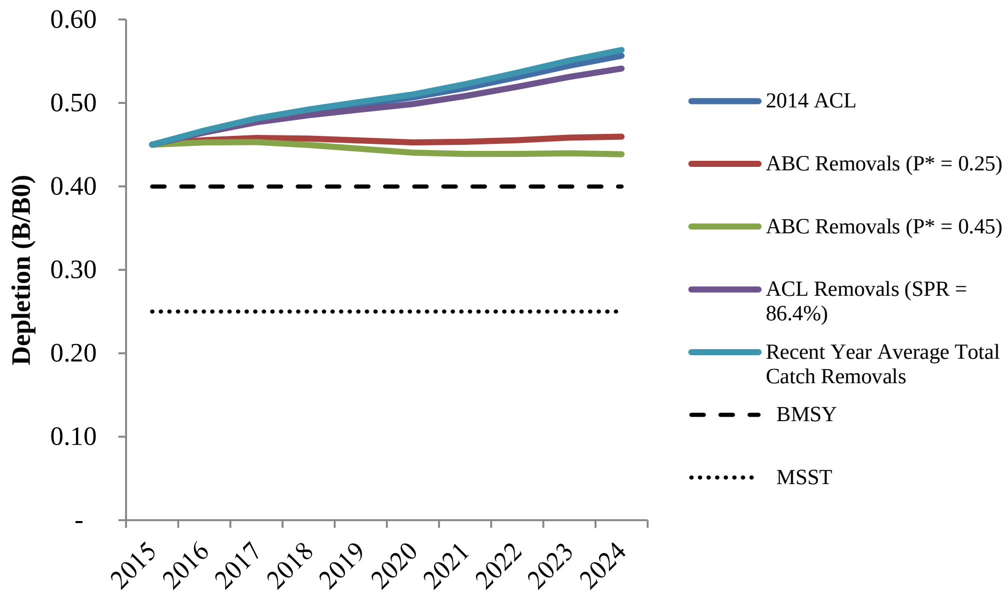


Figure 4-91. Projected depletion under alternative catch streams under the high state of nature model for Pacific ocean perch.

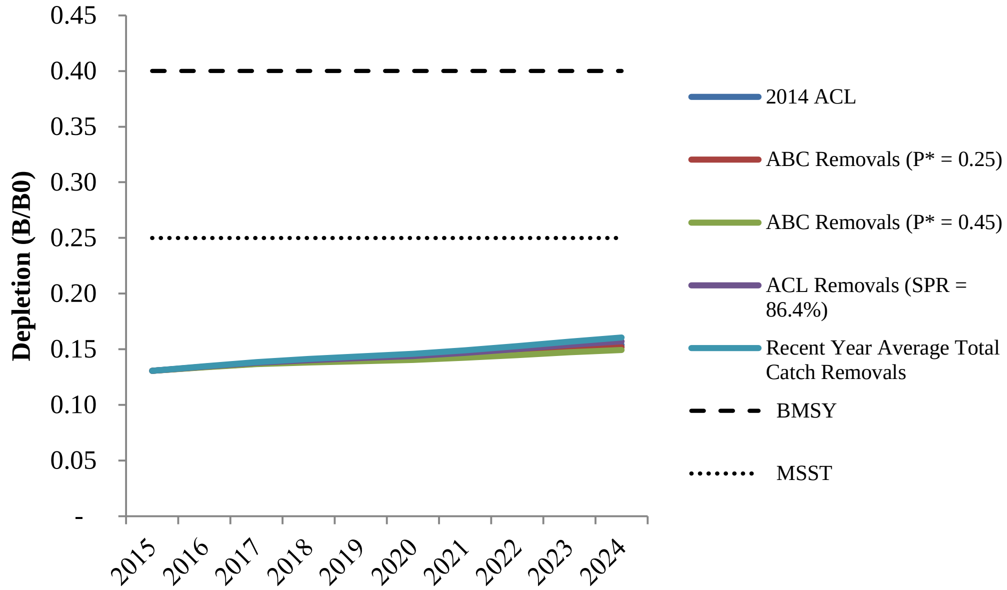


Figure 4-92. Projected depletion under alternative catch streams under the low state of nature model for Pacific ocean perch.

4.8.4.6 Rougheye/Blackspotted Rockfish

The modeled catch scenarios for rougheye/blackspotted rockfish range from an annual average catch of 60 mt per year based on the 2014 ACL contribution (based on a data-poor OFL that preceded the OFL estimated from the 2013 assessment and a 16.6% ABC deduction from the OFL based on the stock then being categorized as a cat. 3 stock under a P* of 0.45) to an annual average catch in 2015-2024 of 319 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-174). Projected rougheye/blackspotted rockfish depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-93 and Figure 4-94). Projected rougheye/blackspotted rockfish depletions under the low state of nature for all catch scenarios are predicted to rebuild from the precautionary zone to above the B_{MSY} threshold during the projection period (Figure 4-95).

Table 4-174. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for rougheye/blackspotted rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL Contribution (No Action Alt.)	60
	ABC Removals (P* = 0.25; Alt. 2)	141
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	202
	Recent Year Average Total Catch Removals	189
High	2014 ACL Contribution	60
	ABC Removals (P* = 0.25)	224
	ABC Removals (P* = 0.45)	319
	Recent Year Average Total Catch Removals	189
Low	2014 ACL Contribution	60
	ABC Removals (P* = 0.25)	91
	ABC Removals (P* = 0.45)	130
	Recent Year Average Total Catch Removals	189

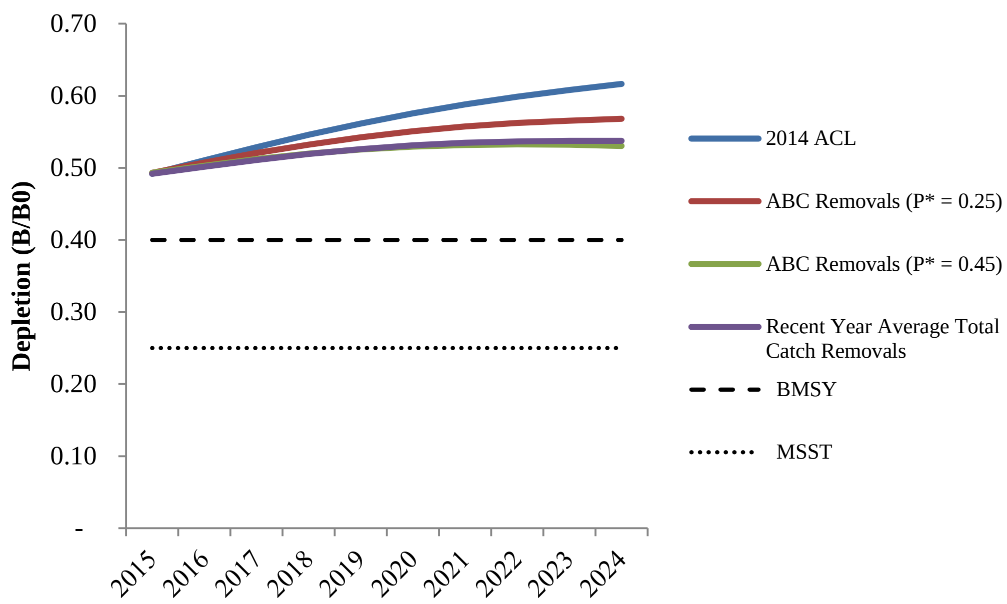


Figure 4-93. Projected depletion under alternative catch streams under the base case state of nature model for rougheye/blackspotted rockfish.

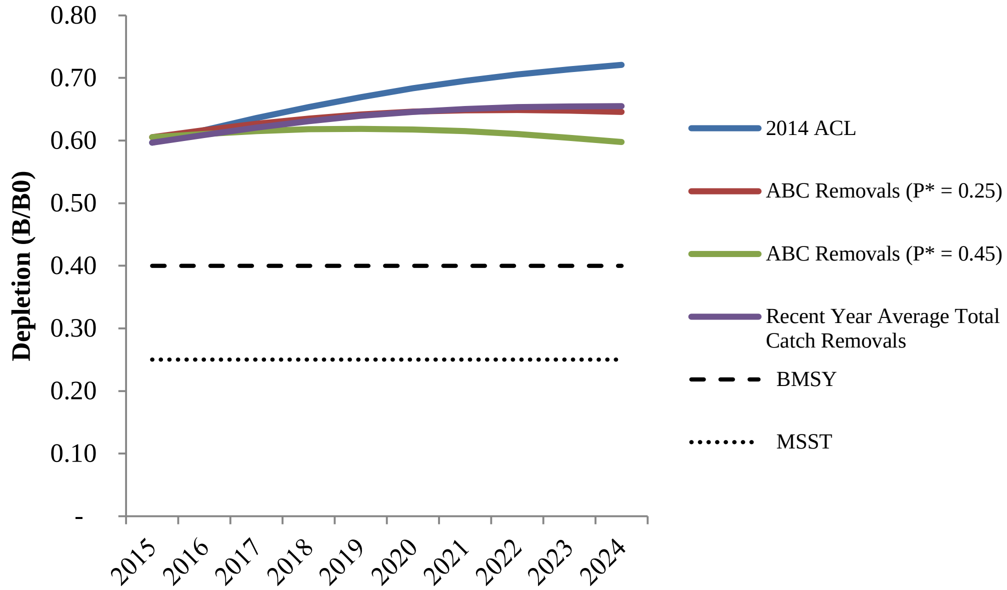


Figure 4-94. Projected depletion under alternative catch streams under the high state of nature model for rougheye/blackspotted rockfish.

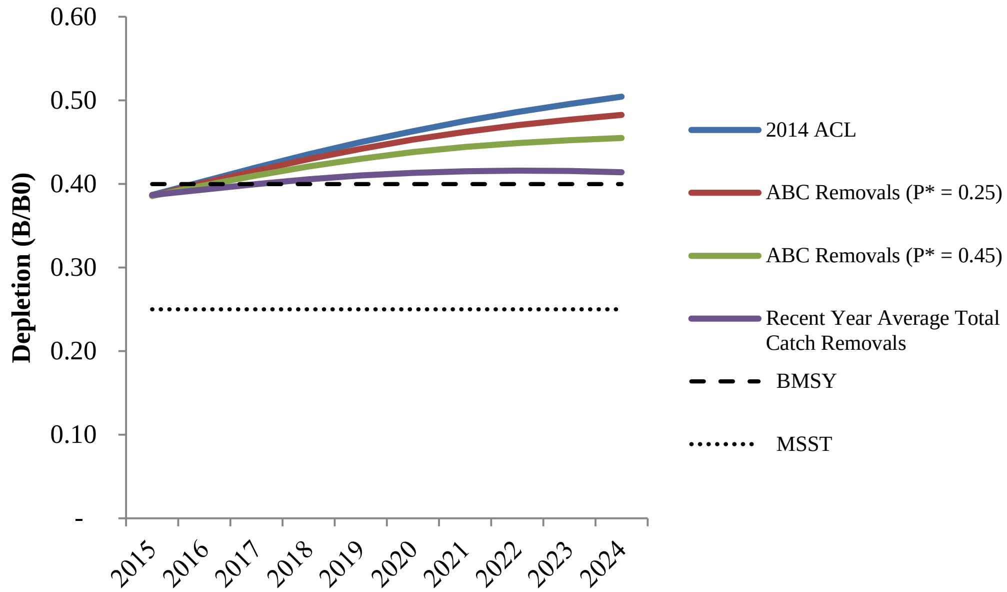


Figure 4-95. Projected depletion under alternative catch streams under the low state of nature model for rougheye/blackspotted rockfish.

4.8.4.7 Shortspine Thornyheads

The modeled catch scenarios for shortspine thornyheads range from an annual average catch of 754 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 8,011 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-175). Projected shortspine thornyhead depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-96, Figure 4-97, and Figure 4-98).

Table 4-175. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for shortspine thornyheads.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	1,918
	ABC Removals (P* = 0.25; Alt. 2)	1,928
	ABC Removals (P* = 0.4; Pref. Alt.)	2,566
	ABC Removals (P* = 0.45; Alt. 1)	2,794
	Recent Year Average Total Catch Removals	953
High	2014 ACL	1,918
	ABC Removals (P* = 0.25)	5,527
	ABC Removals (P* = 0.4)	7,356
	ABC Removals (P* = 0.45)	8,011
	Recent Year Average Total Catch Removals	953
Low	2014 ACL	1,918
	ABC Removals (P* = 0.25)	754
	ABC Removals (P* = 0.4)	1,003
	ABC Removals (P* = 0.45)	1,093
	Recent Year Average Total Catch Removals	953

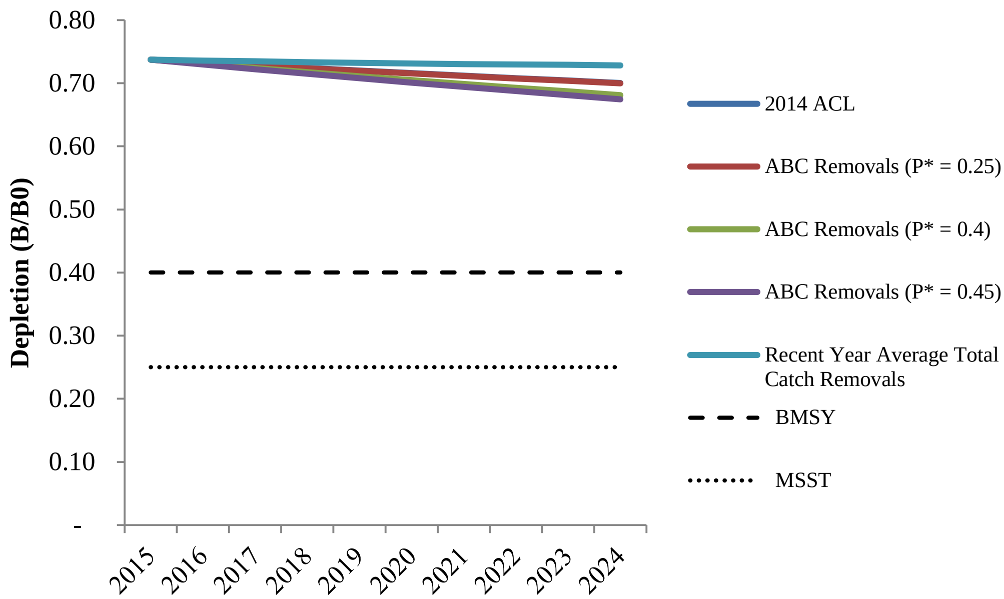


Figure 4-96. Projected depletion under alternative catch streams under the base case state of nature model for shortspine thornyheads.

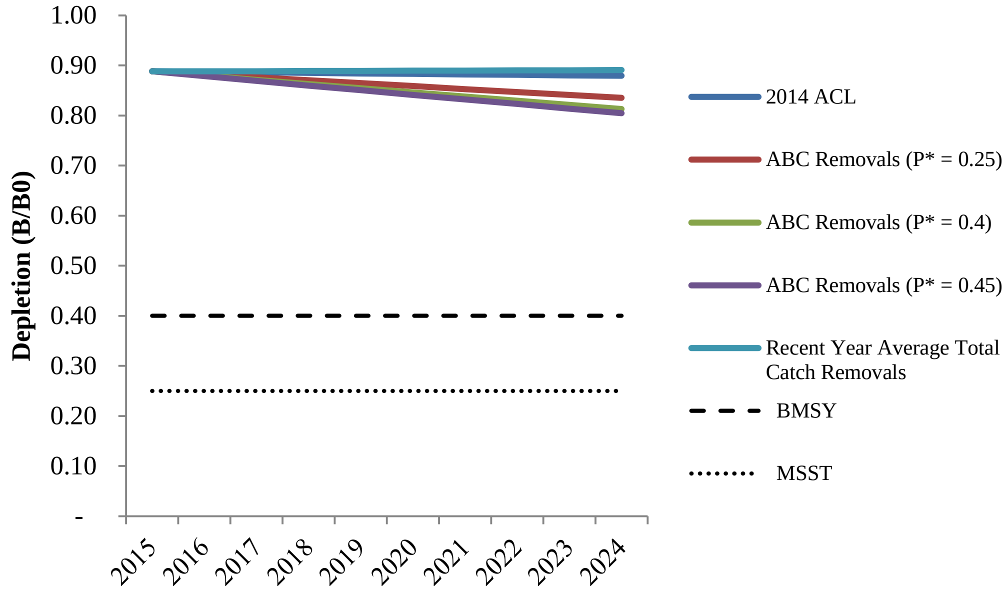


Figure 4-97. Projected depletion under alternative catch streams under the high state of nature model for shortspine thornyheads.

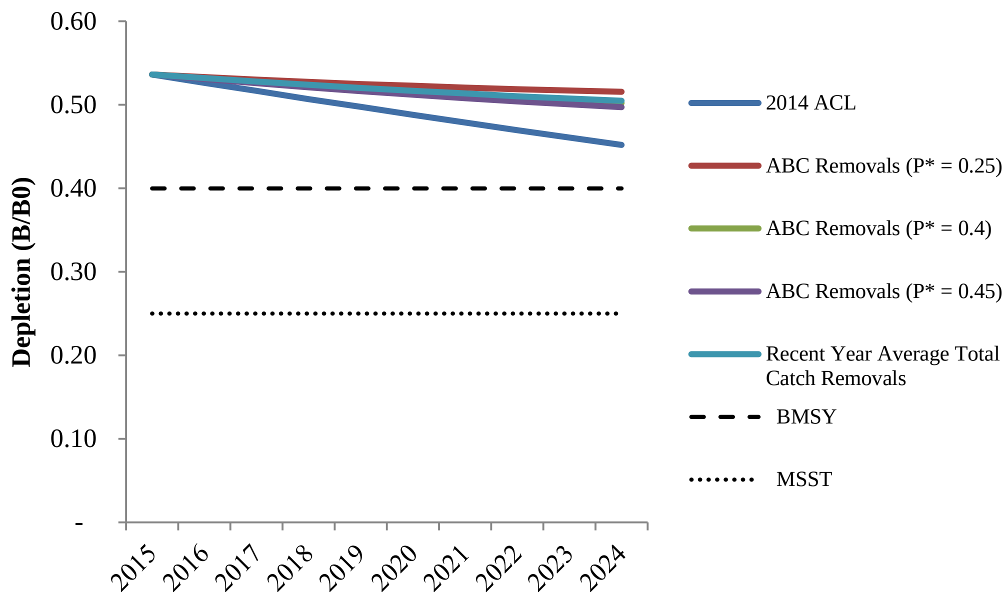


Figure 4-98. Projected depletion under alternative catch streams under the low state of nature model for shortspine thornyheads.

4.8.4.8 Splitnose Rockfish

The modeled catch scenarios for splitnose rockfish range from an annual average catch of 70 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 3,036 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-176). Projected splitnose rockfish depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-99, Figure 4-100, and Figure 4-101).

Table 4-176. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for splitnose rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	2,440
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	2,908
	Recent Year Average Total Catch Removals	70
High	ABC Removals (P* = 0.25)	2,549
	ABC Removals (P* = 0.45)	3,036
	Recent Year Average Total Catch Removals	70
Low	ABC Removals (P* = 0.25)	2,028
	ABC Removals (P* = 0.45)	2,417
	Recent Year Average Total Catch Removals	70

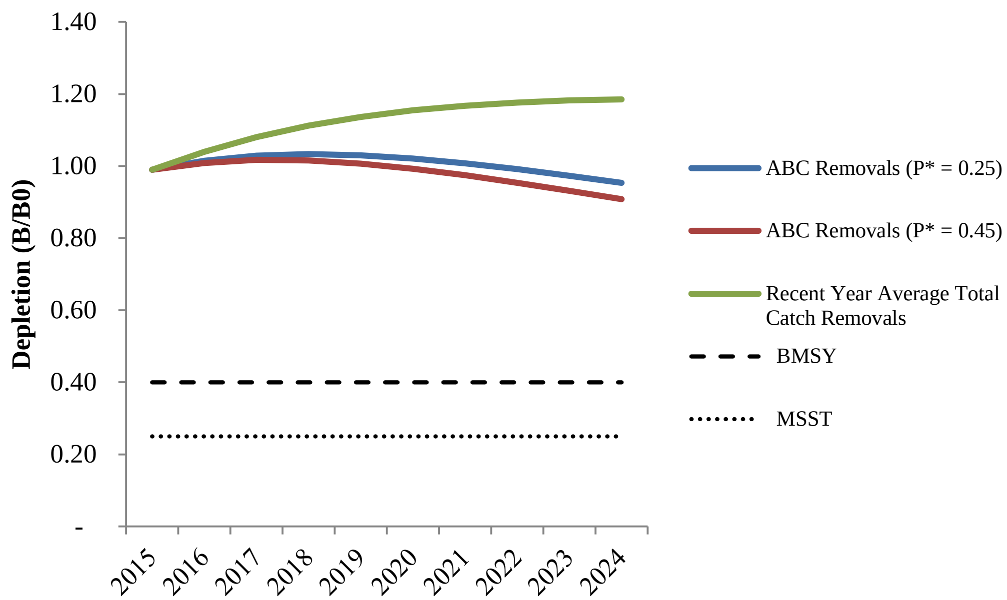


Figure 4-99. Projected depletion under alternative catch streams under the base case state of nature model for splitnose rockfish.

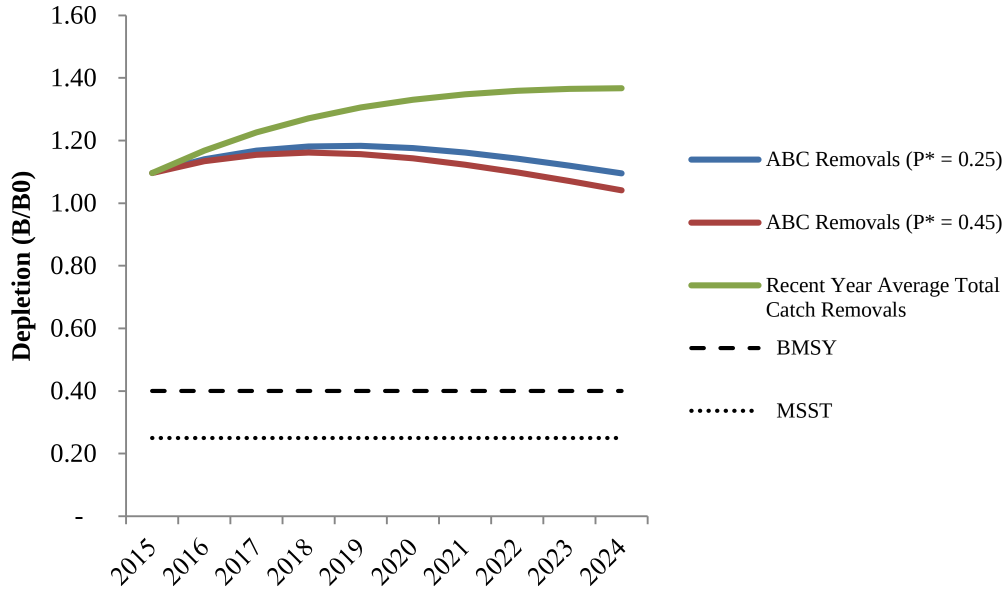


Figure 4-100. Projected depletion under alternative catch streams under the high state of nature model for splitnose rockfish.

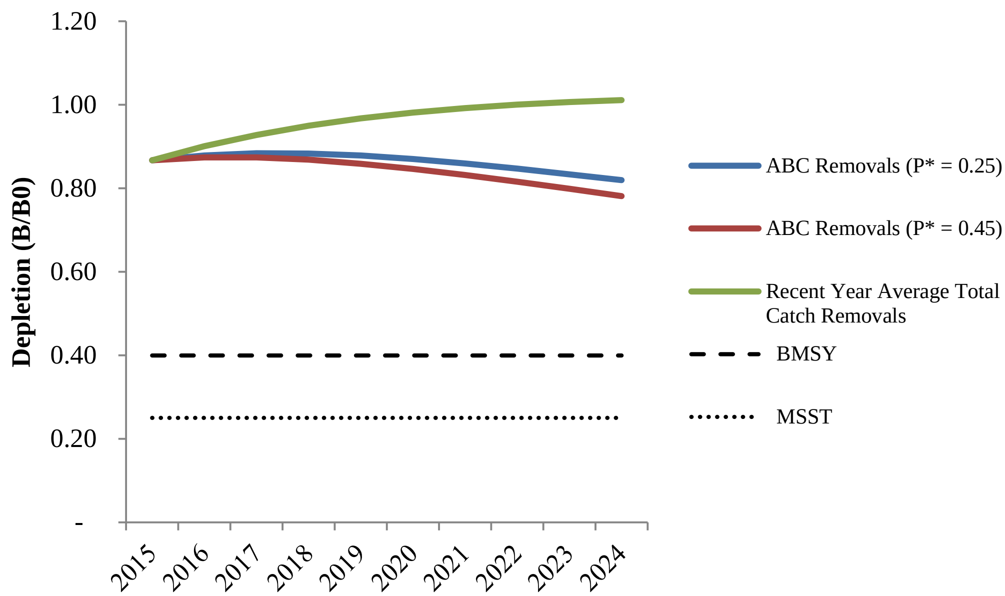


Figure 4-101. Projected depletion under alternative catch streams under the low state of nature model for splitnose rockfish.

4.8.4.9 Sharpchin Rockfish

The modeled catch scenarios for sharpchin rockfish range from an annual average catch of 7 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 636 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-177). Projected sharpchin rockfish depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-102, Figure 4-103, and Figure 4-104).

Table 4-177. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for sharpchin rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL Contribution (No Action Alt.)	179
	ABC Removals (P* = 0.25; Alt. 2)	223
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	340
	Recent Year Average Total Catch Removals	7
High	2014 ACL Contribution	179
	ABC Removals (P* = 0.25)	422
	ABC Removals (P* = 0.45)	636
	Recent Year Average Total Catch Removals	7
Low	2014 ACL Contribution	179
	ABC Removals (P* = 0.25)	121
	ABC Removals (P* = 0.45)	187
	Recent Year Average Total Catch Removals	7

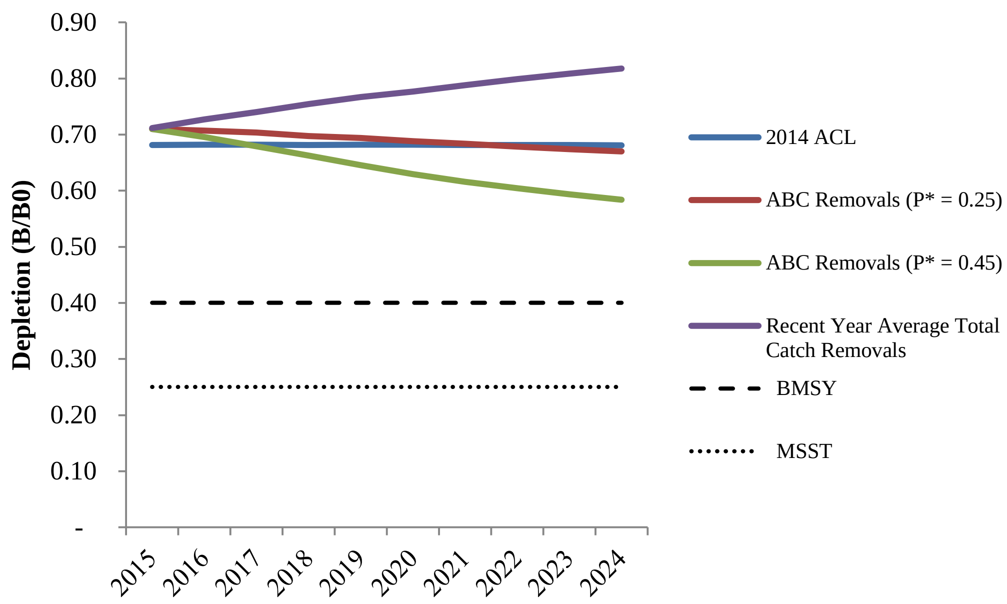


Figure 4-102. Projected depletion under alternative catch streams under the base case state of nature model for sharpchin rockfish.

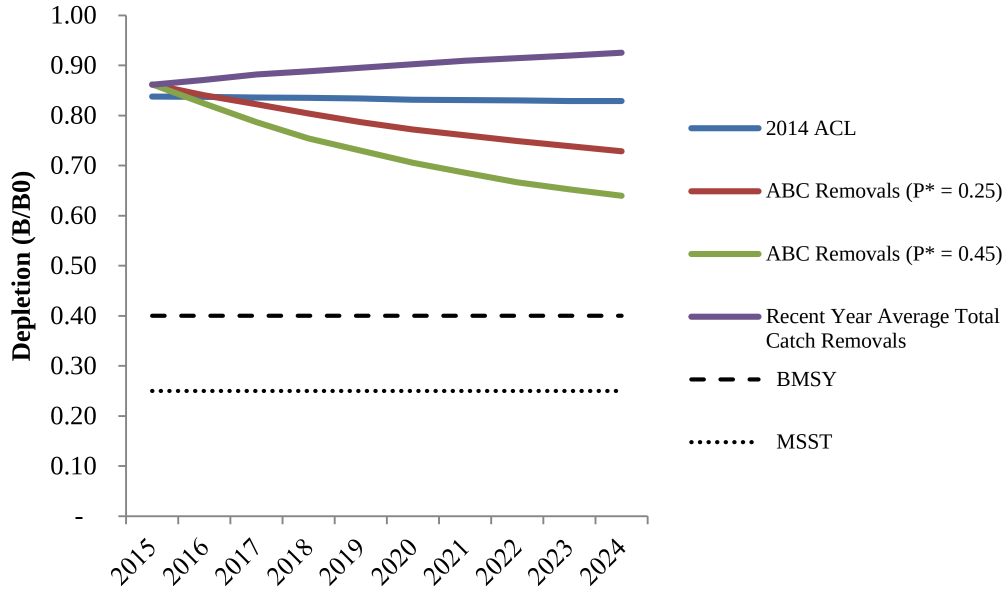


Figure 4-103. Projected depletion under alternative catch streams under the high state of nature model for sharpchin rockfish.

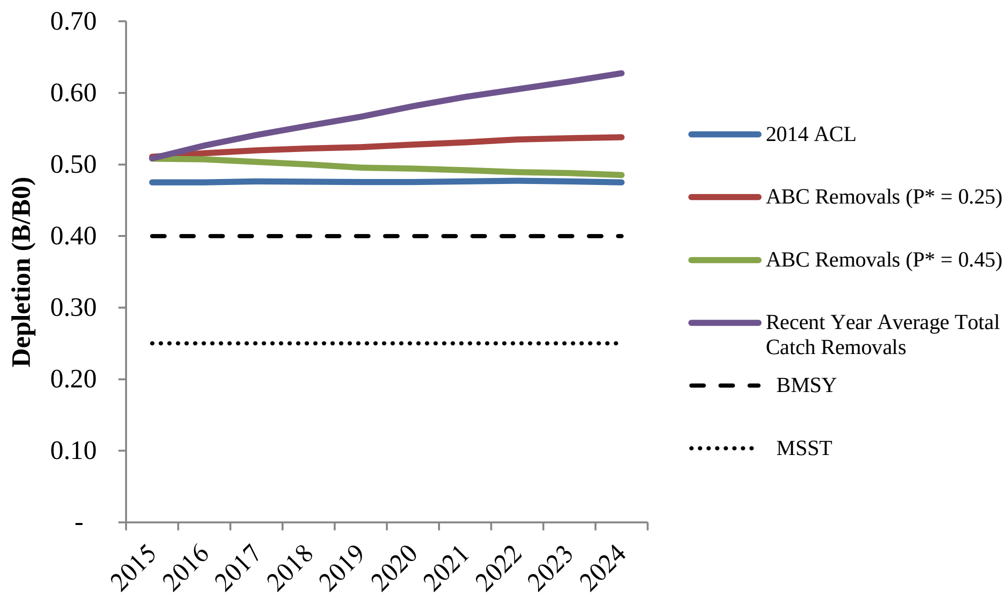


Figure 4-104. Projected depletion under alternative catch streams under the low state of nature model for sharpchin rockfish.

4.8.5 Long Term Impacts of Assessed Roundfish Species

Of the assessed roundfish species, only cabezon in California is missing from this analysis.

4.8.5.1 Cabezon in Oregon

The modeled catch scenarios for cabezon in Oregon range from 24 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 88 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-178). Projected Oregon cabezon depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-105 and Figure 4-106). Projected Oregon cabezon depletions under the low state of nature for the ABC removals with a P* of 0.25 catch scenario is predicted to rebuild from below the MSST to above the B_{MSY} threshold during the projection period (Figure 4-107). The ABC removals with a P* of 0.45 under the low state of nature is predicted to rebuild the stock from below the MSST but keeps the stock in the precautionary zone during the projection period (Figure 4-107). The 2014 ACL and recent year average catch scenarios are predicted to drive the stock to lower levels of depletion below the MSST under the low state of nature (Figure 4-107).

Table 4-178. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for cabezon in Oregon.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	47
	ABC Removals (P* = 0.25; Alt. 2)	43
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	49
	Recent Year Average Total Catch Removals	45
High	2014 ACL	47
	ABC Removals (P* = 0.25)	77
	ABC Removals (P* = 0.45)	88
	Recent Year Average Total Catch Removals	45
Low	2014 ACL	47
	ABC Removals (P* = 0.25)	24
	ABC Removals (P* = 0.45)	27
	Recent Year Average Total Catch Removals	45

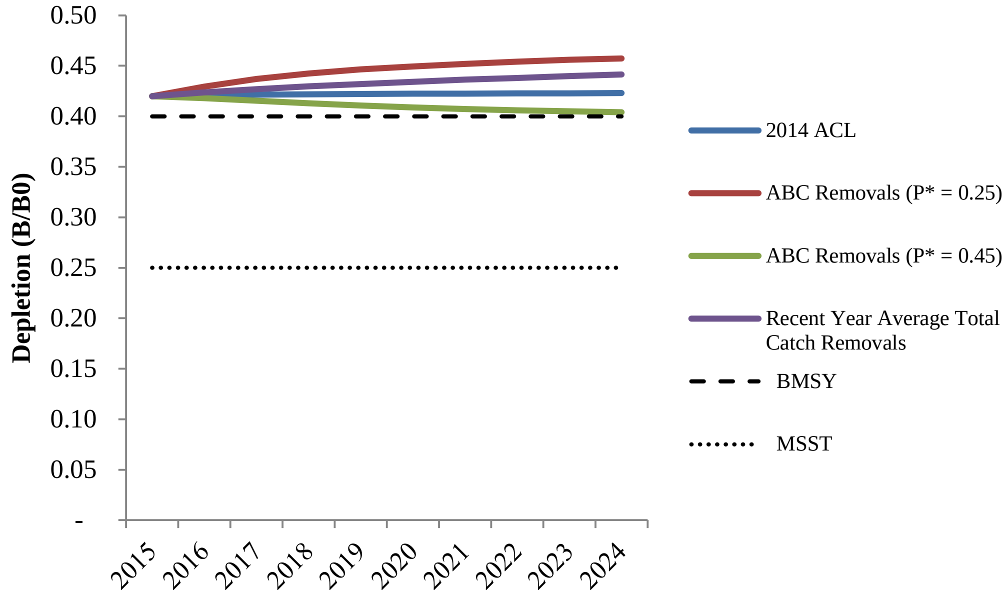


Figure 4-105. Projected depletion under alternative catch streams under the base case state of nature model for cabezon in Oregon.

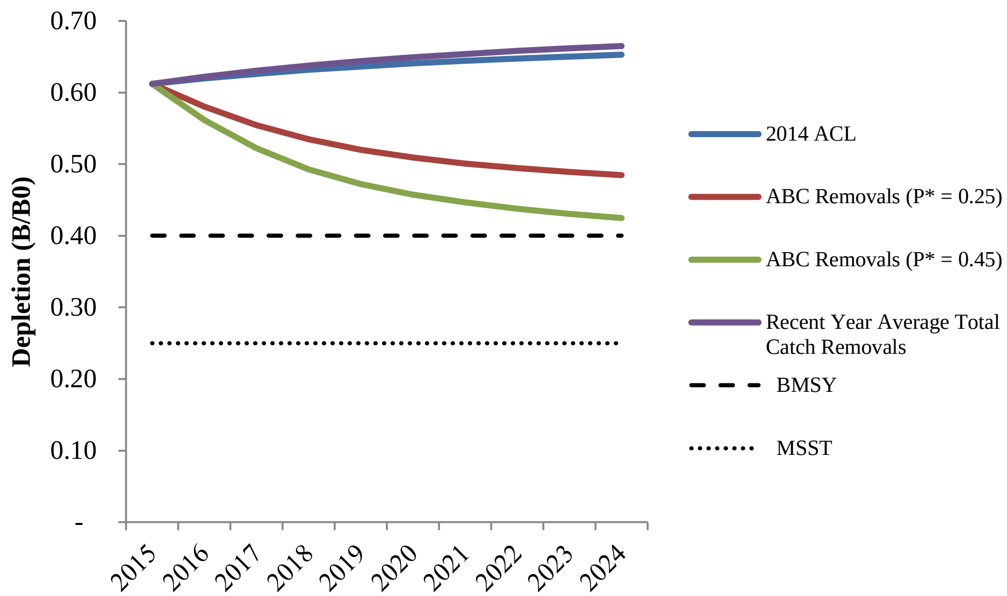


Figure 4-106. Projected depletion under alternative catch streams under the high state of nature model for cabezon in Oregon.

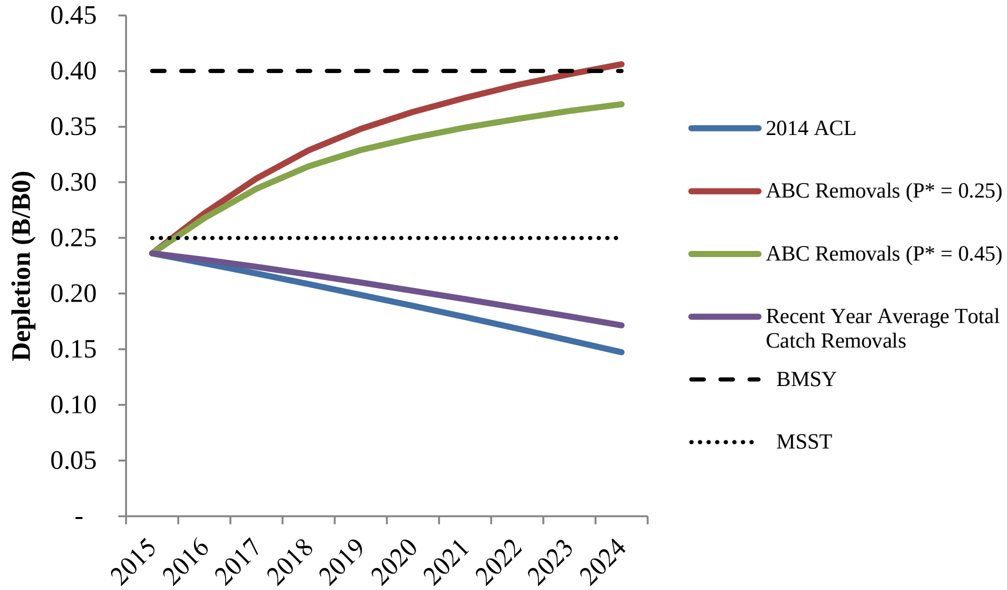


Figure 4-107. Projected depletion under alternative catch streams under the low state of nature model for cabezon in Oregon.

4.8.5.2 Lingcod North of 40º10' N lat.

The modeled catch scenarios for lingcod north of 40º10' N lat. range from an annual average catch of 893 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 3,696 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-179). Projected northern lingcod depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-108, Figure 4-109, and Figure 4-110).

Table 4-179. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for lingcod north of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2,878
	ABC Removals (P* = 0.25; Alt. 2)	2,499
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	3,060
	Recent Year Average Total Catch Removals	893
High	2014 ACL	2,878
	ABC Removals (P* = 0.25)	3,002
	ABC Removals (P* = 0.45)	3,696
	Recent Year Average Total Catch Removals	893
Low	2014 ACL	2,878
	ABC Removals (P* = 0.25)	2,115
	ABC Removals (P* = 0.45)	2,570
	Recent Year Average Total Catch Removals	893

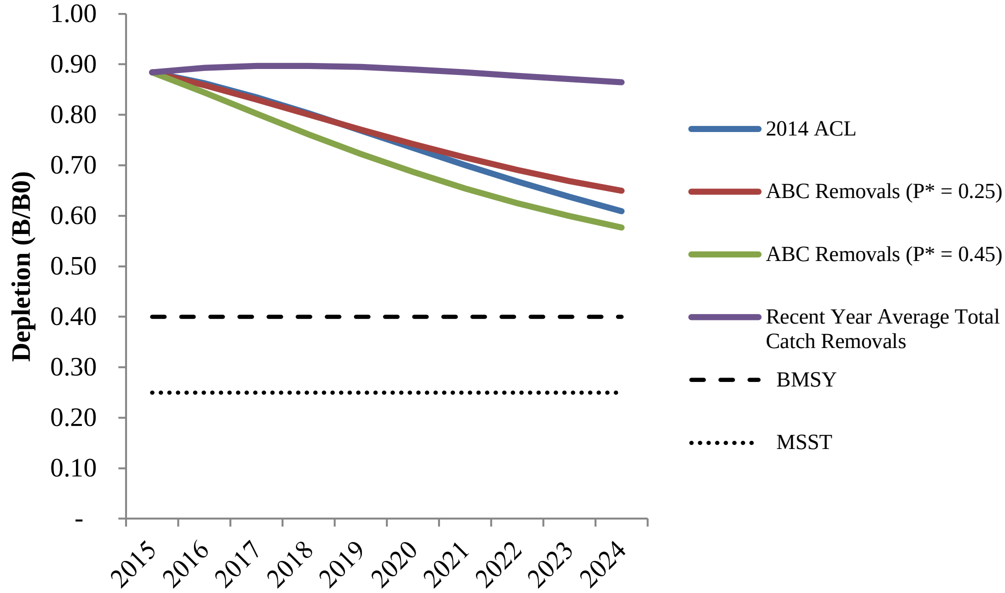


Figure 4-108. Projected depletion under alternative catch streams under the base case state of nature model for lingcod north of 40º10' N lat.

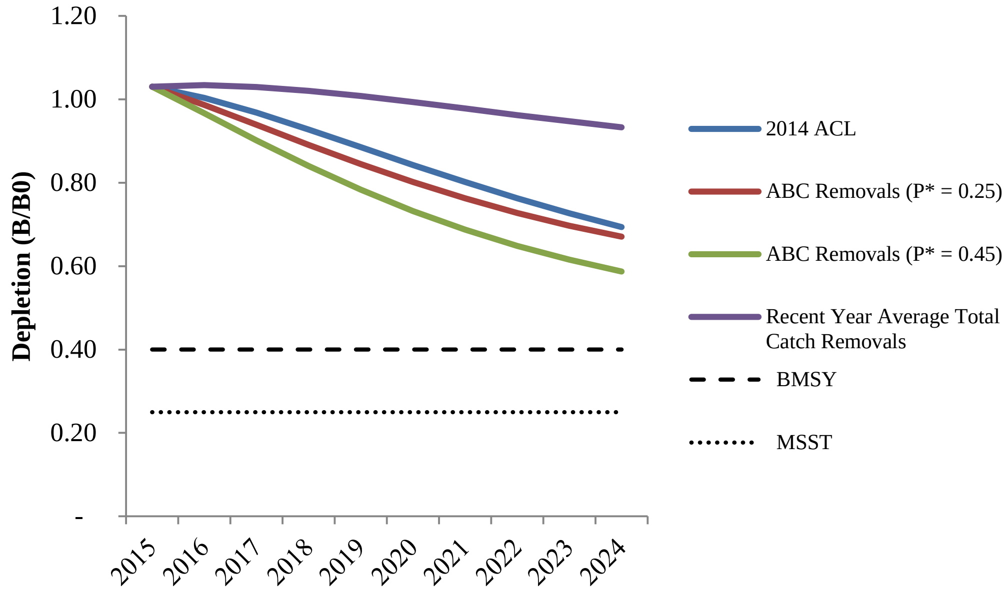


Figure 4-109. Projected depletion under alternative catch streams under the high state of nature model for lingcod north of 40º10' N lat.

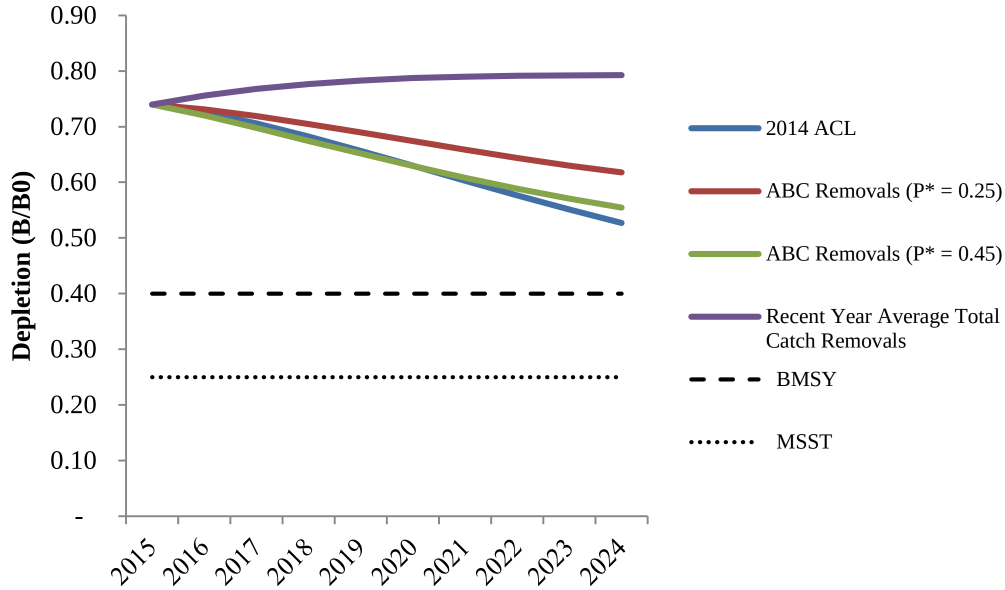


Figure 4-110. Projected depletion under alternative catch streams under the low state of nature model for lingcod north of 40º10’ N lat.

4.8.5.3 Lingcod South of 40º10’ N lat.

The modeled catch scenarios for lingcod south of 40º10’ N lat. range from an annual average catch of 175 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,624 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-180). Projected southern lingcod depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-111, Figure 4-112, and Figure 4-113).

Table 4-180. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for lingcod south of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	1,063
	ABC Removals (P* = 0.25; Alt. 2)	859
	ABC Removals (P* = 0.4; Pref. Alt.)	1,092
	ABC Removals (P* = 0.45; Alt. 1)	1,170
	Recent Year Average Total Catch Removals	175
High	2014 ACL	1,063
	ABC Removals (P* = 0.25)	1,201
	ABC Removals (P* = 0.4)	1,519
	ABC Removals (P* = 0.45)	1,624
	Recent Year Average Total Catch Removals	175
Low	2014 ACL	1,063
	ABC Removals (P* = 0.25)	640
	ABC Removals (P* = 0.4)	810
	ABC Removals (P* = 0.45)	866
	Recent Year Average Total Catch Removals	175

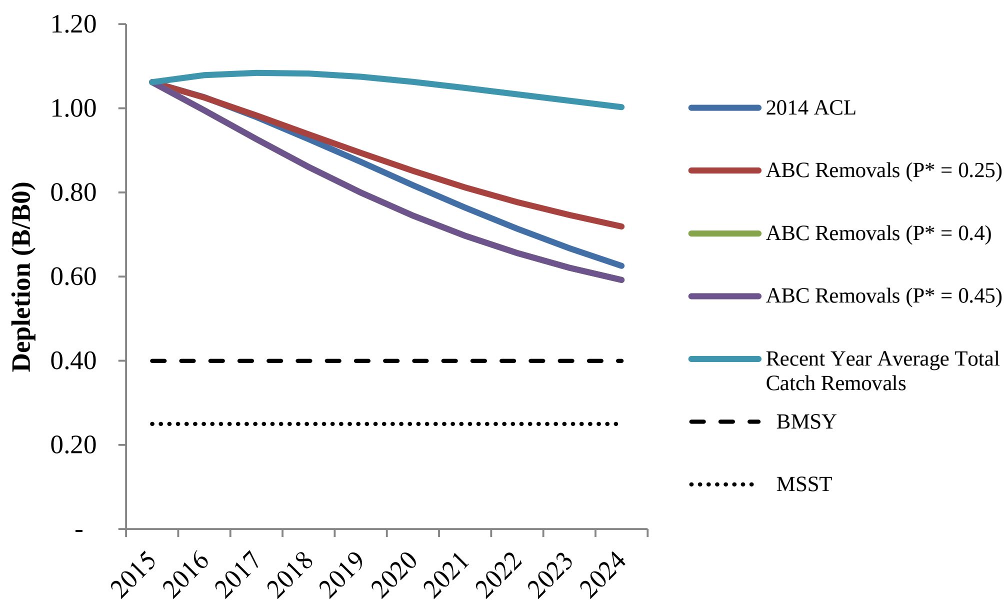


Figure 4-111. Projected depletion under alternative catch streams under the base case state of nature model for lingcod south of 40º10' N lat.

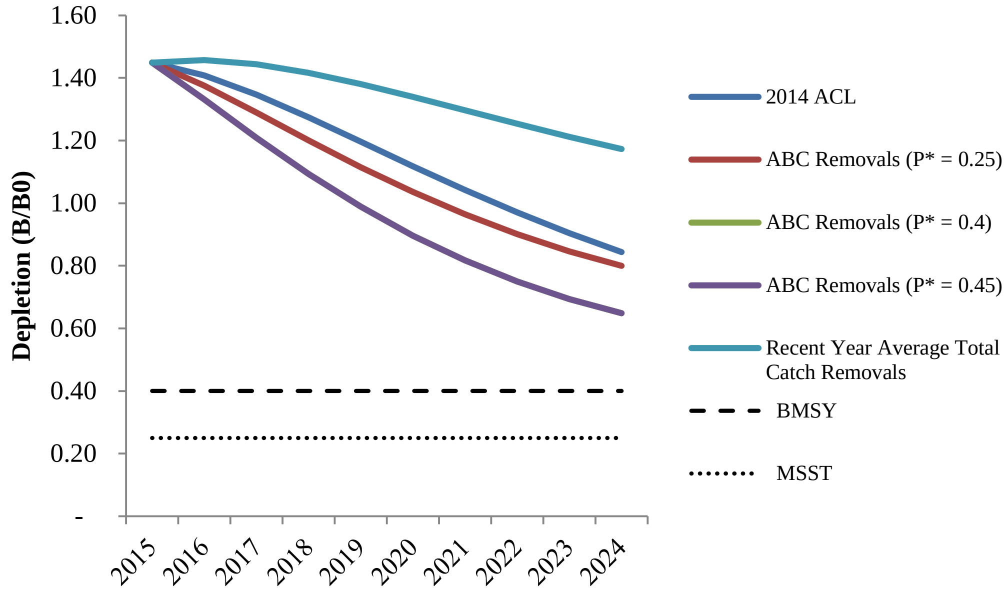


Figure 4-112. Projected depletion under alternative catch streams under the high state of nature model for lingcod south of 40°10' N lat.

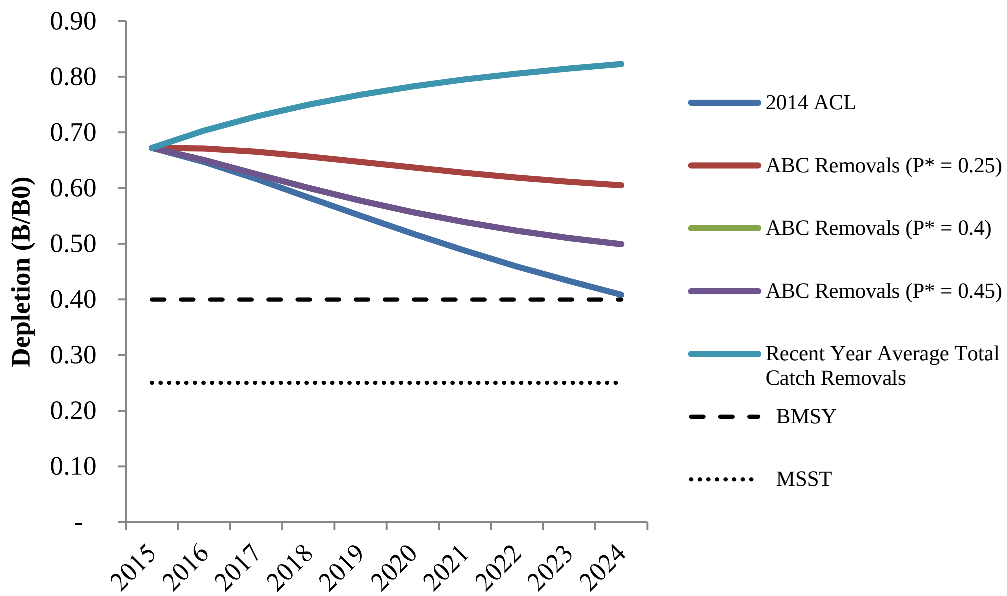


Figure 4-113. Projected depletion under alternative catch streams under the low state of nature model for lingcod south of 40°10' N lat.

4.8.5.4 Sablefish

The modeled catch scenarios for sablefish range from 4,086 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 12,335 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-181). Projected sablefish depletions for all catch scenarios under the base case state of nature are predicted to increase in abundance but remain in the precautionary zone during the projection period (Figure 4-114). Projected sablefish depletions for all catch scenarios under the high state of nature are predicted to be sustainable during the projection period (Figure 4-115). Projected sablefish depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-116).

Table 4-181. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for sablefish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	5,909
	ABC Removals (P* = 0.25; Alt. 2)	7,358
	ABC Removals (P* = 0.45; Alt. 1)	8,542
	ABC Removals (P*= 0.4; Pref. Alt.)	8,258
High	2014 ACL	5,909
	ABC Removals (P* = 0.25)	10,630
	ABC Removals (P* = 0.45)	12,335
	ABC Removals (P*= 0.4)	11,926
Low	2014 ACL	5,909
	ABC Removals (P* = 0.25)	4,086
	ABC Removals (P* = 0.45)	4,749
	ABC Removals (P*= 0.4)	4,590

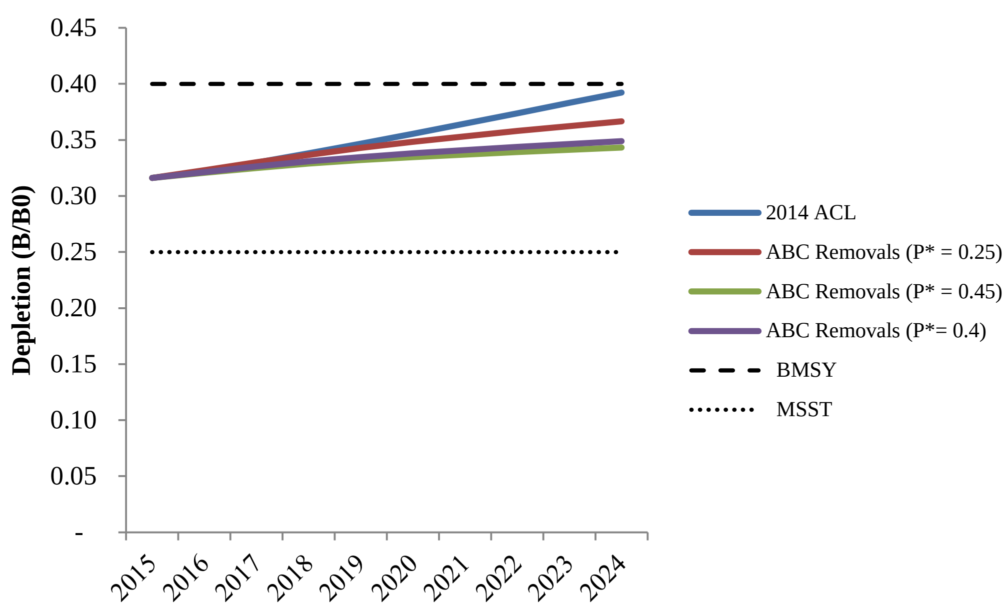


Figure 4-114. Projected depletion under alternative catch streams under the base case state of nature model for sablefish.

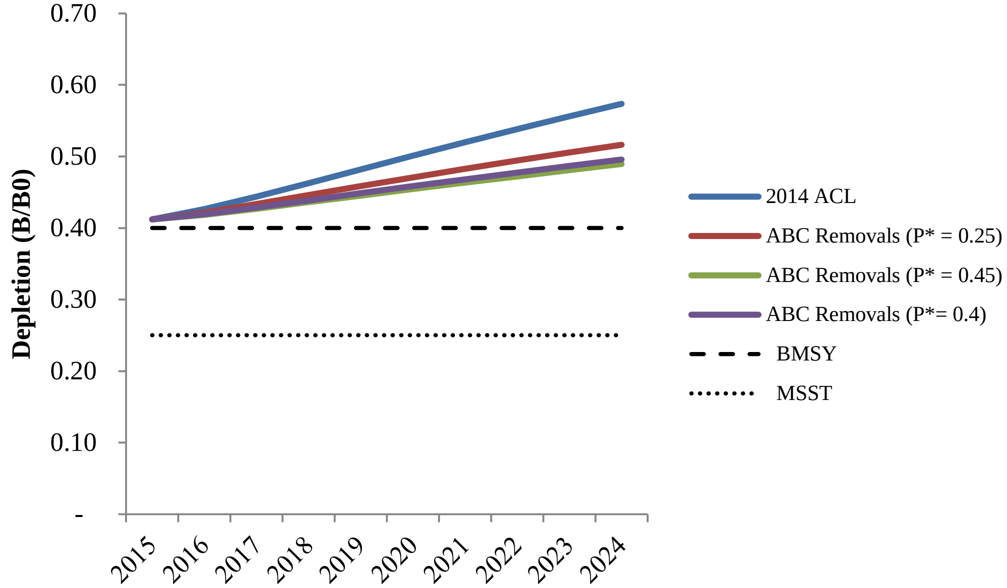


Figure 4-115. Projected depletion under alternative catch streams under the high state of nature model for sablefish.

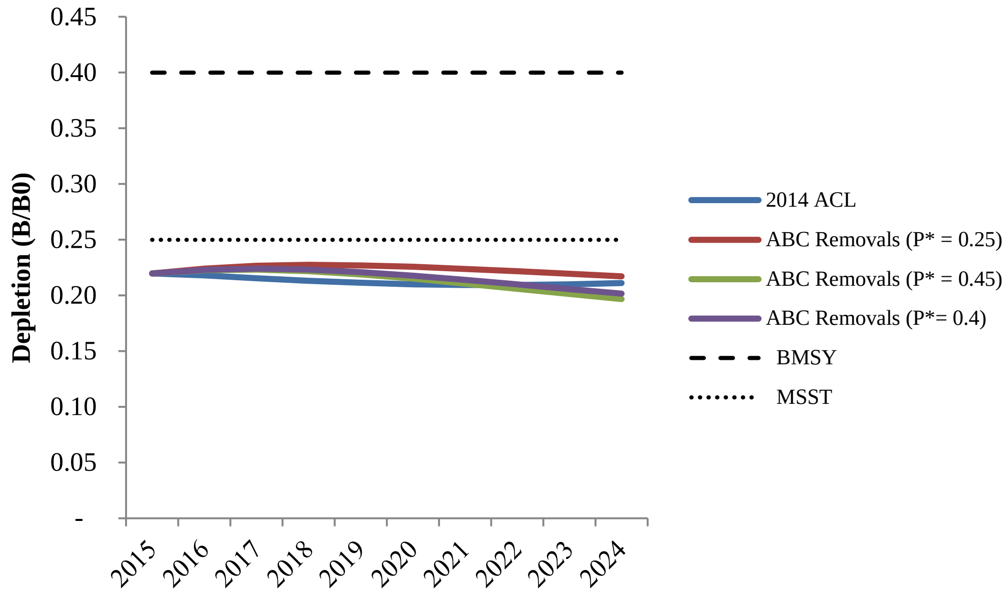


Figure 4-116. Projected depletion under alternative catch streams under the low state of nature model for sablefish.

4.8.6 Long Term Impacts of Assessed Elasmobranch Species

4.8.6.1 Longnose Skate

The modeled catch scenarios for longnose skate range from an annual average catch of 999 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 2,892 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-182). Projected longnose skate depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-117 and Figure 4-118). Projected longnose skate depletions under the low state of nature for the recent year average catch scenario is predicted to be sustainable, but the other catch scenarios are predicted to drive the stock below the B_{MSY} threshold and into the precautionary zone during the projection period (Figure 4-119).

Table 4-182. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for longnose skate.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	2,014
	ABC Removals (P* = 0.45; Alt. 1)	2,382
	ACL Removals (2,000 mt constant catch; No Action Alt.; Pref. Alt.)	2,000
	Recent Year Average Total Catch Removals	999
High	ABC Removals (P* = 0.25)	2,446
	ABC Removals (P* = 0.45)	2,892
	ACL Removals (2,000 mt constant catch)	2,000
	Recent Year Average Total Catch Removals	999
Low	ABC Removals (P* = 0.25)	1,939
	ABC Removals (P* = 0.45)	2,264
	ACL Removals (2,000 mt constant catch)	2,000
	Recent Year Average Total Catch Removals	999

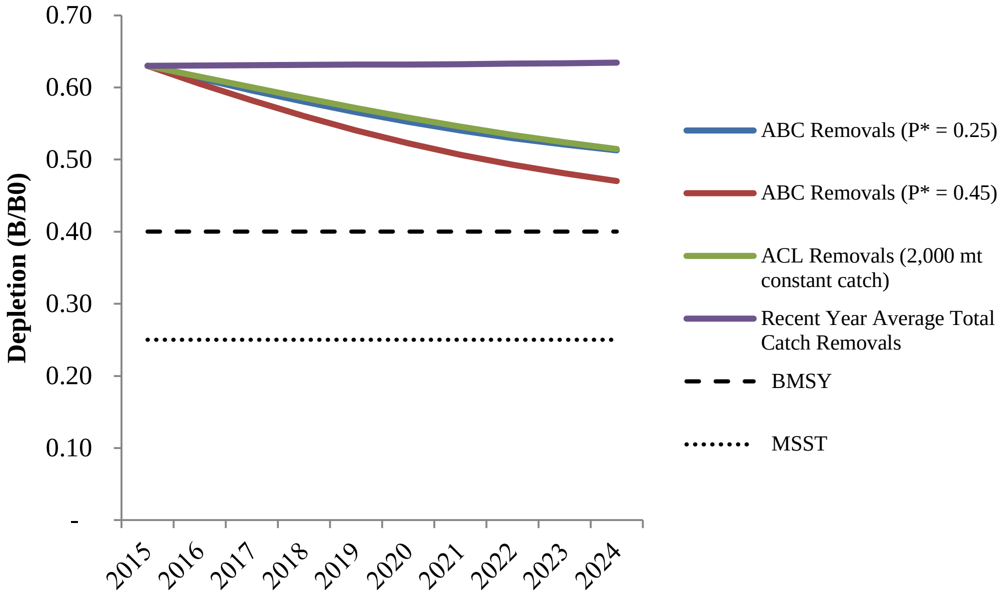


Figure 4-117. Projected depletion under alternative catch streams under the base case state of nature model for longnose skate.

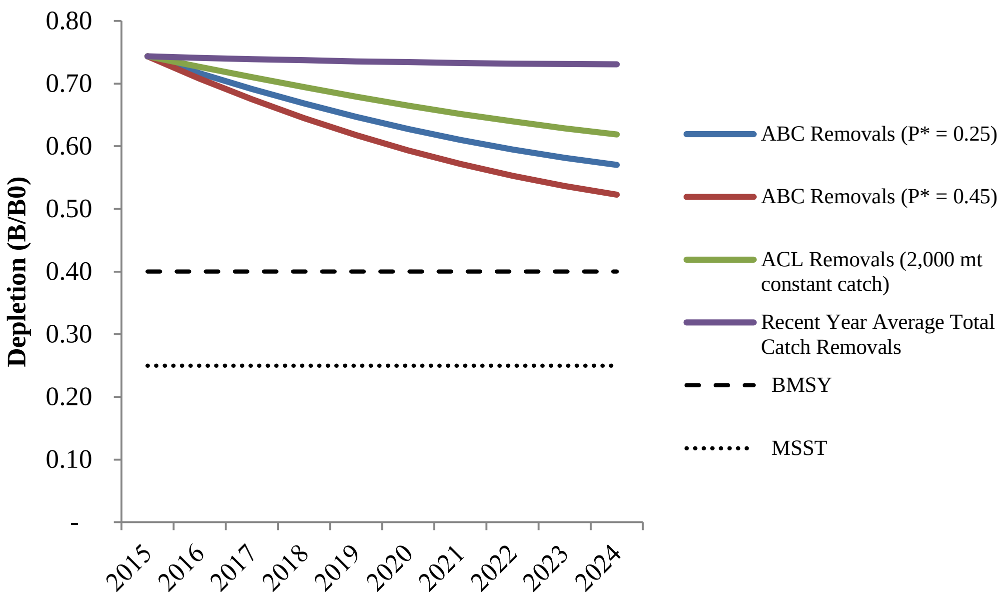


Figure 4-118. Projected depletion under alternative catch streams under the high state of nature model for longnose skate.

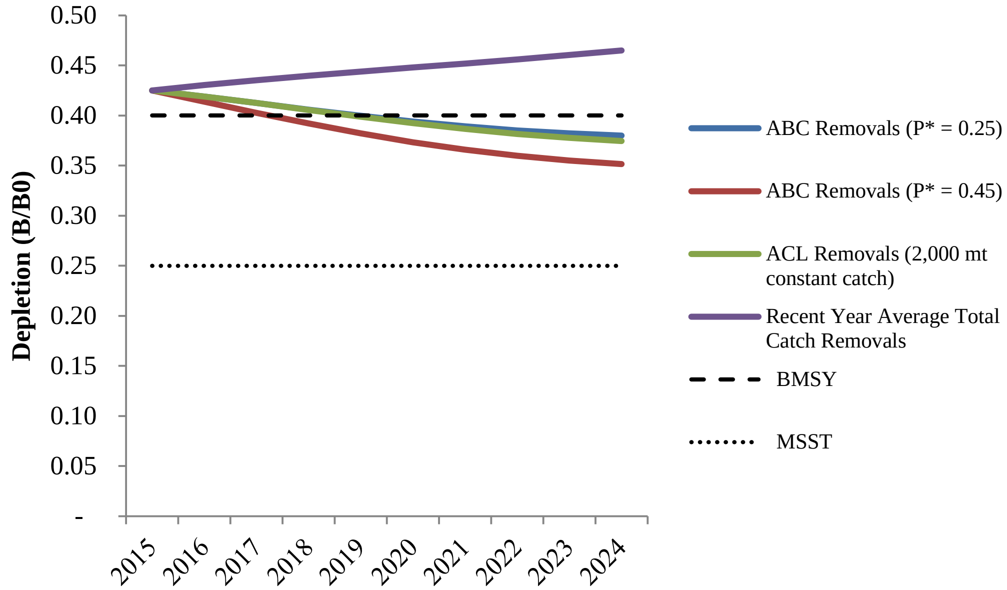


Figure 4-119. Projected depletion under alternative catch streams under the low state of nature model for longnose skate.

4.8.6.2 Spiny Dogfish

The modeled catch scenarios for spiny dogfish range from an annual average catch of 482 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 5,503 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-183). Projected spiny dogfish depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-120 and Figure 4-121). Projected spiny dogfish depletions for all catch scenarios under the low state of nature are predicted to keep the stock in the precautionary zone during the projection period (Figure 4-122).

Table 4-183. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for spiny dogfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	1,560
	ABC Removals (P* = 0.35; No Action Alt.)	1,907
	ABC Removals (P* = 0.45; Alt. 1)	2,275
	Recent Year Average Total Catch Removals	1,619
High	ABC Removals (P* = 0.25)	3,775
	ABC Removals (P* = 0.35)	4,612
	ABC Removals (P* = 0.45)	5,503
	Recent Year Average Total Catch Removals	1,619
Low	ABC Removals (P* = 0.25)	482
	ABC Removals (P* = 0.35)	588
	ABC Removals (P* = 0.45)	700
	Recent Year Average Total Catch Removals	1,619

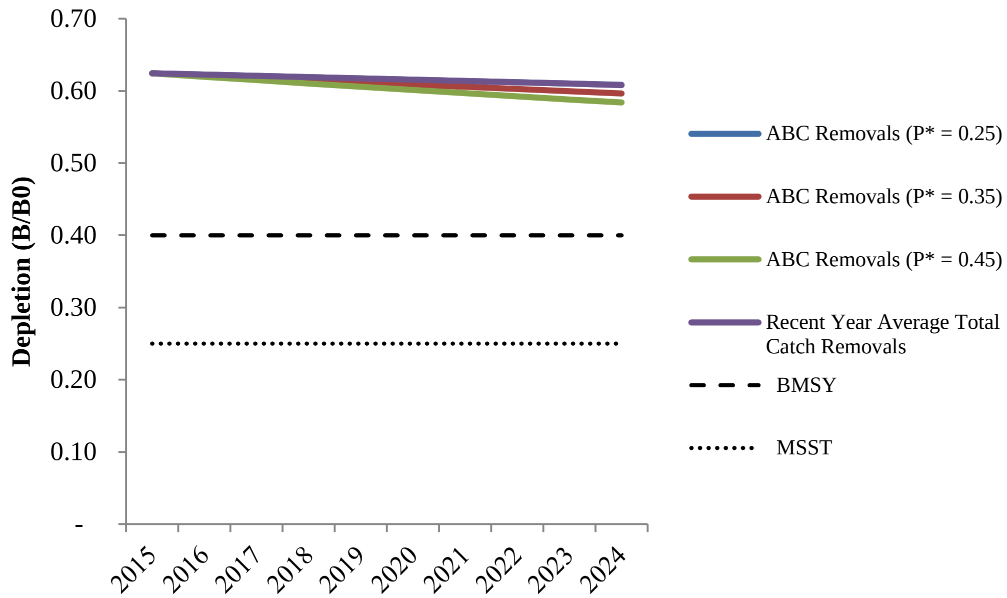


Figure 4-120. Projected depletion under alternative catch streams under the base case state of nature model for spiny dogfish.

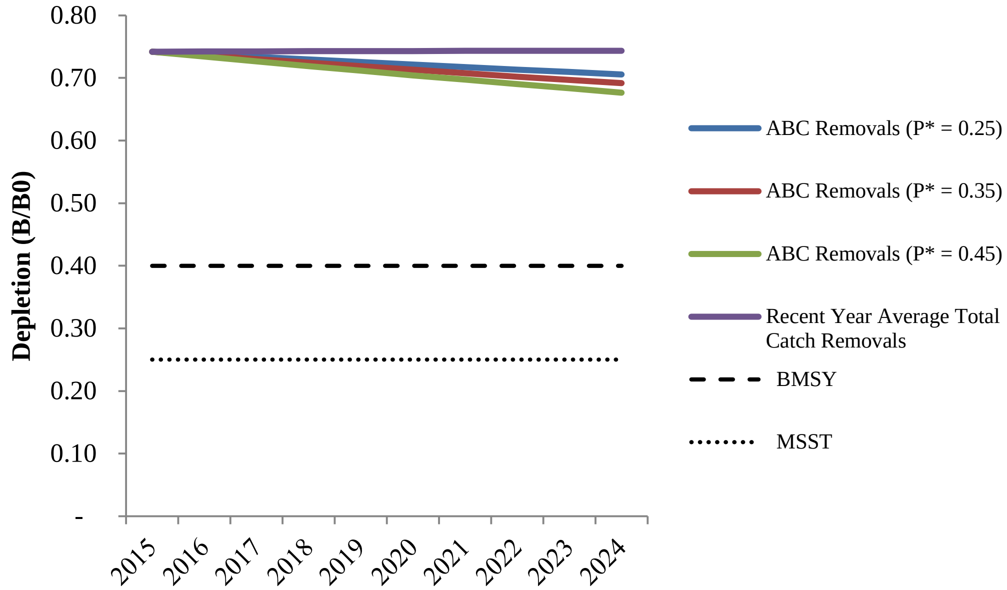


Figure 4-121. Projected depletion under alternative catch streams under the high state of nature model for spiny dogfish.

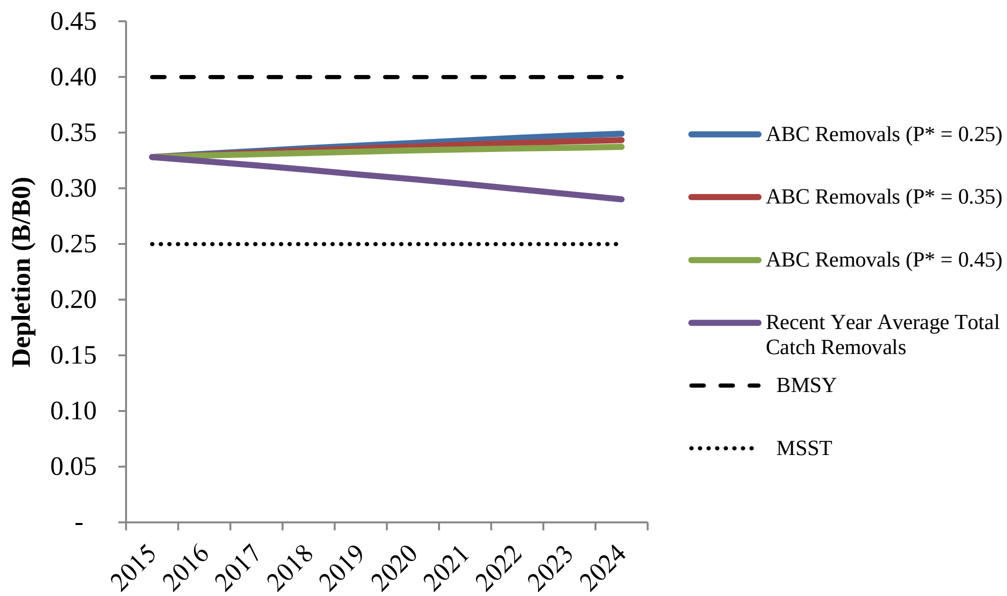


Figure 4-122. Projected depletion under alternative catch streams under the low state of nature model for spiny dogfish.

4.9 Long-term Impacts of Establishing and Adjusting Management Measures for Groundfish Fisheries

Management measures are the primary link between management objectives (such as harvest specifications) and environmental impacts. Management measures affect behavior (most directly, fishing activity), which in turn determines how resources are affected and the location and intensity of benefits and costs for human communities. For this reason the effects of management measures are evaluated in their own right in this section.

This section describes the long-term effects of the application of different types of management measures during the biennial management process by linking their potential impacts to the environmental components evaluated in this chapter. As discussed in section 3.2, the Groundfish FMP distinguishes between new measures and routine measures. The categories of management measures discussed below encompasses measures that may be considered routine or new. For example, a change in the configuration of an RCA (a type of closed area) may be considered routine, if the boundary lines and configuration were used in the past; it would be considered a new measure if a new boundary line or configuration is proposed. Since these categories of management measures are applied continuously with changes such as just described, they are an important aspect of the long-term impacts of groundfish fishery management.

This section describes the types of management measure adjustments and associated impacts anticipated when harvest specifications are implemented in future biennial cycles. A comprehensive description of management measures and application by sector can be found in Section XXX (reference Chapter 4, Description of No Action Management Measures). Section XXX provides a more detailed look at the measures proposed for implementation in regulations for the 2015-16 biennial period.

This section does not evaluate every possible adjustment in management measures (e.g., changes to RCA configurations, trip limit adjustments, bag and sub-bag limits) given the range of ACL projections under the various states of nature. Many or most changes in routine measures result in impacts of the same type and intensity. Furthermore, individually, the specific impacts of such adjustments are usually too small to predict.

As specified in the FMP, the principal management measures available to control fishing mortality in the west coast groundfish fisheries are:

- Measures to reduce bycatch and bycatch mortality
- Defining authorized fishing gear and regulating the configuration and deployment of fishing gear, including mesh size in nets and escape panels or ports in traps
- Restricting catches by defining prohibited species and establishing landing, trip frequency, bag, and size limits
- Establishing fishing seasons and closed areas
- Limiting fishing capacity or effort through permits, licenses and endorsements, and quotas, or by means of input controls on fishing gear, such as restrictions on trawl size/shape or longline length or number of hooks or pots. Fishing capacity may be further limited through programs that reduce participation in the fishery by retiring permits and/or vessels

Management measures may also be imposed for habitat protection, resource conservation, or social or economic reasons consistent with the criteria, procedures, goals, and objectives set forth in the FMP.

Management measures are normally imposed, adjusted, or removed at the beginning of the biennial fishing period when revised harvest specifications are implemented. Inseason adjustments, including automatic actions by the NMFS Regional Administrator, may be imposed, adjusted, or removed during the biennial period based on projected mortality relative to the ACL. New management measures may be developed through a regulatory or FMP amendment.

4.9.1 Commercial Fisheries

Commercial management measures have been applied to lengthen the duration of the fishery, so as not to disturb traditional fishing and marketing patterns; to reduce discards and waste, or; to discourage targeted fishing of some stocks. In cases where protection of an overfished or depleted stock is required, limits may differ by gear type or closed areas or seasons may be established.

Impact mechanisms and the types and intensity of impacts for each type of measure are discussed below. In general, all these measures are intended to reduce the mortality of certain groundfish species in order to achieve but not exceed ACLs. Measures may be developed to reconcile this principal objective with other objectives, such as maximizing commercial fishing opportunity and related socioeconomic benefits.

Season Restrictions: Time and area restrictions can be reviewed as related types of measures in two dimensions. Fishing seasons prohibit fishing during specified periods and are at least implicitly applied to a certain area. Time/area restrictions control fishing effort with the possibility of concentrating fishing effort on stocks or portions of stocks based on the availability in time and space. For example, such restrictions may direct fishing effort toward or away from spawning fish, a particular age or size class, or fish that are seasonable available due to their migratory pattern.

Groundfish Conservation Areas: Areas where it is unlawful to take and retain, possess, or land groundfish with commercial gear. Impacts are similar to season restrictions by limiting fishing opportunity by time and area. As stocks rebuild or if lower overfished species bycatch rates occur, less restrictive GCAs will likely be implemented. Conversely, if progress toward rebuilding is not proceeding consistent with the rebuilding plan and MSA, new stocks are declared overfished, or higher than anticipated overfished species bycatch rates occur, more restrictive GCAs may be implemented.

IFQ and IBQ: These tools divide the total amount of quota into shares controlled by individual fishermen or groups of fishermen (cooperatives).

Cumulative Landing Limits (also known as trip limits): These are limits on the pounds of fish a vessel may land in a period. Adjustments to cumulative landing limits influence fishing mortality, either directly through catch or indirectly by reducing fishing effort ("time on the water").

Take and Retain Prohibitions: These restrictions discourage targeting because retention and thus sale is prohibited. This type of measure is functionally equivalent to a trip limit set at zero.

Size Limits: Limits the size of fish (usually by length) that may be retained by a commercial fishing vessel. There can also be limits on "headed" or fillet sizes, which are easier to monitor onshore and can be correlated to the original size of the fish. Size limits change age-specific fishing mortality (fishery selectivity) and therefore can control mortality by life stage (e.g., juveniles, spawning stock).

Gear Restrictions: Gear definitions and restrictions are used to protect juvenile fish (trawl mesh size), to disable lost gear so that it no longer catches fish (biodegradable escape panels for pots), to slow the rates of catch in particular sectors (hook limits), to reduce bycatch of non-target species (trawl configuration requirements), and to protect marine habitat (trawl roller gear size restrictions).

4.9.2 Recreational Fisheries

In addition to the broad management objectives mentioned in Section XXX recreational management measures are also designed to avoid waste, spread catch over a large number of anglers, protect juvenile fish, and enhance the quality of the recreational fishing experience.

The requirement to rebuild stocks that have been declared overfished is an important consideration when establishing and adjusting recreational management measures. Presently, the following species are encountered in the recreational fisheries and are declared overfished: bocaccio south of 40°10 N. latitude, canary, cowcod south of 40°10 N. latitude, and yelloweye rockfish. Season and depth closures, including specific area closures are the primary management measure adjustments used to reduce overfished species mortality.

Most bag limits, size limits, and area closures in the recreational fisheries have been designated as “routine”.

Impact mechanisms and the types and intensity of impacts for each type of measure are discussed below. In general, all these measures are intended to reduce the mortality of certain groundfish species in order to achieve but not exceed ACLs. Measures may be developed to reconcile this principal objective with other objectives, such as maximizing recreational fishing opportunity and related socioeconomic benefits.

4.9.3 Impact Mechanisms

Season Restrictions: Time and area restrictions can be reviewed as related types of measures in two dimensions. Fishing seasons prohibit fishing during specified periods and are at least implicitly applied to a certain area. Time/area restrictions control fishing effort with the possibility of concentrating fishing effort on stocks or portions of stocks based on the availability in time and space. For example, such restrictions may direct fishing effort toward or away from spawning fish, a particular age or size class, or fish that are seasonable available due to their migratory pattern.

Recreational Rockfish Conservation Areas: Areas where it is unlawful to take and retain, possess, or land groundfish with recreational gear. Impacts are similar to season restrictions by limiting fishing opportunity by time and area.

Bag Limits, Boat Limits, Hook Limits: These are limits on: 1) the number of fish an angler may keep, 2) the total number of fish that may be retained aboard a vessel (no matter who aboard caught them), 3) on the number of hooks on any given fishing line. Bag and boat limits include fish taken in both state and federal waters. Changes in these limits influence fishing mortality, either directly through catch or indirectly by reducing fishing effort (“time on the water”) due to a change in the perceived value of the recreational experience.

Take and Retain Prohibitions: Discourages targeting species because of restrictions on anglers taking and retaining certain species. This type of measure is functionally equivalent to a bag or boat limit set at zero.

Prohibited Sale: Groundfish taken in the course of recreational groundfish fishing cannot be sold. No money revenue is realized, which otherwise could offset costs, increase the value of the activity, and therefore stimulate more fishing effort.

Size Limits: Limits the size of fish (usually by length) that may be retained by an angler. There can also be limits on fillet sizes, which are easier to monitor onshore and can be correlated to the original size of the fish. Size limits change age-specific fishing mortality (fishery selectivity) and therefore can control mortality by life stage (e.g., juveniles, spawning stock).

Gear Restrictions: Only hook-and-line or spear can be used for recreational fishing. This limits the efficiency (CPUE) and other gear-specific adverse impacts. If prohibited gear would enhance the angler experience, restrictions would reduce the value of recreational activity.

4.9.4 Impacts

Figure 4-123 diagrams the impact mechanisms, or causal relationships, for recreational and commercial management measures based on the above descriptions. Measures may control fishing effort, possibly in time and space (seasons, RCAs, take and retain prohibitions, prohibited sale); directly control fishing mortality (bag and boat limits, size limits); or control gear (hook limits, gear restrictions). This in turn affects the pattern of fishing effort, fishing efficiency (CPUE), and fishery selectivity. These intermediate effects determine fishing mortality and angler experience; there may other incidental effects that are not the principal objective of the management measures. Finally, these effects can be described with respect to the environmental components evaluated in this EIS.

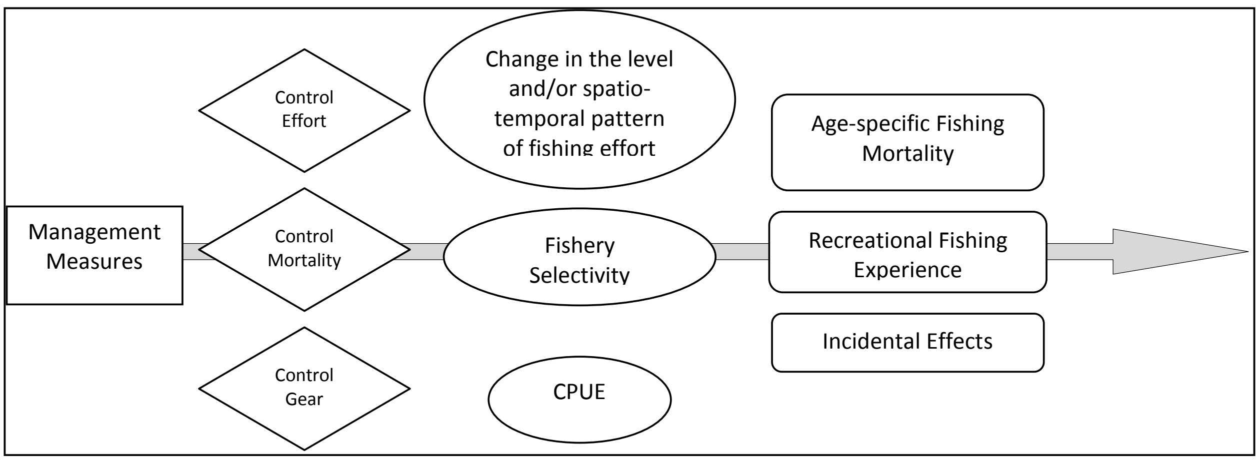


Figure 4-123. Summary of impact mechanisms for recreational management measures.

4.9.4.1 Groundfish Stocks

- By limiting fishing effort, time/area restrictions (seasons, RCAs) reduce groundfish mortality, which is usually the primary objective of such measures. Time/area restrictions are particularly effective in reducing mortality of … (species, life stage). Age-specific mortality may be an input to stock assessments and the effect of time/area closures would be accounted for in this way.
- Bag, boat, and trip limits have a direct effect on groundfish fishing mortality by restricting how many fish may be retained.
- Hook limits and other gear restrictions reduce the efficiency of the fishing gear and thus CPUE, indirectly affecting fishing mortality.
- Prohibiting the take and retention discourages targeting, which decreases mortality. These measures may provide an additional disincentive for vulnerable species (e.g., overfished species). Prohibiting commercial sale is a more general disincentive to increasing fishing effort, because the financial cost of the activity cannot be offset by revenue.
- Size limits affect fishery selectivity. This can help to increase yield by focusing catch on larger fish or conversely by discouraging catch of sexually mature fish.

4.9.4.2 California Current Ecosystem

- Changes in age-specific fishing mortality affect stock structure and relative abundance. Section 3.3 describes how these factors influence ecosystem structure.
- Reduced fishing effort may correlate with a reduction in vessel-related pollution. The direct effect is likely negligible but may have cumulative impacts. If other boat-based recreational activities are substituted (e.g., targeting other species) there would be no net change in the effect.

4.9.4.3 Essential Fish Habitat

- Adverse impacts to groundfish EFH due to fishing are a function of the type of gear used. Recreational gear is hook-and-line and infrequently contacts benthic groundfish EFH. Because of the small size of the gear even when contacting the bottom, adverse impacts are negligible. Therefore, other measures affecting fishing effort (reducing aggregate gear contact) also have a negligible effect on EFH.

4.9.4.4 Non-Groundfish Species

- The impact mechanism and effects are the same for non-groundfish species as for groundfish (reduction in fishing effort, mortality, change in fishery selectivity). Most catch of non-groundfish would be regulated under other authorities (other Council FMPs, state management programs) and any “bycatch mortality” is accounted for in the management of those stocks.

4.9.4.5 Protected Species

- Measures that control fishing effort and its spatio-temporal distribution (time/area closures) influence interactions between recreational vessels and protected species (marine mammals, seabirds, other ESA-listed species) according to their seasonal occurrence in the management area. Effects could include injurious/fatal interactions with fishing gear or vessels and adverse effects on behavior from non-injurious interactions. Because of gear restrictions recreational fishing employs relatively light hook-and-line gear so fatal interactions are unlikely.

4.9.4.6 Anglers and Fishing Communities

- Measures that affect fishing effort (time/area closures) influence the size and distribution of recreational expenditures. Changes in expenditure affect coastal communities that have recreational fishing engaged businesses. Measures may also affect the quality of the recreational fishing experience, which could indirectly affect fishing effort and related expenditures. These include limits on catch (bag and boat limits, take and retain prohibitions), prohibition of commercial sale, and gear restrictions. In long-term, management measures that maintain or increase target species abundance could enhance the recreational fishing experience by increasing CPUE and resulting in adaptive management feedback where management restriction are relaxed.

4.9.5 Summary

Table 4-184 summarizes the effects of the commercial and recreational groundfish management measures described above on the environmental components evaluated in this EIS.

Table 4-184. Summary of commercial and recreational management measures and impacts to environmental components. (- adverse effect, 0 negligible/no effect, + positive effect)

	Environmental Component					
Measure	**Groundfish Stocks**	**California Current Ecosystem**	**Essential Fish Habitat**	**Non-Groundfish Species**	**Protected Species**	**Anglers and Fishing Communities**
Season restrictions	+	0	0	0	+	-/+
GCAs	+	0	+	0	+	-/+
Trip limit	+	0	0	0	0	-/+
Bag limit	+	0	0	0	0	-/+
Boat limit	+	0	0	0	0	-/+
Gear restrictions	+	0	+	0	+	0
Hook limit	+	0	0	0	0	0
Size limit	+	0	0	0	0	-/+
Take & retain prohibs	+	0	0	0	0	-/+
Prohib sale	+	0	0	0	0	-/+

4.10 Long-term Impacts of Setting Harvest Specifications on the Socioeconomic Environment

4.10.1 Impact Evaluation Methods

4.10.1.1 Revenue Volatility

As a preface to the considering socioeconomic impacts, future fishery performance should be considered with respect to historical inter-annual volatility in ex-vessel revenue. Such changes can be in response to a variety of factors, including management (the proposed action), prices, and other environmental factors. Figure 3-2 shows the deviation from the 1981-2012 long-term mean of total annual inflation-adjusted groundfish revenue (including at-sea Pacific whiting sectors). Figure 4-124 is similar except that it is based on data from 1998 to 2012 and shows nonwhiting and whiting revenue separately. As discussed below, groundfish revenues dropped precipitously and remained below the long-term average starting in 2008. Although above the mean in 2009, there is considerable volatility in following years, especially for Pacific whiting. High prices for sablefish likely contributed to the spike in nonwhiting revenue in 201. The time series does not necessarily suggest a trend of increasing revenue going forward; rather, the historical record suggests that inherent volatility will cause revenue to periodically fall to—or below—the average.

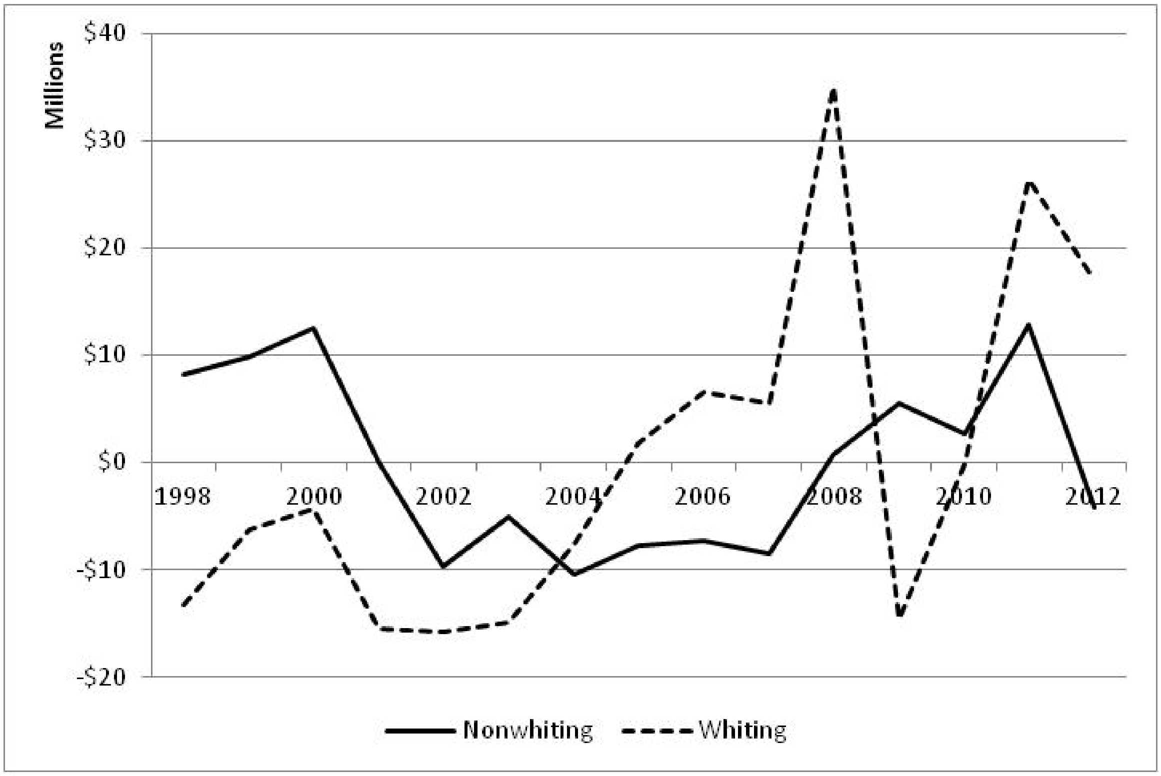


Figure 4-124. Deviation from the mean for inflation adjusted ex-vessel revenue from nonwhiting and whiting fisheries, 1998-2012.

By way of comparison, Table 4-185 shows some metrics for the absolute and relative variability in inflation-adjusted ex-vessel revenue for different species groups. For the entire time series the absolute variation (the range between the maximum value and minimum value) for groundfish is about $73 million; crab, HMS, and salmon show a greater range while CPS and shrimp are very close to the value for groundfish. The lower panels in the table show the coefficient of variation (CV), a relative measure of variability. For the entire time series groundfish shows the smallest relative variability; the only instance where groundfish shows greater relative variability than another group is in the 1998-2011 period where the Other species group (generally, various state-managed species) has a lower CV.

Table 4-185. Absolute variation in ex-vessel revenue (range between maximum and minimum value) in inflation-adjusted $1,000s during 1981-2011, and coefficient of variation for three time periods, by species group.

	CPS	Crab	Ground fish	HMS	Other	Salmon	Shellfish	Shrimp
Absolute Variation (inflation-adjusted $1,000s)								
1981-2011	$73,237	$121,503	**$73,389**	$95,012	$52,950	$112,882	$26,564	$73,090
Coefficients of Variation (CV)								
1981-2011	0.348	0.397	**0.247**	0.516	0.397	0.924	1.343	0.507
1981-1997	0.290	0.307	**0.092**	0.486	0.385	0.774	0.819	0.387
1998-2011	0.358	0.271	**0.149**	0.175	0.132	0.618	0.537	0.339

Table 4-186. Maximum year-on-year decline in inflation-adjusted revenue, 1982-2011, by species group; showing year of maximum decline and the amount of the decline in $millions, and in percent.

	CPS	Crab	Groundfish	HMS	Other	Salmon	Shellfish	Shrimp	All Species
Year	1998	1991	**1998**	1985	1998	2008	1998	2003	1998
$mil	-$47	-$39	**-$38**	-$57	-$14	-$71	-$12	-$32	-$139
Percent	-78%	-53%	**-35%**	-54%	-35%	-84%	-94%	-48%	-37%

Table 4-186 presents information on the maximum year-on-year revenue decline by species group. In addition to revenue for all species, 1997-98 also showed the maximum decline for the CPS (-78%), Groundfish (-35%), Other (-35%), and Shellfish (-94%) species groups. Although the maximum decline in percent terms is smaller for groundfish than all other groups except "Other," in absolute dollar terms Groundfish's largest single-year decline, $38 million, is larger than Other, Shellfish, and Shrimp. More generally, all of the maximum 1-year declines occurred after 1990 except for HMS. The comparisons show that revenue from groundfish revenues are not unusually volatile compared to other west coast fisheries. Expressed as percent, the maximum year-on-year change for groundfish, -35%, is close to the value for all species, -37%.

Note that these data represent a longer time series than the 2003-2012 baseline period used elsewhere. During the baseline period the maximum year-on-year decline was between 2011 and 2012 at $20.7 million or -22%. However, this statistic is somewhat misleading, because 2011 recorded the largest year-on-year gain of $23.9 million or 34%. Applying the historical data to describe socioeconomic impact over the long-term future suggests that inter-annual volatility in revenues is to be expected and could be as much as a one-third gain or drop. Since ACLs remain constant at 2014 values under No Action, exogenous factors, such as changes in prices, would likely be more important than management (the proposed action) in determining ex-vessel revenue. The fact that record setting declines in revenue occurred in four of the eight groups shown in Table 4-186 suggests that management of the groundfish fishery at that time was not a primary factor in the decline in revenue.

4.10.1.2 Stock Assessment Projections

Historical catch is compared to potential catch to evaluate the impact of the alternatives. The analysis focuses on a subset of species that generate most of the ex-vessel revenue in commercial fisheries and/or are important targets in recreational groundfish fisheries. For No Action, it is assumed that the 2014 ACLs are carried forward for some indefinite period.[63] For No Action, historical catch is compared to those ACLs; cases where historical average catch is greater than a 2014 ACL could represent an adverse socioeconomic impact. Projected aggregate catch (the sum of catch over the 2015-2024 projection period) is used to evaluate the potential effect of the action alternatives. Catch under both the base case and high state of nature are used for Alternative 1, the base case and the low state of nature for Alternative 2, and just the base case for Alternative 3. Pairing the high state of nature with Alternative 1 and the low state of nature with Alternative 2 is intended to "bookend" the potential yields in the projections. Minimum aggregate catch is also considered although not associated with any of the alternatives. This is either the recent average catch stream or P*=0.25 ACL catch stream for the stocks considered here. Favoring the base case state of nature recognizes that the base case represents the most likely scenario for any policy choice.

Projected catches are based on the assumption that the entire ACL is caught; in other words total fishing mortality is equal to the ACL. In order to make these scenarios more comparable to historical

[63] Routine management measures, defined as those already in place, can be changed inseason. These routine changes usually involve some form of catch control to ensure that ACLs are not exceeded.

information they have been adjusted by applying the historical ACL catch attainment rates based on WCGOP data (Bellman, *et al.* 2013). It should be noted that adjusting the projections in this way likely under-represents future yield and catch. First, since the projections assume that the stock is being reduced each year by the entire ACL, catches below that level (the assumption made in applying attainment rates) would likely result in some additional yield in future years. Second, technical and market changes could lead to higher attainment rates for some species. Adjusting the ACLs in this way as a proxy for catch would under-represent potential future catch if attainment rates increase.

As discussed in Section 4.9, it is important to bear in mind that these projections assume perfect information and no management error. As a result, over the projection period yields converge towards an equilibrium related to MSY. In the case of stocks above the B_{MSY} proxy yields decline as the stock is fished down towards the B_{MSY} level while stocks below B_{MSY} increase towards that level. Changes in stock productivity and recruitment that cannot be predicted add to uncertainty about what future yields may actually be. Resulting misspecification of catch limits would result in forgone fishing opportunity (if specifications are low compared to actual stock status) or stock depletion (if specifications are too high).

4.10.2 Commercial Fisheries: Shorebased IFQ and Non-nearshore Fixed Gear

4.10.2.1 No Action Alternative

During the baseline period shoreside groundfish limited entry fisheries have accounted for 70% of inflation-adjusted ex-vessel revenue from non-tribal groundfish fisheries; with at-sea whiting included the fraction rises to 94%. inflation adjusted (2012 prices) ex-vessel revenue during the 2003-2012 baseline period ranged from $23.1 to $36.8 million for the limited entry groundfish bottom trawl fishery (including vessels fishing with fixed gear since 2011 under the IFQ program) and averaged $29.8 million. Comparable figures for the non-nearshore fixed fishery are $11.8-$29.2 million and an average of $18.2 million. Under No Action it is expected that revenues would range similarly.

The evaluation below considers No Action ACLs more broadly with respect to fishery performance. While this analysis uses data for all groundfish fisheries (to simplify comparisons to ACLs, which apply to all groundfish catch), the species considered are primarily caught in shorebased IFQ and non-nearshore fixed gear fisheries. (Recreational fishing mortality is also accounted for in the management scheme while only commercial data are considered here. For the species in question recreational catch is negligible.

Table 4-187 shows average annual catch of these commercially important species compared to the 2014 ACLs.[64] Commercial catch attainment (the fraction of the ACL caught in commercial fisheries) for the 2003-2012 period is also shown. Historically, low ACLs for overfished species have affected fishery performance, because management measures that discourage catch of these species can also limit fishing opportunity for target stocks. Individual accountability in the shorebased IFQ fishery is changing fishery strategies in a variety of ways and the greater flexibility afforded harvesters in pursuing fishing strategies may improve their ability to avoid catching stocks for which they have relatively few quota pounds. Since these types of behavioral changes cannot be predicted, one must rely on the assumption stated above, that at a gross level the magnitude of the ACL affects performance. In this regard, comparing historical catch attainment to catch as a fraction of the 2014 ACL may be indicative. The 2014 ACL for sablefish, the most commercially valuable species, would likely have the largest impact on fishery performance. During the baseline period mostly of each ACL was caught (an attainment rate of 95%) and average catch during the baseline period exceeds the 2014 ACL. This suggests that coastwide revenue under No Action is likely to be lower compared to the baseline. By this logic, cases where average

[64] See Figure 3-1 for a breakdown of total shoreside ex-vessel revenue by species.

annual catch during the baseline period divided by the 2014 ACL (the right most column in Table 4-187) is greater than baseline period catch attainment (the third column from the left in Table 4-187) could result in lower revenue compared to the baseline period. Arrowtooth flounder is the only target species aside from sablefish where this holds true (and arrowtooth is a relatively unimportant species, accounting for only 1.2% of coastwide inflation-adjusted revenue during the baseline period). For overfished species shown in Table 4-187 this relationship holds true only for POP.

Table 4-187. Comparison of 2003-2012 catch to ACLs for commercially important stocks. (Catch estimates from WCGOP multi-year data product.)

Stock	2003-2012 Average Annual Catch	2003-2012 ACL Attainment	2014 ACL	Catch/ 2014 ACL
Arrowtooth Flounder	3,399	42%	5,758	59%
Dover Sole	8,981	63%	25,000	36%
Longspine Thornyhead - coastwide*	1,173	53%	2,305	51%
Petrale Sole	1,887	81%	2,652	71%
Sablefish - coastwide*	6,325	95%	5,909	107%
Shortspine Thornyhead - coastwide*	1,122	80%	1,918	58%
CANARY ROCKFISH	31	56%	119	26%
DARKBLOTCHED	216	87%	330	65%
PACIFIC OCEAN PERCH	119	50%	153	78%
YELLOWEYE	3	16%	18	15%

*Sum of geographically defined component ACLs.

4.10.2.2 Action Alternatives

Table 4-188 compares baseline catch to potential catch, using adjusted ACLs as a proxy, based on stock assessment projections for major target species in the groundfish trawl and non-nearshore fixed fisheries. As shown in the table, these species account for almost four-fifth of landings by weight and value of groundfish by the trawl and non-nearshore sectors. As discussed above, ACL catch is adjusted based on historical attainment rates. (These attainment rates are based on total catch for all sectors, but trawl and non-nearshore fixed gear account for most of the catch of these species.) For each alternative and state of nature scenario the ratio between projected aggregate catch and aggregate catch during the 2003-2012 baseline period is shown. These ratios make it easier to compare the difference between the alternatives in terms of potential revenues. Because potential ex-vessel revenue is likely to be influenced by many other factors aside from fishing opportunity, these results are not presented in terms of potential revenue; the ratios are meant to give a general indication of possible revenue differences from baseline conditions.

The ratios for Alternative 1 (P*=0.45) and the high state of nature range from 1.4 for Petrale sole to 6.3 for Dover sole; the ratio for these stocks combined is 4.1. Sablefish accounts for the largest fraction of groundfish revenues in this sector (almost two-fifths of nominal revenue during the baseline period) and has a ratio of 1.7. Nominal revenue from sablefish averaged $23.5 million per year for these fishery sectors during the baseline period. Under the base case state of nature the difference between the adjusted ACLs and baseline catch is not as great. For sablefish the ratio is only 1.2. On the other hand, the Dover sole adjusted ACL is almost four times as large as baseline catch. For the 2015-2016 biennial period the Council is proposing to increase the Dover sole ACL from 25,000 mt to 50,000 mt. Although historically harvesters have caught a relatively small fraction of smaller ACLs, this suggests there may be an opportunity to garner higher revenue in the future if demand for Dover sole is sufficient. Annual average nominal revenue from Dover sole landed by these sectors is $6.6 million.[65]

Even under the low state of nature scenario Alternative 2 (P*=0.25) does not differ greatly when adjusted ACLs are compared to baseline catch. The exception is Dover sole with a ratio of 2.4 under the low state of nature. This skews the ratio value for these stocks combined, which is 1.3. If Dover sole is removed, the resulting ratio is 0.6. Likewise, under the base case state of nature the ratio is 1.0 when Dover sole is excluded. Coincidentally, the ratios for sablefish are also 0.6 and 1.0 under these two state of nature scenarios. Depending on how effective harvesters could be in catching Dover sole while avoiding species with relatively low ACLs, revenue may not be much different under Alternative 2 than it was during the baseline period.

Alternative 3 (default P* values), shown for the base case state of nature, could result in slightly higher catches compared to the baseline level of catch; the ratio of adjusted ACLs to baseline catch is 1.4. Note that under this scenario the Dover sole ACL is a constant value of 25,000 mt, which is lower than the ABC harvest level even with a P* of 0.25. Given that the Council is proposing an increase in the ACL to 50,000 mt for the 2015-2016 biennial period the scenario shown in Table 4-188 likely under-represents fishing opportunity and potential catch of this species under Alternative 3. Excluding Dover sole, recognizing some of the anomalies resulting from the projections across all scenarios, Alternatives 2 and 3 have adjusted ACL catch proxies equal to baseline catch. Excluding Dover sole, nominal ex-vessel revenue for these species from the trawl and non-nearshore fixed gear average $35 million per year during the baseline period for these sectors.

The minimum catch streams from the projections for the low state of nature are also shown. These are not adjusted based on historical attainment, because in most cases they represent historical average catch rather than a fully attained ACL. The ratio for these stocks combined is 0.8, which suggests adverse socioeconomic impacts, because catches would likely be below those during the baseline period.

[65] Nominal revenue estimates cited here include the non-trawl portion of the shorebased IFQ fishery.

Table 4-188. Catch proxies for major target species in the trawl and non-nearshore fixed gear fisheries. Percent of total groundfish landings in these sectors by weight and nominal value; baseline catch and attainment; cumulative ACLs, adjusted cumulative ACLs and ratio of adjusted ACLs to baseline catch for the action alternatives and the minimum catch streams. Results shown for high, low, and base states of nature scenarios. Note that the minimum catch stream is not adjusted for attainment. Historical catch from Bellman (2013). Stocks combined for thornyheads (longspine and shortspine), and sablefish (north and south of 36° N. lat.).

						Alt 1 (P*=0.45)					
	Percent of Groundfish Total					High			Base		
Stock	By weight	By value	2003-2012 Catch	2003-2012 Cum. ACLs (OYs)	ACL Attainment	Cum. ACLs	Adjusted Cum. ACLs	Ratio	Cum. ACLs	Adjusted Cum ACLs	Ratio
Arrowtooth Flounder	9%	1%	33,985	83,402	41%	379,146	154,496	4.5	73,075	29,777	0.9
Dover Sole	35%	16%	89,812	145,920	62%	912,486	561,625	6.3	566,111	348,435	3.9
Thornyheads	8%	8%	22,951	41,760	55%	146,311	80,413	3.5	64,256	35,315	1.5
Petrale Sole	7%	9%	18,874	23,008	82%	31,700	26,004	1.4	27,711	22,732	1.2
Sablefish	22%	56%	63,245	71,411	89%	123,354	109,249	1.7	85,424	75,656	1.2
Stocks Combined	82%	91%	228,867	365,501	63%	1,592,997	931,787	4.1	816,577	511,915	2.2

	Alt. 2 (P* =0.25)						Alt. 3 (Default P*)			Minimum Catch Stream	
	Low			Base			Base			Low	
Stock	Cum. ACLs	Adjusted Cum ACLs	Ratio	Cum. ACLs	Adjusted Cum ACLs	Ratio	Cum. ACLs	Adjusted Cum ACLs	Ratio	Cum. Catch	Ratio
Arrowtooth Flounder	40,011	16,304	0.5	63,641	25,933	0.8	71,249	29,033	0.9	30,880	0.9
Dover Sole	348,799	214,682	2.4	506,304	311,625	3.5	250,000	153,872	1.7	75,509	0.8
Thornyheads	24,857	13,661	0.6	46,114	25,344	1.1	59,605	32,759	1.4	16,961	0.7
Petrale Sole	21,912	17,975	1.0	25,217	20,686	1.1	27,711	22,732	1.2	9,390	0.5
Sablefish	40,862	36,190	0.6	73,583	65,169	1.0	82,581	73,138	1.2	40,862	0.6
Stocks Combined	476,441	298,811	1.3	714,860	448,757	2.0	491,146	311,534	1.4	173,602	0.8

4.10.3 Commercial Fisheries: Pacific Whiting

Pacific whiting fisheries show greater revenue volatility compared to non-whiting fisheries as indicated in Figure 3-5. For the shoreside whiting fishery inflation-adjusted ex-vessel revenue ranged from $7.7 to $25.8 million and averaged $13.6 million during the 2003-2012 baseline period. For the two at-sea sectors the range was $8.1-$46.6 million with an average of $21.4 million.

Potential future variability in future revenue can be characterized in terms of the CVs for whiting sectors' inflation-adjusted ex-vessel revenue during the baseline period. Table 4-189 shows CVs for revenue from whiting and non-whiting trawl fisheries and for the catch limits on which allocations to these fisheries are based during the baseline period. Whiting fisheries show much higher variability in revenue compared to non-whiting trawl. This at least partly explained by the variability in catch limits; the CV for whiting catch limits is more than double that for non-whiting catch limits.

Table 4-189. CVs for inflation adjsuted ex-vessel revenue and catch limits for whiting and non-whiting trawl fisheries, 2003-2012. (CV for non-whiting catch limits is the sum of commercially important non-whiting species' ACLs.)

Fishery	Revenue	Catch Limit
Whiting		0.25
Shoreside	0.44	
C-P	0.50	
Mothership	0.55	
Non-whiting	0.13	0.12

Non-tribal Pacific whiting sectors ex-vessel revenue under the No Action alternative used to evaluate 2015-2016 ACLs and management measures is $54 million. During the baseline period whiting fisheries (including tribal sectors) landed between 79% and 99% of the catch limit with no strong relationship between the limit and attainment. Since historical variability in revenue has been about twice that of ACLs (Table 4-189), it is likely that exogenous factors play an important role in both attainment and revenues.

In coming years a value similar to this range of revenues during the baseline period may be expected under any of the alternatives, including No Action. However, given the high variability in Pacific whiting abundance, values outside this range could also occur. For example the 2014 U.S. share of the TAC for Pacific whiting is 316,206 mt. Using the 2013 shoreside average price per pound for whiting and assuming the entire non-tribal allocation were caught, this translates into about $27 million for the non-tribal shoreside sector and $37 million for the combined two non-tribal at-sea sectors. While $37 million would lie within the 2003-2012 historical range of revenues for the combined at sea sectors, for the shoreside sector $27 million would lie slightly above the 2003-2012 historical range.

Ten-year projections were not made for Pacific whiting, because yield is highly variable and long-term projections were deemed unrealistic. It is also important to note that the proposed action does not include setting harvest specifications for Pacific whiting; these are set in an intergovernmental forum between the U.S. and Canada. However, whiting is considered in this impact evaluation because ex-vessel revenue from these fisheries is an important component of ex-vessel revenue for the target fisheries.

During the baseline period total ex-vessel revenue from Pacific whiting (including the at-sea sectors) ranged from $16.9 to $66.8 million and this range holds going back to 1997, the first year that at-sea data are available.

4.10.4 Commercial Nearshore Fixed Gear and Recreational Fisheries

4.10.4.1 No Action Alternative

The commercial nearshore fishery is prohibited in Washington but occurs in Oregon and California waters. Recreational fisheries occur primarily in state waters off all three states. Generally, the nearshore commercial fishery and recreational fishery target the same species: black rockfish, blue rockfish, cabezon, lingcod, greenlings, principally kelp greenling, and other rockfish grouped in the nearshore complexes (geographically subdivided north and south of 40°10’ N. lat.).

The nearshore fixed gear sector accounted for 5% of inflation-adjusted revenue from shoreside fisheries during the baseline period. Although this fishery sector is not very significant from a coastwide perspective, as discussed in Sections 3.2.2.4 and 3.2.8 it makes up an important component of groundfish revenue in some coastal communities, particularly in southern Oregon and Northern California. This revenue (from groundfish) ranged from $2.9 million to $4.2 million and averaged $3.6 million. Under No Action it is likely that comparable levels of revenue would be generated.

Recreational groundfish fisheries are managed with time/area closures and bag limits to limit angler effort and catch. Generally, recreational fisheries are managed to limit catch overfished species, yelloweye and canary rockfish in Washington and Oregon, and also cowcod and bocaccio in California. Comparable management measures would be implemented under No Action as those described in Section 4.3. As in the 2015-2016 biennial period, under No Action over the long term these measures would be regularly adjusted in response to new information about catch.

Table 4-190 compares 2005-2012 catch, ACL attainment, and 2014 ACLs for stocks that are targets in nearshore commercial and recreational fisheries. As in Table 4-187, historical catch divided by the 2014 ACL to give an indication of whether more restrictive management measures may be needed to control catch in the future. Average annual catch in previous years is close to or exceeds the 2014 ACL for black rockfish and Cabazon in Oregon and California, and minor nearshore rockfish north. Black rockfish and minor nearshore rockfish north are mostly caught in recreational fisheries. Thus, under No Action over the long term it is likely that recreational management measures would have to take these stocks into account.

Table 4-190. Comparison of commercial nearshore fixed gear and recreational catch (mt), 2005-2012 to ACLs for commercially important nearshore stocks and stock complexes. Commercial catch estimates from WCGOP multi-year data product (Bellman, *et al.* 2013). Recreational catch estimates from RecFIN Recent Estimate Tabulation, http://www.recfin.org/data/estimates/tabulate-recent-estimates-2004-current.

Stock	Average Annual Catch 2005-2012	Attainment	2014 ACL	Catch / 2014 ACL	Comm.-Rec. Split	
Black Rockfish (OR-CA)	608	84%	409	149%	27%	73%
Black Rockfish (WA)	224	35%	1,000	22%	0%	100%
Cabezon (California)	59	61%	158	37%	46%	54%
Cabezon (OR-WA) [a/]	48	109%	47	103%	54%	46%
Lingcod Coastwide [b/]	441	19%	3,941	11%	12%	88%
Minor Nearshore RF North	85	65%	94	90%	39%	61%
Minor Nearshore RF South	485	69%	990	49%	19%	81%

a/ Attainment based on ACLs in 2011-2012 only.

b/ Lingcod has been managed under different geographic units; for comparison catch limits and catch is presented coastwide.

Recreational fisheries can also be evaluated with respect to angler fishing effort. For the 2015-2016 biennial period bottomfish + Pacific halibut marine angler boat trips under No Action are estimated at 835,000 (see Table 4-x) generating personal income of $XX million. During the baseline period (2004-2012) bottomfish + Pacific halibut marine angler boat trips averaged 648,000 annually. As described in Section 3.2.5, California accounted for 82% of marine angler boat trips during the baseline period and the Los Angeles- Orange County-San Diego region alone accounted for 48% of these trips. The change in the number of boat trips over time has been more variable but also greater in California compared to the other two states. The number of these trips averaged 586,203 from 2006 to 2010 but then jumped to an average of 836,837 in 2011-2012. Over the long term, recreational effort and resulting personal income is likely to be within the range of the baseline period.

4.10.4.2 Action Alternatives

Table 4-191 presents data similar to Table 4-188 but for nearshore species important in commercial fixed gear and recreational fisheries. For the Nearshore Rockfish complexes blue rockfish is used as a proxy, because it is the only stock in these complexes for which a projection could be produced. In this case ACLs were only available for the 2005-2012 period so the projected ACLs were adjusted for both the time series difference (by multiplying by 0.8) and historical ACL attainment. Since blue rockfish is managed as part of a complex no historical ACL attainment rate was applied as part of the adjustment. As result, the ratios shown for this species are higher than would otherwise be the case. Species in the Nearshore Rockfish complexes accounted for 22% of landings and 43% of revenue from the commercial fixed gear sector during the baseline period.

Table 4-191. Catch proxies for major target species in nearshore fixed gear and recreational fisheries. Percent of total groundfish landings in these sectors by weight and nominal value; baseline catch and attainment; cumulative ACLs, adjusted cumulative ACLs and ratio of adjusted ACLs to baseline catch for the action alternatives and the minimum catch streams. Results shown for high, low, and base states of nature scenarios. Note that the minimum catch stream is not adjusted for attainment. Historical catch from Bellman (2013). Geographic stocks combined for black rockfish, cabezon and lingcod.

				Alt 1 (P*=0.45)					
				High			Base		
Stock	2005-2012 Catch	2005-2012 Cum. ACLs (OYs)	ACL Attainment	Cum. ACLs	Adjusted Cum. ACLs	Ratio	Cum. ACLs	Adjusted Cum ACLs	Ratio
Black Rockfish	6,658	10,888	61%	26,042	12,739	1.9	16,008	7,831	1.2
Cabezon	855	869	98%	2,523	1,987	2.3	1,798	1,416	1.7
Lingcod	3,526	36,022	10%	53,205	4,166	1.2	42,294	3,312	0.9
Blue Rockfish [a/]	1,393			3,960	*3,168*	2.8	2,230	1,784	1.6
Stocks Combined [b/]	11,039	47,779	23%	81,770	18,893	1.7	60,100	12,559	1.1

	Alt. 2 (P* =0.25)						Alt. 3 (Default P*)			Minimum Catch Stream	
	Low			Base			Base			Low	
Stock	Cum. ACLs	Adjusted Cum ACLs	Ratio	Cum. ACLs	Adjusted Cum ACLs	Ratio	Cum. ACLs	Adjusted Cum ACLs	Ratio	Cum. ACLs	Ratio
Black Rockfish	8,483	4,150	0.6	13,685	6,694	1.0	13,946	6,822	1.0	5,540	0.7
Cabezon	980	772	0.9	1,541	1,213	1.4	1,798	1,416	1.7	553	0.5
Lingcod	27,557	2,158	0.6	33,580	2,630	0.7	41,517	3,251	0.9	242	0.1
Blue Rockfish [a/]	487	*390*	0.3	1,609	1,287	1.2	2,230	*1,784*	1.6	1,335	0.8
Stocks Combined [b/]	37,020	7,080	0.6	48,805	10,537	1.0	57,261	11,489	1.0	6,336	0.5

[a/] Blue rockfish adjusted for time period only (see text for explanation)
[b/] Excluding blue rockfish

Alternative 1 under the high state of nature the overall ratio (excluding blue rockfish) is 1.7, which may be biased downward somewhat by the very low attainment rate for lingcod. Across all fishery sectors (including recreational) the attainment rate for lingcod is only 15%. However, this bias may be counteracted by the high value for blue rockfish, which as discussed above does not take into account attainment rates. Under the base case state of nature scenarios the catch proxies across all the action alternatives differ little from baseline catch with ratios of 1.0 for Alternative 2 and 3 and 1.1 for Alternative 1. For Alternative 2 under the low state of nature scenario the ratio is 0.6 suggesting adverse impacts. Note that the ratio for blue rockfish is 0.3; if blue rockfish status and stock dynamics are actually representative of the species in the Nearshore Rockfish complexesthe adverse impacts could be greater than indicated by combined species ratio (which excludes blue rockfish and by extension the Nearshore Rockfish complexes). As noted above, the Nearshore Rockfish complexes comprise a large proportion of ex-vessel revenue from the commercial nearshore fishery. The minimum catch stream scenario represents a substantial reduction in potential catch compared to the baseline, which would result in severe adverse impacts. The minim catch stream results in catch proxy ratio of 0.5 overall; this is outside of the range of default HCR policies of the alternatives but represents the low end of projected catches.

4.10.5 Buyers and Processors

Data are not available to estimate processor revenues so ex-vessel revenue is used in groundfish harvest specifications impact analyses as a measure of the flow of raw fish into the production process. Although prices for processed fish may not correlate directly with this input cost, the discussion of revenue impacts discussed above for fishery sectors may indicate the relative impact of the alternatives on processors.

Processors would also likely play a role in stimulating demand for particular fish products by developing new products for example. This is relevant to productive, currently under-utilized species such as flatfish.

4.10.6 Fishing Communities

Section 3.2.8 summarizes the economic characteristics of west coast fishing communities during the 2003-2012 baseline period, focusing on the distribution of ex-vessel revenue and the relative importance of different groundfish fishery sectors among ports. Setting harvest specifications has an indirect effect on fishing opportunity, which, along with other factors such as price and allocations, determines the amount of ex-vessel revenue flowing to a particular fishing community. As noted above, the No Action alternative for 2015-2016 harvest specifications uses a 2014 commercial ex-vessel revenue estimate of $124 million, which is the basis for estimating the regional distribution of personal income impacts, shown in Table 4-x. These distributions are based on landing patterns in 2013, and should be broadly similar to the information on landings distributions during the baseline period, as described in Section 3.2.8. All other factors being equal, one would expect the amount and distribution of income to fishing communities would be comparable over the long term if harvest specifications remained at their 2014 values.

As discussed in the previous sections evaluating fishery sector impacts, under the action alternatives catch could increase or decrease relative to baseline catches.

It is not possible to predict changes in community characteristics due to exogenous factors; the description of communities in Section 3.2 during the baseline period is the best characterization of future conditions if exogenous factors do not change. These factors, which could affect the amount and distribution of ex-vessel revenue and income, include:

- Changes in the relative prices of fish and fish products leading to changes in fishery behavior including the amounts landed and the distribution of landings.
- An increase in ACL attainment for a particular species due to technical factors (e.g., more selective fishing gear)
- A decrease in ACL attainment for target species because of increases in stock abundance of non-target species not accounted for in No Action ACLs (the "rebuilding paradox").
- Changes in the distribution of landings due to agglomeration (geographic concentration of related firms)
- Public and private initiatives intended to support the continued viability of fishing communities

As discussed in Section 3.2.8, geographic trends in landings during the baseline period suggest increasing agglomeration at fewer ports. This is likely driven by the shorebased IFQ fishery, which accounts for the largest proportion of coastwide groundfish revenue. But harvest specifications are unlikely to be a substantial contributor to this trend, because exogenous factors are likely to have a greater influence on landing patterns. For example, concentration of processing facilities could be mediated by owner/operator preferences and overland transport costs related to trucking fish from landing sites to processing facilities. Under No Action, ACLs would remain constant over time so one might expect the trends shown in Figure 3-19 to continue until a plateau is reached. On the other hand, if stock abundance increases without a corresponding increase in catch limits (the "rebuilding paradox"), and harvesters are unable to avoid catching stocks with low ACLs, their ability to attain target species' ACLs could be impeded. This could affect fishing communities differently depending on the operational characteristics of their fleets. While techniques and technologies to more selectively target species and avoid those with low catch limits might be expected to eventually spread to all fishery participants, local fishing grounds vary with respect to the occurrence of low ACL species (such as overfished/rebuilding species). The FEIS for Groundfish FMP Amendment 20 (PFMC 2010) identified ports "adjacent to fishing grounds with high constraining overfished species abundance" (p. 530). While that analysis focused on overfished species, if ACLs remain constant while species abundance increases, various other species could become a limiting factor for local fisheries. Interventions outside the biennial process, such as the trawl rationalization adaptive management program, are likely to have a much greater effect on the distribution of landings.

As discussed above, potential catch under the action alternatives is likely to be close to baseline period catch, based on the adjusted cumulative ACLs ratios. The influence of exogenous factors, discussed with respect to the No Action Alternative, would be equally influential if ACLs and resulting management measures were established under any of the three ACL policies. Alternative 2 implements a larger precautionary reduction from the OFL compared to Alternatives 1 and 3 (although under the proposed Amendment 24 procedures the Council could modify the default ACLs). The lower ACLs under Alternative 2 would be more limiting in terms in cases where the proportion of the ACL caught (the attainment rate) increases towards 100%. Differential socioeconomic impacts to fishing communities under any set of ACLs would more likely result from differences between catch limits for stocks under any of the alternatives rather than the broader policy differences represented by the action alternatives.

4.10.7 Summary of the Impacts of the Alternatives

All other factors being equal, ex-vessel revenue, personal income, and employment is likely to remain within the range exhibited during the recent past. Table 4-192 shows the maximum and minimum total annual revenue for whiting and non-whiting fisheries and all groundfish fisheries from 1998 to 2012. This period was chosen because 1997-98 represents a breakpoint where there was sudden precipitous decline in groundfish ex-vessel revenue. For groundfish fisheries as a whole revenue ranged from $63.5 million to $128.2 million. This is the best estimate of the likely range in future real revenues recognizing many factors that could affect actual landings, beyond the biological yield from stocks. The most important of these uncertainties is the true future yield from stocks. The fraction of this yield that is actually landed is almost as important. Changing ACL attainment is a function of technical innovation and market demand. Technical innovation (including institutional arrangements such as risk pools) allows harvesters to better match actual catch in a multi-species fisheries to harvest limits.

Table 4-192. Maximum and minimum annual inflation adjusted (2012) revenue for non-whiting and whiting fishery sectors, and all groundfish.

	Revenue	Year
Nonwhiting		
Min	$46,774,698	2004
Max	$70,008,542	2011
Whiting		
Min	$16,013,680	2002
Max	$66,819,804	2008
Total		
Min	$63,484,665	2002
Max	$128,212,249	2011

The No Action Alternative established 2014 ACLs for the indefinite future. The No Action Alternative in Section **Error! Reference source not found.** (socioeconomic impacts of 2015-2016 harvest specifications and management measures) provides a first approximation of ex-vessel revenue and personal income impacts under the long-term No Action Alternative. In that section annual coastwide commercial and tribal ex-vessel revenue for No Action is estimated to be $124 million near the maximum for the 1998-2012 period. The annual average for the 2003-2012 baseline period is $91 million. This difference is mainly explained by the increasing Pacific whiting TAC since 2009, because the 2015-2016 No Action Alternative uses 2013 revenues.

Since No Action implements static ("constant catch") ACLs, over the long term the discrepancy between these ACLs and actual abundance could lead to adverse socioeconomic impacts since additional yield that might otherwise be available for harvest would not be accommodated under these ACLs. A prime example is Dover sole, where the 2014 policy is a 25,000 mt constant catch limit. Furthermore, the so-called rebuilding paradox, where increasing abundance of a stock makes it more difficult for them to be avoided in a multi-species fishery, could result in the imposition of restrictive management measures affecting fishing opportunity for other species. Even in catch share fisheries, where there is greater scope for innovation, technical limitations could prevent harvesters from attaining their target species quotas.

The action alternatives policies allow higher harvests than No Action. Table 4-193 compares No Action ACLs to the annual average of the 10-year catch streams for action alternatives under different state of nature scenarios for the commercially and recreational species presented above. The ratio of the 2014 ACL to the annual average catch stream also presented. For the trawl and non-nearshore target species combined the ratios for the base case state of nature range from 1.9 times the 2014 ACLs under Alternative 1 to 1.1 time the 2014 ACLs under Alternative 3. For Alternative 2 the ratio 1.6 for the base case. Alternative 3 has a smaller ratio than the more risk averse policy (P*=0.25) under Alternative 2 because of the default constant catch ACL of 25,000 mt for Dover sole. As discussed elsewhere, the Council proposes doubling this ACL to 50,000 mt for 2015-2016, so the combined species ratio for Alternative 3 is unrealistically biased downward. For the nearshore commercial and recreational fishery target species these ratios are small, ranging from 1.1 under Alternative 1 to 0.9 for Alternative 2.

Table 4-193. Comparison of ACLs for the alternatives for selected stocks

		Annual Average ACLs				
Stock	**2014 ACL**	**Alt 1 High**	**Alt 1 Base**	**Alt 2 Low**	**Alt 2 Base**	**Alt 3 Base**
Arrowtooth Flounder	5,758	37,915	7,307	4,001	6,364	7,125
Dover Sole	25,000	91,249	56,611	34,880	50,630	25,000
Thornyheads	4,223	14,631	6,426	2,486	4,611	5,960
Petrale Sole	2,652	3,170	2,771	2,191	2,522	2,771
Sablefish	5909	12,335	8,542	4,086	7,358	8,258
Stocks Combined	43,542	159,300	81,658	47,644	71,486	49,115
		Ratios				
Arrowtooth Flounder		6.6	1.3	0.7	1.1	1.2
Dover Sole		3.6	2.3	1.4	2.0	1.0
Thornyheads		3.5	1.5	0.6	1.1	1.4
Petrale Sole		1.2	1.0	0.8	1.0	1.0
Sablefish		2.1	1.4	0.7	1.2	1.4
Stocks Combined		3.7	1.9	1.1	1.6	1.1
		Annual Average ACLs				
	2014 ACL	**Alt 1 High**	**Alt 1 Base**	**Alt 2 Low**	**Alt 2 Base**	**Alt 3 Base**
Black Rockfish (OR-CA)	409	2,032.0	1,219.8	714.8	1,043.7	1,000.0
Black Rockfish (WA)	1,000	572.2	380.9	133.5	324.8	394.6
Cabezon (off CA only)	158	164.3	130.9	73.8	111.3	130.9
Cabezon (OR-WA)	47	88.0	48.9	24.2	42.8	48.9
Lingcod N. of 42° (OR & WA)	2,878	3,696.2	3,059.8	2,115.4	2,499.0	3,059.8
Lingcod S. of 42° (CA)	1,063	1,624.4	1,169.7	640.3	859.0	1,092.0
Stocks Combined	5,555	8,177	6,010	3,702	4,881	5,726
		Ratios				
Black Rockfish (OR-CA)		5.0	3.0	1.7	2.6	2.4
Black Rockfish (WA)		0.6	0.4	0.1	0.3	0.4
Cabezon (off CA only)		1.0	0.8	0.5	0.7	0.8
Cabezon (OR-WA)		1.9	1.0	0.5	0.9	1.0
Lingcod N. of 42° (OR & WA)		1.3	1.1	0.7	0.9	1.1
Lingcod S. of 42° (CA)		1.5	1.1	0.6	0.8	1.0
Stocks Combined		1.5	1.1	0.7	0.9	1.0

As noted above, the deterministic projections used to evaluate long-term impacts of the action alternatives assume perfect information so that stock biomasses tend to converge on the policy target (B_{MSY} or proxy thereof). In a decision table the state of nature scenarios are intended to bracket uncertainty around key model parameters; here they are presented to bracket potential catch if lower probability parameter values are the “true” values. But in a multispecies fishery involving a variety of different targeting strategies it is likely that one or more stocks will fall below their target biomasses, because of factors other than management policy dictating catch. According to the management framework more restrictive catch limits would be required for those stocks, potentially affecting harvesters who cannot avoid catching those species. Given the range of unpredictable exogenous factors influencing the proposed action (setting harvest specifications and related management measures) it is likely that future ex-vessel revenue from the groundfish fishery across the action alternatives will be within the range of annual values recorded for the baseline period.

Benefits to harvesters are a function of net revenue or "profits," a function of costs, including opportunity costs. Figure 3-17 shows the estimated breakdown of costs by category for the shorebased IFQ and at-sea co-op fisheries. Wages are the largest component of costs for the trawl component; for the fixed gear segment quota is the largest share and wages are a smaller fraction of total costs. Changes in net revenue would result from changes in the price of these costs components relative to ex-vessel prices for fish.

4.11 Long-term Impacts of Setting Harvest Specifications and Management Measures on Essential Fish Habitat

Setting harvest specifications does not directly affect essential fish habitat (EFH). Furthermore, an analysis of groundfish trawl logbook data does not reveal any clear relationship between catch limits and fishing effort (see Appendix A). As discussed in Section 3.3.3.3, fishing effort in the shoreside trawl fishery has declined substantially since 2010 while catch generally increased. Section 3.2.3 reports participation trends in groundfish fixed gear and trawl fisheries during the baseline period. Non-nearshore fishery participation has remained relatively stable while nearshore fishery participation has declined. The trend in effective fishing effort is not directly related to participation, but it is unlikely that fishing effort increased during the baseline period. Considering the lack of a clear relationship between seeting harvest specifications and fishing effort it is not possible to distinguish the effect on EFH of the long-term Amendment 24 alternatives. To the degree that the amount and spatio-temporal distribution of gear-specific fishing effort does not change from historical patterns, adverse impacts to EFH from the groundfish fishery are likely to be equivalent to the historical impacts described in Section 3.3, which serves as a proxy for describing the impacts of the No Action Alternative.

Groundfish fisheries have negligible impact to the water column itself, parts of which are designated EFH under other FMPs. Benthic habitats are disturbed by gear types the contact the bottom. These effects are summarized in Section 3.3 and described in more detail elsewhere (NMFS 2005; NMFS 2013b; NMFS 2014b).

The proposed action does indirectly mitigate adverse impacts to EFH from fishing through the use of time/area closures. As discussed in Sections 3.3 and 4.4, Groundfish Conservation Areas (GCAs), established as top-down measures to reduce bycatch of overfish species, have an ancillary mitigating impact on the adverse impacts of groundfish fisheries on EFH by prohibiting fishing within these areas.[66] If an area is closed for an extended period of time, the EFH within it may recover from these adverse impacts. Estimates of recovery times for EFH are shown in Table 3-24 by habitat and gear type causing the impact. These range from less than a year to decades. Although the maximum recovery time shown in the table is 56 years (the upper end of the range of recovery times for offshore biogenic habitat impacted by trawl gear), estimates range into centuries for some deepwater coral species. However, Table A.3a.2 in NMFS (2013a) shows a maximum recovery time across gear types and habitat categories of 3.2 years.

While some GCA configurations, such as the Cowcod Conservation Areas, have remained static since implementation, in the case of the trawl RCA boundaries change seasonally and year to year to optimize fishing opportunity versus bycatch avoidance. Inseason changes of this kind involve moving seaward and shoreward boundaries of the RCA using sets of waypoints published in Federal regulations that

[66] Other closed areas, principally EFH Conservation Areas, were established with the objective of mitigating such impacts or (in the case of MPAs) addressing a variety of objectives closely related to habitat protection. However, establishing or modifying these areas is not part of the proposed action.

approximate different depth contours. The depths closed to trawl gear by RCAs also vary latitudinally. Over time waypoints comprising a particular depth boundary have been changed so that they better approximate the actual depth contours. These improvements in accuracy are generally minor with respect to the area affected and thus have negligible potential impact on EFH related to permitting fishing in areas that were previously inside the trawl RCA. As an example, Appendix C to the 2013-2014 Groundfish Harvest Specifications FEIS (PFMC and NMFS 2012) includes an analysis of proposed changes to RCA waypoints to improve their accuracy.

It is likely that as overfished species stocks rebuild and other measures are implemented that more effectively and efficiently control catch of species with low ACLs, the rationale for maintaining GCAs, at least in their present configurations, will diminish. However, the need to control catch because of the changed status of other species could lead to the implementation of new GCAs. For example, for the 2015-2016 biennial period the Council is developing new trawl RCA boundaries that could be implemented inseason to control the catch of rougheye rockfish. It is also possible that over the long term time/area closures could be developed with the dual objectives of controlling catch and mitigating adverse impacts of fishing to EFH. This might be the case if one or more stocks with intrinsically low yield are found to associate with benthic habitat types that have long recovery times.

In the past RCA boundaries were changed frequently as a routine matter based on the premise that the effects of such changes had been previously analyzed when a particular RCA configuration was initially implemented. However, as discussed in Sections 3.3 and 4.4, as part of a 2014 rulemaking to modify the trawl RCA boundary, NMFS identified criteria for considering adverse impacts to EFH from such changes, including the history of fishing that may have caused adverse impacts, the estimated recovery time of the EFH in the area where fishing will be permitted, and related habitat conservation considerations (such as proposals to close the area to fishing specifically to protect EFH). These criteria would be taken into consideration in focused analyses for RCA changes judged to have more than a 'minimal and temporary' adverse impact to EFH. As with the bycatch objective of RCAs, evaluation of adverse impact to EFH would consider the tradeoff of conservation and socioeconomic costs and benefits based on the practicability standard in Federal regulations at 50 CFR 600.815(a)(2)(iii).

4.11.1 Summary of the Impacts of the Alternatives

4.12 Long-term Impacts of Setting Harvest Specifications and Management Measures on the California Current Ecosystem

4.12.1 Impact Evaluation Methods

Section 3.4.3 reviews published results from the use of the California Current Atlantis Ecosystem Model to evaluate the cumulative effects of fishery removals on ecosystem structure. Kaplan (2014, reproduced in Appendix A) conducted a similar evaluation of the harvest policies proposed in the Amendment 24 alternatives to simulate and evaluate food web impacts of groundfish fisheries. As noted by Kaplan, these simulations do not take into account stressors such as habitat damage by fishing gear, climate change, or ocean acidification.

The analysis uses the 10-year projections from groundfish stock assessments but extends the simulation period to 30 years in order to better reveal food web effects. Selected catch streams from the stock assessment projections were used for the first 10 years of the simulation; catch projections were extended for at least another 20 years based on the fishing mortality rates experienced in the tenth year of the projection period. The state of nature scenarios from the stock assessment projections were converted to ecosystem productivity by transferring the productivity parameters lnRo (log of initial, unfished number of recruits), steepness (h), and natural mortality (M) from the assessments to the ecosystem model.[67] Four catch streams are modeled:

- **High Catch Stream**: ABC removals of P* = 0.45 when the stock assessments assumed the stocks were in their high states of nature. This extreme scenario assumes a median catch scalar across Atlantis functional groups of 10.3x, relative to the benchmark Recent Average catches (ranging from 1.7x for Sablefish to 618x for Small shallow rockfish)
- **Moderately High Catch Stream**: ABC removals of P* = 0.45 when the stock assessment assumed the stock was in its base case state of nature. The exception is for Atlantis functional groups that include overfished species, for which the moderately high catch stream corresponds to catches equal to the 2014 ACL. Overall, the moderately high catch stream assumes a median catch scalar across Atlantis functional groups of 2.7x, relative to the benchmark Recent Average catches (ranging from 1.1x for Sablefish to 68x for Small shallow rockfish). Catches of groups with overfished species are scaled by less than or equal to 2.8x their benchmark Recent Average catches.
- **Recent Average Catch Stream**: Recent Average Catch when the stock assessment assumed the stock was in its base case state of nature.
- **Low Catch Stream**: The lower of recent average catch or ABC removals of P*=0.25, when the stock assessment assumed the stock was in its low state of nature.

Since the Pacific whiting (hake) fishery is outside the scope of the actions in this EIS, whiting catch was not varied between scenarios.

Results are reported with respect to the following metrics, which correspond to the metrics reported in Section 3.4.3 from Kaplan (2012):

- mean trophic level of the catch
- mean trophic level of biomass
- ratio of target species biomass to catch
- total system biomass
- abundance of piscivorous fish (trophic level >= 4)
- abundance of forage fish
- abundance of krill (euphausiids)
- the number of healthy assessed stocks above B25 (flatfish) or B40
- the number of healthy non-assessed stocks above B25 (flatfish) or B40
- abundance of marine mammals and birds ("median depletion" of these stocks)

The two 'healthy stocks' metrics require an estimate of B_{25} or $B_{40,}$ and the abundance of marine mammals and birds metric requires an estimate of B_{100}. These were calculated based on an unfished Atlantis simulation with base productivity and no fishing.

[67] In the discussion here, the term "state of nature" can be confusing. As discussed elsewhere in this EIS, the term refers to uncertainty about the true value of key parameters in the stock assessments. Low and high state of nature parameter values represent the tails of the likelihood distribution for the value. Within a stock assessment, these distributions are developed independent of any explicit consideration of ecosystem state.

Each of the ten metrics is standardized relative to its value in a benchmark management scenario that projects a base case productivity state of all stocks in the ecosystem model, with recent average catches projected into the future.

4.12.2 Evaluation of the Alternatives

The simulations bracket the harvest specification policies of the alternatives to evaluate the broadest possible range of impacts. The Low Catch scenario corresponds to the lower of Recent Average Catch or the policy in Alternative 2 (P*=0.25) while the benchmark simulation (Recent Average Catch, base case productivity) is representative of No Action. As noted above, recent average catch under base case productivity is the benchmark for comparison. (Thus in Table 4-194values are 1.00 across all the metrics for this scenario.) The High and Moderately High Catch scenarios bracket Alternative 1. Alternative 3 (default, or 2014, HCRs) is intermediate in this range, especially assuming the base case state of nature. Combining four catch stream scenarios with three ecosystem productivity states results in 12 sets of results. Since the 10-year metrics show the same trends as the metrics from averaging values for years 25-30, the focus below is on the year 25-30 metrics, which are displayed in Table 4-194.

4.12.2.1 Direct Impacts Assuming Base Ecosystem Productivity

Three metrics represent direct impacts to harvested stocks: Ratio of Target Species Biomass to Catch, Abundance of Piscivores, and Number of Healthy Assessed Stocks.

Under base productivity of the ecosystem model, the Low Catch scenario (analogous to Alternative 2) led to ecosystem metrics within 1% of the Recent Average Catch scenario benchmark scenario (No Action). This is due to the underlying catch streams themselves, since for most functional groups Recent Average Catches are equal to Low Catch streams.

The primary impact of increased catches (High Catch streams, analogous to Alternative 1 and high state of nature) is on the Abundance of Piscivores, which directly reflects the abundance of groundfish fishery target species. The High Catch streams caused a ~50% reduction in Abundance of Piscivores, and the Moderately High catch streams caused a ~25% reduction in this metric. The Number of Healthy Assessed Stocks and Ratio of Target Species Biomass to Catch metrics reflect the abundance of both groundfish and other stocks. These two metrics decline by at most ~20% after 25-30 years of High Catch and ~15% after 25-30 years of Moderately High Catch. Other ecosystem metrics responded by less than 5%. By years 25-30 the Abundance of Krill increases slightly due to indirect effects discussed below. Overall, the metrics that best reflect food web effects (rather than effects of direct harvest) suggest minimal impacts of the tested harvests.

The sensitivity of the three metrics representing direct impacts to harvested stocks (Ratio of Target Species Biomass to Catch, Abundance of Piscivores and Number of Healthy Assessed Stocks) to increased catches should be expected *a priori.* Relative to the benchmark scenario (Recent Average Catch, base case productivity, representative of No Action), the High Catch scenario (analogous to Alternative 1, high state of nature) involves a median catch increase across Atlantis functional groups of 10.3x, and the Moderately High Catch scenario involves a median catch increase of 2.7x.

The main direct impact predicted by the ecosystem model under High Catch is full depletion of Large flatfish (e.g., arrowtooth flounder), Small shallow rockfish, and Dover sole (to ~0 biomass by year 30, see Table 4-195). Species that show 30-70% declines in biomass under the High Catch stream (analogous to Alternative 1, high state of nature), relative to biomasses under the benchmark catch stream (Recent Average Catch, base case productivity, representative of No Action) include sablefish, Small demersal sharks, Yelloweye and Cowcod, Shallow Large Rockfish, Deep large rockfish, and Large Demersal Predators such as lingcod.

Like the High Catch Scenario, the Moderately High Catch streams (analogous to Alternative 1, base case state of nature) led to substantial declines for several functional groups: nearly 100% for Dover sole, ~40% for Large flatfish, and ~25% for Large Demersal predators after 25-30 years. The abundance of all other groups was within approximately 15% of the benchmark simulation (No Action analogue). Within the ecosystem model, these three groups can sustain the benchmark, but can't sustain the large increases in catch (e.g., an 11-fold increase for Dover sole) assumed under Moderately High Catch, or the much higher increases assumed under High Catch.

These simulations assume specified catches (years 1-10) and constant fishing mortality rates for (years 11-30) with no management feedback. This implies no management response to new information about stock status, which is unlikely. In fact, the biennial harvest specifications process is the mechanism for making such adjustments. Maintaining policies resulting in high catch streams when productivity results in biomass decline (depletion) is unlikely given the feedback mechanisms in the management system.[68]

4.12.2.2 Indirect impacts, Assuming Base Ecosystem Model Productivity

Under the base ecosystem productivity state, higher catches (Under High Catch or Moderately High Catch, Alternative 1 analogues) led to moderate indirect effects through the food web; abundance of krill was predicted to increase by 1-8% by years 25-30, as predators (groundfish) on krill were removed (Table 4-194). Similarly, shrimp biomass increased in abundance by 3-19%. The strongest indirect effect of the High Catch scenario was an increase in a predator of krill, Large planktivores (mackerel) (30% increase under High Catch and ~10% increase under Moderately High catch). A predator on large planktivores, Miscellaneous pelagic sharks, also therefore increased, though by less than 10%. Cephalopods declined slightly (≤ 6%) due to shark predation (Table 4-195).

As predation and competition by harvested groundfish decreased in scenarios with higher catch, Miscellaneous nearshore fish (croaker, sculpin) and Shortbelly rockfish both increased 4% (under Moderately High Catch) and 12% and 8%, respectively (under High Catch). These two groups have low and constant fishing mortality rates that are not varied here, thus the responses are due to food web effects only.

Dolphins and porpoises increased 6% under High catch and 2% under Moderately High catch, and other mammal and bird groups showed less than 1% response to increased catches (Table 4-195). All other vertebrate and invertebrate groups responded to High Catches by <5%. Overall, the ecosystem model predicted a limited food web response, which should be viewed as a qualitative prediction of potential ecosystem response.

4.12.2.3 Low and High Ecosystem Productivity

Kaplan (2014, reproduced in Appendix A) also evaluated the effect of changes in ecosystem model productivity, in combination with the four catch streams. In these simulations the productivity of the ecosystem model was adjusted to approximate the productivity implied by the 'States of Nature' from the 37 stock assessments, as well as the Pacific whiting (hake) stock assessment.

Similar to when the ecosystem was assumed at base productivity, in high productivity and low productivity states, most ecosystem metrics declined by less than 5% relative to their benchmark values

[68] A management strategy evaluation approach would be necessary to simulate these feedback mechanisms.

by Year 10 or Year 25-30 (Table 4-194). Again, the exceptions are Ratio of Target Species Biomass/Catch (which partially reflects groundfish species tested with the catch streams), and Abundance of Piscivores and Number of Healthy Assessed Stocks (which echo the direct effects forced with the catch streams).

The most extreme mismatch between ecosystem productivity and catch streams occurred in the low productivity state and High Catch scenario, where Abundance of Piscivores fell to 42% of the value in the benchmark scenario by years 25-30. This is due to declines in the same species noted above for the base productivity state and High Catch scenario, with the addition of 20-25% declines in abundance of Pacific whiting (hake), Deep small rockfish, and Small flatfish. This is a direct result of the parameterization of lower productivity for these stocks in this scenario. In particular, compared to base productivity, at low productivity increasing catches from Recent Average Catch to High Catch led to stronger declines (~ 20% additional decline) in the Yelloweye and cowcod, Deep large rockfish, Small flatfish, Large demersal predators, and Small demersal sharks (dogfish) functional groups. Therefore, the direct impact of the catch streams on these species or groups is stronger in the low productivity state compared to high productivity.

4.12.3 Summary of the Impacts of the Alternatives

In summary, the main effect of the action alternatives, bracketed by the catch streams used in the Atlantis California Current Ecosystem Model simulations, was on the groundfish stocks directly harvested in these simulations. This is reflected in the ecosystem metrics of Piscivores, Number of Healthy Assessed Stocks, and Target Biomass/catch.

Food web effects were evident but not common. In the Moderately High catch scenario, and especially in the High catch scenario, the Atlantis ecosystem model predicted some indirect effects via krill, species linked to krill, and some prey of groundfish. Low catch streams, and resulting model dynamics, are similar to the No Action benchmark (Recent Average Catch, base productivity).

Ecosystem model high and low productivity states likely bracket the range of uncertainty regarding stock productivity, but it is difficult to place probabilities on these alternate ecosystem model productivities. Overall, most ecosystem metrics responded by <5% regardless of the productivity assumed in the ecosystem model. However, the three ecosystem metrics that directly reflect groundfish abundance are more sensitive to the catch streams at low ecosystem productivity states.

Alternative 3 (2014 HCRs, representing the defaults) was not explicitly modeled with respect to the catch streams from the stock assessment projections. For 13 stocks the default HCR is ACL=ABC and P*=0.45, the policy applied to all stocks under Alternative 1.[69] For other stocks, the default HCRs result in lower ACL values. The sum of the catch streams for Alternative 3 under the base case state of nature is one-third the sum for Alternative 1 under the high state of nature (equivalent to the High Catch scenario used in the Atlantis simulation) and 3.5 times the sum for the Recent Average Catch stream under the base case (the benchmark or No Action scenario in the Atlantis simulation). This suggests that Alternative 3 would have direct and indirect impacts intermediate between the Moderately High Catch scenario (Alternative 1, base case state of nature) and the Recent Average Catch benchmark scenario. However, as discussed in Section 4.10, historical catch (or recent average catch) has been well below catch limits for most stocks. While ACL attainment could increase for some target stocks, it is very

[69] These stocks are aurora rockfish, blackgill rockfish S of 40º10’ N lat., blue rockfish S of 42º N lat. , cabezon (CA), cabezon (OR), chilipepper rockfish, English sole, gopher rockfish S of 40º10’ N lat., greenstriped rockfish, lingcod N of 40º10’ N lat., petrale sole, rougheye/blackspotted rockfish, and splitnose rockfish.

unlikely that it will approach the aggregate level of the catch streams used in this evaluation, which are based on full attainment of ACLs for all stocks.

Table 4-194. Value of ecosystem metrics, average over years 25-30. (from Table A4 in Kaplan 2014, reproduced in Appendix A) 'Productivity' refers to productivity of the ecosystem model, which is forced by catch streams (low, high, moderately high, or recent average) taken from stock assessments. Values are reported relative to benchmark scenario (Base productivity and Recent Average catch stream).

	Mean trophic level of the catch	Mean trophic level of biomass	Ratio of target species biomass to catch	Total system biomass	Abundance of piscivores	Abundance of forage fish	Abundance of krill (euphausiids)	Num. healthy assessed stocks	Num. healthy non-assessed stocks	Abundance of birds and mammals
Low Productivity, Low Catch	0.99	0.99	1.00	0.97	1.17	1.03	0.98	1.00	1.00	1.00
Low Productivity, 'Recent Average' Catch	0.99	0.99	0.99	0.97	1.16	1.03	0.98	1.00	1.00	1.00
Low Productivity, Moderately High Catch	1.00	0.98	0.84	0.94	0.85	1.03	1.03	1.00	1.00	1.00
Low Productivity, High Catch	1.00	0.98	0.77	0.92	0.42	1.04	1.02	0.86	1.00	1.00
Base Productivity, Low Catch	1.00	1.00	1.01	1.00	1.01	1.00	1.01	1.00	1.00	1.00
Base Productivity, 'Recent Average' Catch	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Base Productivity, Moderately High Catch	1.01	0.99	0.84	0.97	0.76	1.01	1.08	1.00	1.00	1.00
Base Productivity, High Catch	1.01	0.98	0.78	0.95	0.49	1.01	1.01	0.86	1.00	1.00
High Productivity, Low Catch	1.01	1.01	1.09	1.05	1.37	0.97	0.98	1.00	1.00	1.00
High Productivity, 'Recent Average' Catch	1.01	1.01	1.08	1.05	1.35	0.97	0.96	1.00	1.00	1.00
High Productivity, Moderately High Catch	1.02	1.00	0.90	1.01	1.10	0.98	1.11	1.00	1.00	1.00
High Productivity, High Catch	1.02	0.99	0.81	0.99	0.54	1.00	1.17	0.91	1.00	1.00

Table 4-195. Predicted biomass per functional group, under base ecosystem productivity, average over years 25-30. (from Table A5 in Kaplan 2014, reproduced in Appendix A)
The model is forced by catch streams (low, high, moderately high, or recent average) taken from stock assessments. Groups with catches specified by these alternate catch streams are denoted by red text. Values are reported relative to benchmark scenario (Base productivity and Recent Average catch stream).

Functional Group	Low Catch	Recent Average Catch	Moderately High Catch	High Catch
Large planktivores	1.00	1.00	1.11	1.33
Canary rockfish	1.01	1.00	1.03	0.72
Small planktivores	1.00	1.00	1.01	1.01
Large flatfish	1.00	1.00	0.57	0.00
Shortbelly rockfish	1.00	1.00	1.04	1.08
Large demersal predators	1.00	1.00	0.76	0.59
Salmon	1.00	1.00	1.00	1.00
Large pelagic predators	1.00	1.00	1.00	1.01
Migrating birds	1.00	1.00	1.00	1.00
Pacific hake	1.00	1.00	1.00	1.01
Sablefish	1.12	1.00	0.84	0.61
Deep vertical migrators	1.00	1.00	1.01	1.01
Deep misc. fish	1.00	1.00	1.00	1.00
Misc. nearshore fish	1.00	1.00	1.04	1.12
Midwater rockfish	1.00	1.00	0.98	0.79
Surfperch	1.00	1.00	0.99	0.99
Dover sole	1.00	1.00	0.04	0.00
Small shallow rockfish	1.00	1.00	0.90	0.00
Deep small rockfish	1.00	1.00	0.93	0.88
Deep large rockfish	1.01	1.00	0.96	0.63
Small flatfish	1.00	1.00	0.98	0.98
Small demersal sharks	1.22	1.00	0.91	0.29
Large demersal sharks	1.00	1.00	1.00	1.00
Yelloweye and cowcod	1.00	1.00	0.98	0.66
Misc. pelagic sharks	1.00	1.00	1.03	1.09
Shallow large rockfish	0.99	1.00	0.86	0.69
Skates and rays	1.00	1.00	0.90	0.87
Surface seabirds	1.00	1.00	1.00	1.00
Diving seabirds	1.00	1.00	1.00	1.00
Pinnipeds	1.00	1.00	1.00	1.00
Transient orcas	1.00	1.00	1.00	1.00
Baleen whales	1.00	1.00	1.00	1.00
Dolphins and porpoises	1.00	1.00	1.02	1.06
Toothed whales	1.00	1.00	1.00	1.01
Sea otter	1.00	1.00	1.00	1.00
Cephalopods	1.00	1.00	0.97	0.94
Shallow benth. filt feeders	1.00	1.00	1.00	1.00

Functional Group	Low Catch	Recent Average Catch	Moderately High Catch	High Catch
Other benthic filter feeders	1.00	1.00	1.02	1.03
Deep benthic filter feeders	1.00	1.00	1.00	1.00
Benthic herb. grazers	1.00	1.00	1.00	1.00
Deep macrozoobenthos	1.00	1.00	1.00	1.00
Megazoobenthos	1.00	1.00	1.00	1.00
Shallow macrozoobenthos	1.00	1.00	1.00	1.00
Shrimp	1.00	1.00	1.03	1.19
Large zooplankton	1.01	1.00	1.08	1.01
Deposit feeders	1.00	1.00	1.00	0.99
Macroalgae	1.00	1.00	1.00	1.00
Seagrass	1.00	1.00	1.00	1.00
Carnivorous infauna	1.00	1.00	1.00	1.01
Gelatinous zooplankton	1.00	1.00	0.99	1.00
Large phytoplankton	1.00	1.00	0.99	1.00
Small phytoplankton	1.00	1.00	1.01	1.01
Mesozooplankton	1.00	1.00	0.99	1.00
Microzooplankton	1.00	1.00	1.00	0.97
Pelagic bacteria	1.00	1.00	1.00	0.99
Benthic bacteria	1.00	1.00	1.01	1.00
Meiobenthos	0.99	1.00	0.99	0.99
Labile detritus	1.00	1.00	1.00	1.00
Refractory detritus	1.00	1.00	1.00	0.99

4.13 Long-term Impacts of Setting Harvest Specifications and Management Measures on Protected Species

Setting harvest specifications does not directly affect protected species. Furthermore, an analysis of groundfish trawl logbook data does not reveal any clear relationship between catch limits and fishing effort (see Appendix A). As discussed in Section 3.3.3.3, fishing effort in the shoreside trawl fishery has declined substantially since 2010 while catch generally increased. Equivalent information is unavailable for fixed gear fisheries. Section 3.2.3 reports participation trends in groundfish fixed gear and trawl fisheries during the baseline period. Non-nearshore fishery participation has remained relatively stable while nearshore fishery participation has declined. The trend in effective fishing effort is not directly related to participation, but it is unlikely that fishing effort increased during the baseline period. Over the long term, alternative harvest policies represented by the Amendment 24 alternatives are indistinguishable with respect to the effect on protected species. To the degree that the amount and spatio-temporal distribution of gear-specific fishing effort does not change from historical patterns, adverse impacts to protected species from the groundfish fishery are likely to be equivalent to the historical impacts described in Section 3.5, which serves as a proxy for describing the impacts of the No Action Alternative.

NMFS and USFWS have engaged in Section 7 consultations with respect to the effects of the groundfish fishery on ESA-listed species; Section 3.5.2 summarizes the resulting Incidental Take Statements. Over the long term, exceeding these levels would likely trigger reinitation of the Section 7 consultation and the development of additional measures to ensure takes do not jeopardize the continued existence of listed species.

Marine mammals not listed under the ESA are still protected under the MMPA. Estimated takes of non-ESA-listed marine mammals in groundfish fisheries are unlikely to result in PBR being exceeded if takes are generally similar to what has been experienced during the baseline period. This should allow these species to recover to their OSP levels.

Seabirds not listed under the ESA are incidentally killed in groundfish fisheries. Generally, the level of mortality is negligible with respect to the population status of these species. Black-footed albatross has the highest number of estimated mortalities across observed species (Jannot, *et al.* 2011) and is listed as Vulnerable on the IUCN Red List. Mitigation measures being implemented in fixed gear fisheries based on the USFWS Section 7 consultation for short-tailed albatross are likely to also reduce mortality of this species.

<u>No Action Alternative</u>: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

<u>Alternative 1</u>: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

<u>Alternative 2</u>: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

<u>Alternative 3</u>: There is no information to conclude that protected species takes will differ substantially from the average level of takes during the baseline period. A substantial increase in the level of take would trigger action under applicable law to mitigate any increased take, if necessary.

4.14 Long-term Impacts of Setting Harvest Specifications and Management Measures on Non-groundfish Species

Section 3.6 describes non-groundfish species caught in groundfish fisheries based on WCGOP estimates (Bellman, *et al.* 2013). Over the long-term it is not possible to predict how non-groundfish catch could change, especially since there is no correlation between total catch and non-groundfish catch during the baseline period (2003-2011). Non-groundfish are not targeted and infrequently landed on groundfish directed trips for economic and regulatory reasons. These factors are unlikely to change in the foreseeable future. Therefore, patterns of non-groundfish catch during the baseline period provide the best available information for future catch.

Tribal shoreside and at-sea whiting sectors accounted for 38% of non-groundfish catch. Management measures for these sectors are not directly established as part of the proposed action. Instead, the Federal government, through the Council process, reaches an agreement on the level of catch that will occur in the tribes' usual and accustomed fishing grounds. Non-groundfish catch declined in the shorebased IFQ/trawl sector, which account for the largest proportion of non-groundfish catch in commercial sectors at 28%, over the baseline period from 7.7% (2,240 mt) in 2003 to 3.4% (809 mt) in 2011. The drop in 2011 could be an ancillary effect of trawl rationalization if changes in fishing strategies has an indirect effect on non-groundfish catch. Gear switching could be a factor, because fixed gear fisheries have lower bycatch of non-groundfish. The shorebased IFQ sector is subject to IBQ for Pacific halibut, which is effective in controlling bycatch mortality of this commercially important species

4.14.1 Summary of the Impacts of the Alternatives

No Action Alternative: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

Alternative 1: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

Alternative 2: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

Alternative 3: There is no information to conclude that non-groundfish catch will differ substantially from the average level during the baseline period. Fishery monitoring allows any such change to be detected. Over the long-term, if continuing catch of a non-groundfish species in the groundfish fishery triggered a conservation concern appropriate mitigation measures could be implemented through other Federal/state authorities or pursuant to the Groundfish FMP.

4.15 Cumulative Impacts

A cumulative effects analysis is required by the Council on Environmental Quality (CEQ) (40 CFR part 1508.7). The purpose of a cumulative effects analysis is to consider the combined effects of many actions on the human environment over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful. This Section of the EIS addresses the significance of the expected cumulative impacts as they relate to the federally managed groundfish fishery.

4.15.1 Affected Resources

In Chapter 3 (Description of the Affected Environment) the environmental components affected by the proposed action are identified and described. Therefore, the significance of the cumulative effects will be discussed in relation to those affected environmental components as grouped below:

- Groundfish and (Section 3.1)
- The socioeconomic environment or human communities (Section 3.2)
- Essential fish habitat and (Section 3.3)
- The California Current ecosystem (Section 3.4)

- Protected species (Section 3.5)
- Non-groundfish fish stocks and (Section 3.6)

4.15.2 Geographic Boundaries

The analysis of impacts focuses on actions related to the management unit species in the Groundfish FMP. The geographic scope of the affected resources listed above is EEZ of the states of Washington, Oregon, and California.

4.15.3 Temporal Boundaries

The temporal scope of past and present actions for the affected resources encompasses actions that occurred after FMP implementation (1982) and more specifically during the baseline period, 2003-2012, which is the temporal context within which affected resources are described in Chapter 3. For endangered species and other protected resources, the scope of past and present actions is determined by analysis pursuant to the ESA and MMPA, including biological opinions for the groundfish fishery and marine mammal stock assessment reports. The temporal scope of future actions for all affected resources extends about 10 years into the future. This period was chosen in order to characterize conditions during future biennial management periods for which harvest specifications and management measures will be set. A 10-year time period allows comparisons to made to the 10-year baseline period.

4.15.4 Effects of Past, Present, and Reasonably Foreseeable Future Actions Other than the Proposed Action

A regular cycle of stock assessment, setting harvest specifications, and establishing related management measures allows the Council and NMFS to regularly assess the status of the fisheries and to make necessary adjustments to ensure that there is a reasonable expectation of meeting the objectives of the Groundfish FMP and the Magnuson-Stevens Act, especially the objective of achieving optimum yield. Achieving OY involves monitoring stock characteristics (fishing mortality, recruitment, etc.) and formally assessing stocks where the data are available. The management framework is adaptive such that the receipt of new information informs decisions about setting harvest limits in future years through each biennial harvest specifications cycle. Compliance with this regulatory regime should result in positive long-term outcomes taking into account the cumulative impacts of past, present, and reasonably foreseeable future Federal fishery management actions. Constraining fishing effort through regulatory actions can often have negative short-term socioeconomic impacts. These impacts are usually necessary to bring about long-term sustainability of a given resource, which should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon groundfish stocks.

Past and present actions and their effects are described in Chapter 3. This forms the environmental baseline. The cumulative effect results from the combination of the effects of these past and present actions, reasonably foreseeable future actions, and the proposed action. Ongoing and reasonably foreseeable actions with detectable effects are summarized below. (Note that establishing harvest specifications and management measures for future bienniums is part of the proposed action.)

<u>Fishery Management Related</u>

- <u>Past groundfish harvest specifications and management measures.</u> Past harvest specifications (or misspecifications) contribute to the current status of managed stocks. Management measures directly or indirectly control catch, affecting stock status, fishing opportunity, harvester costs and net revenue, and personal income and employment in fishing communities.

- Review of groundfish essential fish habitat designation and mitigation measures. The Council has completed Phase II of a three-phase review process. Phase I compiled available information on Pacific Coast groundfish habitat associations, fishing activities, prey species, and many other elements of groundfish EFH. During Phase II proposals for revised designations of groundfish EFH and additional mitigation measures were solicited and eight proposals were reviewed and reported on to the Council in November 2013. In Phase III the Council will consider action to amend the components of groundfish EFH.
- The Council's Fishery Ecosystem Plan. The Council is developing measures to protect unfished and unmanaged forage fish species pursuant to an initiative identified in the FEP. This action involves amending all current FMPs to prohibit targeted harvest of specified forage species. These protections could benefit both currently unmanaged fish stocks and managed stocks that depend on forage fish.
- Regulatory adjustments to the trawl rationalization program. Through a series of rulemakings based on Council recommendations, a variety of adjustments to the trawl rationalization program are being implemented. In general, these measures are intended to make rationalized fisheries operate more efficiently and/or clarify the intent of regulations. Measures that have been implemented or are in the rulemaking process include eliminating the prohibition on further quota pound trading after December 15 each year, changing requirements for observer/catch monitor contractors, and establishing fees to recover costs of the program as required by the MSA. Future measures include establishing a common start date for the Pacific whiting season for all sectors and allowing a vessel to be registered to permits with both trawl and fixed gear endorsements and user the resulting combined limit. The Council is also developing a regulatory package to allow electronic monitoring as an alternative to human observers. Beginning in 2014, the Council will prioritize the development of all new management measures not implemented through the biennial process. The first of these "omnibus" considerations is scheduled for the June 2014 Council meeting. This will create a useful inventory of external fishery related actions.
- Seabird avoidance measures. A regulatory package to implement requirements from the Section 7 consultation for short-tailed albatross is currently in development.
- Regulation of fisheries for species other than groundfish. Other fisheries contribute to mortality of environmental components also affected by groundfish fisheries, particularly protected species. (Catch of groundfish in nongroundfish fisheries is regulated and accounted for through the biennial management process and therefore directly affected by the proposed action.) Adverse impacts from other gear types may also combine with impacts to EFH from groundfish gear. Fishery removals from all sources also have long-term effects on the trophic structure of the California Current ecosystem.

Not Related to Fishing

- Water pollution. A variety of activities introduce chemical pollutants and sewage and cause changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment. Although these activities tend to affect nearshore waters, they adversely impact identified affected biological resources if a substantial part of their life cycle occurs in these waters. Examples of these activities include, but are not limited to, agriculture, port maintenance, coastal development, marine transportation, marine mining, dredging, and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources.
- Other authorities to conserve biological resources considered in this EIS. The MSA (50 CFR 600.930) imposes an obligation on other Federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH. NMFS also reviews certain activities that

are regulated by Federal, state, and local authorities causing adverse effects to the marine environment through processes required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The jurisdiction of these activities is in “waters of the U.S.” and includes both riverine and marine habitats. under the Fish and Wildlife Coordination Act (Section 662) agencies must consult with the USFWS over certain activities affecting freshwater habitats. This Act provides another avenue for review of actions by other Federal and state agencies that may impact resources that NMFS manages. NMFS and the USFWS share responsibility for implementing the ESA. Activities that may jeopardize the continued existence of a species listed under the Act may be regulated directly and through the designation of critical habitat for such species. This provides a way for NMFS to review actions by other entities that may impact endangered and protected resources whose management units are under NMFS’ jurisdiction.

- Cyclical and ongoing climate change. Sections 3.4.5 (System Forcing and Climate Change), 3.4.6 (Implications of Climate Change for Groundfish Fisheries), and 3.4.7 (Baseline Status of the California Current Ecosystem) describe the effects of climate on ecosystem components. Cyclical phenomena include ENSO, PDO, and NGPO. As noted in Section 3.4.6, range shifts of target species may cause the biggest climate change related impact on fisheries

Sections 4.15.4.1 through 4.15.4.6 discuss the effects of these actions on the environmental components evaluated in this EIS. **Error! Reference source not found.**, below, summarizes the effects of these past, present, and reasonably foreseeable future actions on the environmental components evaluated in this EIS.

4.15.4.1 Groundfish Stocks

Past groundfish harvest specifications and management measures. Misspecification of catch limits and management error resulted in overfishing and overfished stocks, primarily rockfish species. Improvements in stock assessment methods and the management system have ended almost all overfishing since the beginning of this century. Rebuilding plans have been implemented and overfished stocks’ stock sizes are increasing. The OFL has been exceeded occasionally for some stocks but not persistently enough (e.g., more than once in four years) to require broad reevaluation of the management system. The OFL contribution for some stocks managed in complexes may have been exceeded.

Review of groundfish essential fish habitat designation and mitigation measures. Mitigation measures that reduce adverse impacts to EFH may result in increased stock productivity.

The Council’s Fishery Ecosystem Plan. Forage fish protection measures may have a marginal effect on maintaining stock abundance of pretty species for piscivorous groundfish. The Council has more information to inform management decision-making through Annual State of the Ecosystem reports.

Regulatory adjustments to the trawl rationalization program. Since these adjustments primarily focus on program efficiency and reducing harvester costs they will have negligible impacts on groundfish stock status.

Seabird avoidance measures. These measures have negligible impacts on groundfish stock status.

Regulation of fisheries for species other than groundfish. These measures

Water pollution. Impacts are localized in nearshore areas and marine project areas where they occur. Therefore, water pollution has negligible impacts on groundfish stock status.

Other authorities to conserve biological resources considered in this EIS. These authorities do not affect groundfish management and therefore have negligible impacts on groundfish stock status.

Cyclical and ongoing climate change. Warm water phases in cyclical climate phenomena decreases the productivity of many groundfish stocks. Climate change may lead to range shifts decreasing local abundance of groundfish.

4.15.4.2 Socioeconomic Environment

Past groundfish harvest specifications and management measures. Implementation of stock rebuilding measures in the late 1990s caused a substantial decline in fishing opportunity and ex-vessel revenue.

Review of groundfish essential fish habitat designation and mitigation measures.

The Council's Fishery Ecosystem Plan. This initiative could potentially have negative short-term socioeconomic impacts if actions taken to protect forage species and unmanaged species resulted in reduced harvest opportunity for managed species.

Regulatory adjustments to the trawl rationalization program.

Seabird avoidance measures. These measures impose modest capital costs on fixed gear vessels to install tori lines and may increase operational costs modestly for these vessels.

Regulation of fisheries for species other than groundfish. Management regulations for other fisheries will have negligible impacts on groundfish ex-vessel revenue but may affect total revenue accruing to fishing communities.

Water pollution. Nearshore water quality has negligible impacts on groundfish stock productivity and therefore is unlikely to affect ex-vessel revenue.

Other authorities to conserve biological resources considered in this EIS. Reinitiation of Section 7 consultations for ESA-listed species affected by the groundfish fishery could result in additional reasonable and prudent measures and terms and conditions. These measures could reduce fishing opportunity and/or increase operational costs. Since there is no information to suggest that the operation of the groundfish fishery will change substantially in the foreseeable future, it is unlikely that groundfish fisheries would impose substantially higher takes on listed species; the same is true for marine mammals and seabirds not listed under the ESA. However, other external factors (e.g., water pollution, climate change) could affect population productivity, changing the assessment of the contributory impacts of the groundfish fishery.

Cyclical and ongoing climate change. Over the very long term (>10 years), sea level rise and changes in storm activity could increase costs for maintaining and/or replacing fishery-related infrastructure in fishing communities. If infrastructure is not maintained/replaced in a port, fishery landings would be made elsewhere, reducing income in the affected port.

4.15.4.3 Essential Fish Habitat

Past groundfish harvest specifications and management measures. Groundfish Conservation Areas, which are closed to specified gear types to reduce bycatch of overfished species, have been implemented through the harvest specifications process beginning in 2003. EFH may have recovered from the adverse impacts of fishing in areas continuously closed to fishing for sufficient time. The length of time needed depends on habitat type and gear type (see Section 3.3.1). As discussed in Section 3.3.3.2, NMFS has indicated that any decision to change the configurations of GCAs that would open areas of potentially recovered habitat would need sufficient rationale and likely could not occur until the current review process is completed. This will have continued positive impacts on EFH.

Review of groundfish essential fish habitat designation and mitigation measures. The current review could result in the Council adopting additional mitigation measures to address the adverse impacts of fisheries on EFH. The Council is scheduled to initiate an FMP amendment process for this purpose in the second half of 2014. It may be several years before any such amendment is finalized.

The Council's Fishery Ecosystem Plan. One of the initiatives identified consequent of the FEP is a cross-FMP EFH initiative. The concept is to "identify habitat areas that are considered highly productive or biodiverse under more than one FMP" and coordinate mitigation measures. However, the Council has not yet scheduled any action related to this initiative so it is not reasonably foreseeable.

Regulatory adjustments to the trawl rationalization program. These regulatory changes by and large have negligible effects on EFH except for proposed regulations to define chafing gear on midwater trawl codends. The draft EA for this action concludes that it will result in "a minimal increase in contact with benthic habitat as the result of additional chafing gear coverage, particularly relative to soft bottom and minimal to no increase in contact with hard bottom."

Seabird avoidance measures. These measures do not affect fisheries in a way that would change the level of adverse impacts to EFH from fishing.

Regulation of fisheries for species other than groundfish. Other gear types have negligible to no impact on groundfish EFH. Regulatory changes for other fisheries is unlikely to affect groundfish EFH.

Water pollution. Water pollution has localized adverse impacts to groundfish EFH, for example in estuaries (designated as a habitat area of particular concern).

Other authorities to conserve biological resources considered in this EIS. As described above, NMFS has several means under which it can review non-fishing actions of other Federal or state agencies that may impact NMFS' managed resources and the habitat on which they rely prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of direct and indirect negative impacts those actions could have on habitat utilized by resources under NMFS' jurisdiction.

Cyclical and ongoing climate change. The way in which climate forcing will affect EFH is not well understood. Effects will depend on the location of EFH and changes in climate forcing vectors such as water temperature and chemistry, currents, and upwelling.

4.15.4.4 California Current Ecosystem

Past groundfish harvest specifications and management measures. As discussed in Section 3.4.3, simulation indicates that past groundfish harvests have had substantial direct effects on managed groundfish stocks but modest indirect effects on other components of the ecosystem.

Review of groundfish essential fish habitat designation and mitigation measures. Groundfish EFH is also habitat for other benthic biota ranging from interstitial microorganisms to sponges and corals. The Atlantis simulation described in Section 4.11 did not take into account adverse impacts to EFH.

The Council's Fishery Ecosystem Plan. The purpose of the FEP is to enhance the Council's species-specific management programs with more ecosystem science, broader ecosystem considerations, and management policies that coordinate Council management across its Fishery Management Plans and the California Current Ecosystem. To the degree this purpose is met, the FEP may have a marginal positive effect on the CCE as measured by the indicators described in Section 3.4.3. However, as discussed in that section and Section 4.12, the range of harvest policies likely to be implemented by the Council do not result in substantial indirect impacts as measured through model simulation.

Regulatory adjustments to the trawl rationalization program. These changes have a negligible effect on the CCE. Even if increased program efficiency allows higher attainment of allocations, Atlantis simulation suggests that substantially higher harvest would be necessary to result in more than negligible changes in ecosystem indicators.

Seabird avoidance measures. Abundance of marine mammals and seabirds is one of the metrics used in the Atlantis CCE Model evaluation of harvest specifications policies (Section 4.12). This implies that greater abundance is a positive ecosystem attribute. The seabird avoidance measures are intended to reduce the mortality of seabirds in fixed fisheries and thus would have a positive impact on the CCE.

Regulation of fisheries for species other than groundfish. As noted in Section 3.4.3, simulation results suggest that CPS purse seine fisheries have substantial indirect effects on CCE attributes. A substantial change in current harvest policies would be necessary to produce a discernible change in ecosystem attributes.

Water pollution. As already noted, relative to the fishery management area, pollution is concentrated in relatively small areas generally along the coastline closest to terrestrial sources. Therefore, pollution has a relatively marginal effect on the ecosystem of affected resources.

Other authorities to conserve biological resources considered in this EIS. As noted above, these authorities may have a small effect on the overall quality of marine habitats. To the degree that these improvements contribute to the productivity of component organisms, there may be a marginal benefit to the CCE.

Cyclical and ongoing climate change. Cyclical changes have transient effects on the productivity of constituent organisms and thus CCE structure. These variations may be considered part of the baseline. Climate change is likely to have moderate to severe impacts on CCE structure.

4.15.4.5 Protected Species

Past groundfish harvest specifications and management measures. Past fishery management actions taken through the FMP process have had a positive cumulative effect on ESA-listed and MMPA-protected species through the reduction of fishing effort (potential interactions) and implementation of gear requirements.

Review of groundfish essential fish habitat designation and mitigation measures. Mitigation measures adopted through this review process that restrict fishing by area would reduce the likelihood of fishery interactions with protected species in those areas.

The Council's Fishery Ecosystem Plan. There are no initiatives stemming from the FEP likely to change fishery interaction rates with protected species.

Regulatory adjustments to the trawl rationalization program. There is no information to determine how these changes may affect overall fishing effort or interaction rates. Establishing a common start date for all Pacific whiting fishery sectors takes into account minimizing Chinook salmon bycatch. To the degree that measures to increase operational efficiency allow harvesters to increase CPUE there may be a marginal beneficial impact.

Seabird avoidance measures. These measures will have direct positive impacts by reducing mortality of seabirds in fixed gear fisheries.

Regulation of fisheries for species other than groundfish. Other fisheries also take protected species and therefore contribute to cumulative effects in terms of total mortality. The cumulative effects analysis in relevant biological opinions (NMFS 2006; NMFS 2012a) contain detailed information on these other sources of mortality (see Section 3.5.2).

Water pollution. Of the ESA-listed species likely to be adversely affected by the proposed action (see Section 3.6.2), Chinook salmon, eulachon, and green sturgeon reside or transit coastal and estuarine waters where pollution from terrerestrial sources may be locally concentrated. These species may be adversely affected. The biological opinion (NMFS 2012a) identifies the adverse impact of water pollution on green sturgeon prey resources.

Other authorities to conserve biological resources considered in this EIS. NMFS authority under the ESA (and USFWS authority for seabirds) directly affects prosecution of the groundfish fishery so that it does not jeopardize the continued existence of any listed species. Permitting of activities under the MMPA is intended to achieve optimal sustainable population levels for marine mammals for both ESA-listed and non-listed marine mammals.

Cyclical and ongoing climate change. As with other biological resources climate change is likely to affect population productivity and occurrence. Effects may be beneficial or adverse depending on the species and its requirements. The net effect of climate change on protected species cannot be predicted.

4.15.4.6 Non-groundfish Species

Past groundfish harvest specifications and management measures. Biennial specifications and management measures generally have not regulated the catch of non-groundfish species except for Pacific halibut, but have affected fishing opportunity and behavior, which may indirectly affect bycatch of these species. Catch of these species is monitored the effect on population abundance is negligible.

Review of groundfish essential fish habitat designation and mitigation measures. Any benefit from the development of additional mitigation measures could benefit non-groundfish species that also depend on groundfish EFH.

The Council's Fishery Ecosystem Plan. No initiatives are identified that address bycatch.

Regulatory adjustments to the trawl rationalization program. None of these measures are likely to materially affect non-groundfish bycatch.

Seabird avoidance measures. These measures are not likely to materially affect bycatch of non-groundfish, because they are intended to be minimally disruptive to fishing operations.

Regulation of fisheries for species other than groundfish. Non-groundfish species with directed fisheries are managed under other Council FMPs, other Federal authorities, or state authority (e.g., Dungeness crab, Pacific halibut, Pacific sardine, salmon, squid; see Table 3-36). For those species catch in groundfish fisheries is generally accounted for when determining catch limits and management measures for target fisheries.

Water pollution. As discussed for other biological resources, water pollution could adversely affect species that occur in coastal or estuarine areas where pollution levels are elevated.

Other authorities to conserve biological resources considered in this EIS. These authorities (habitat protection, measures pursuant to the ESA) are likely to have negligible effect on protected species bycatch, given how indirectly they would affect productivity of non-groundfish populations.

Cyclical and ongoing climate change. As with other biological resources, climate change could positively or negatively affect non-groundfish population productivity and occurrence. The overall effect cannot be predicted.

4.15.5 Summary of the Direct and Indirect Effects of the Proposed Actions

This section briefly summarizes the direct and indirect effects of the proposed actions evaluated in this DEIS. The Council considered changes to the slope rockfish stock complexes but decided not to make a change and address the underlying conservation concern (high catches of rougheye and shortraker rockfish relative to their contributing OFLs) that are described in Section 2.5. The Council's preferred alternative was not to take this action but instead establish a sorting requirement and inseason management measures to better monitor and control catch of these stocks. The Council also reorganized the Other Fish complex by reducing it to three stocks, cabezon in Washington, kelp greenling, and leopard shark. The other stocks in this complex are either designated separate stocks to be managed with their own specifications or as ecosystem component species, which are monitored but not actively managed. These changes are expected to have both short-term and long-term positive effects in terms of better attaining management objectives.

The evaluation of the Amendment 24 proposed action considers the long-term impacts of setting harvest specifications and management measures through the biennial process. As discussed in Chapter 1, "long-term" is generally considered to be 10 years although in specific contexts (e.g., California Current ecosystem) effects are better discerned in simulation over 25-30 years.

4.15.5.1 2015-2016 Biennial Harvest Specifications Including Changes to the Other Fish Complex and Designation of EC Species

Groundfish Stocks (Section 4.1): For stocks whose status is known, none are projected to decline from a higher status to a lower one (healthy to precautionary zone, precautionary zone to overfished) during the 2015-2016 period. Petrale sole is projected to achieve target biomass and be declared rebuilt during the 2015-2016 period. Changes to the Other Fish complex and designation of EC species will allow more effective monitoring and stock specific management for more stocks. The proposed action has overall positive effects on groundfish stocks.

Management Measures (Section 4.2): Management measures are projected to keep catches below ACLs while maximizing fishing opportunity within this constraint.

Socioeconomic Environment (Section 4.3): Total projected ex-vessel revenue under the preferred alternative is expected to increase by $16 million in 2015 and $19.3 million from annual average revenue during the baseline period. The proposed action has an overall positive effect on the socioeconomic environment.

Essential Fish Habitat (Section 4.4): Bottom trawl gear has greater adverse impacts to EFH compared to other gear types, although fixed gear is more readily deployed on rocky habitats that have slower recovery times from the adverse effects of fishing. The amount and spatiotemporal distribution of fishing effort are the primary impact mechanisms. While fishing opportunity under the preferred alternative (measured by projected landings) is forecast to increase by about 10% from No Action, recent historical data suggest that CPUE in the bottom trawl fishery has also been increasing. Furthermore, there is scant evidence in historical data for a direct correlation between increased fishing opportunity (measured by ACLs) and changes in fishing effort. Under the action alternatives the seaward boundary of the trawl RCA between 40°10 N. lat. and 48°10' N lat. would be changed from 200 to 150 fathoms. This area may contains regions where EFH has recovered from the adverse effects of trawl gear. Given this uncertainty and the fact that no major regulatory changes affecting the operational characteristics of the groundfish fishery are reasonably foreseeable, it is likely that the effect of the proposed action will be mixed.

California Current Ecosystem (Section 4.5): Harvest policies are likely to result in catches within the range of historical catch and not result in substantial indirect effects as measured by ecosystem indicators. It is likely that the effects of the proposed action will be neutral.

Protected Species (Section 4.6): Harvest specifications and management measures are projected to result in higher catches compared to No Action and baseline levels. As noted above, catch levels and resulting fishing effort are insufficiently correlated to predict that the proposed action would increase fishery interactions with protected species. Given this uncertainty and the fact that no major regulatory changes affecting the operational characteristics of the groundfish fishery are anticipated, it is likely that the effect of the proposed action will be neutral.

Non-groundfish Species (Section 4.7. There is no information to indicate that bycatch of non-groundfish species will differ from baseline levels. It is likely that the effects of the proposed action will be neutral.

4.15.5.2 Amendment 24

Groundfish Stocks (Section 4.8): The proposed action has overall neutral effects on groundfish stocks.

Management Measures (Section 4.9): Over the long term, only adjustments of routine management measures are considered. The objective of routine management measures is to control catch so that catches do not exceed ACLs. Management measures are not an affected environmental component but rather an impact mechanism intermediate between stock conservation objectives (reflected by ACLs) and ultimate impacts on the environmental components evaluated in other sections of the EIS

Socioeconomic Environment (Section 4.10): Ex-vessel revenue is a function of fishing opportunity determined by catch limits and related management measures, technical factors (e.g., the ability of harvesters to catch target species while avoiding species with low ACLs), and market demand. For many stocks recent average catch represents the low end of 10-year projections. Harvest policies have a relatively modest effect on catch limits compared to variability in stock productivity, which is outside the control of management. External factors, primarily trawl rationalization, may lead to more agglomeration with a larger proportion of landings in fewer ports. The proposed action has overall neutral effects on the socioeconomic environment.

Essential Fish Habitat (Section 4.11): The amount and spatiotemporal distribution of fishing effort are the primary impact mechanisms for the proposed action on EFH. As discussed above, over the long term stock productivity has a much larger influence on fishing opportunity compared to harvest policies. Catch levels and resulting fishing effort are insufficiently correlated to predict that the proposed action would increase the level of adverse impacts to EFH from fishing. Given this uncertainty and the fact that no major regulatory changes affecting the operational characteristics of the groundfish fishery are reasonably foreseeable, it is likely that the effect of the proposed action will be neutral.

California Current Ecosystem (Section 4.12): Harvest policies are likely to result in catches within the range of historical catch and not result in substantial indirect effects as measured by ecosystem indicators. It is likely that the effects of the proposed action will be neutral.

Protected Species (Section 4.13): The amount and spatiotemporal distribution of fishing effort are the primary impact mechanisms for the proposed action on protected species. As discussed above, over the long term stock productivity has a much larger influence on fishing opportunity compared to harvest policies. Catch levels and resulting fishing effort are insufficiently correlated to predict that the proposed action would increase fishery interactions with protected species. Given this uncertainty and the fact that no major regulatory changes affecting the operational characteristics of the groundfish fishery are reasonably foreseeable, it is likely that the effect of the proposed action will be neutral.

Non-groundfish Species (Section 4.14). There is no information to indicate that bycatch of non-groundfish species will differ from baseline levels. It is likely that the effects of the proposed action will be neutral.

4.15.6 Magnitude and Significance of Cumulative Effects

In determining the magnitude and significance of the cumulative effects, the additive and synergistic effects of the proposed action, as well as past, present, and future actions, must be taken into account. This analysis of total cumulative effects considers: (1) impacts from past and present actions, forming the environmental baseline; PLUS (2) reasonably foreseeable future actions; PLUS (3) impacts from the proposed action and alternatives.

Table 4-196 summarizes the combined effects of past, present and reasonably foreseeable future actions other than the proposed action and alternatives (summarized above) affecting the environmental components evaluated in this EIS. Table 4-197 summarizes the conclusions made above on the impacts of past, present, and reasonably foreseeable actions when combined with the impacts of the proposed actions. Based on these assessments the magnitude and significance of cumulative effects are determined.

Groundfish: Positive cumulative effect, because 2015-2016 harvest specifications and management measures and long-term harvest policies are intended to return or maintain stocks at levels at or above their target biomass levels. There is a risk that catch limits could be mis-specified and/or that management measures to not prevent ACLs from being exceeded. Because of precautionary reductions built into the management framework the likelihood that overfishing will occur is low. Over time catch data systems and stock assessment techniques are improving, lessening the likelihood of mis-specification and/or overfishing.

Socioeconomic Environment: Mixed cumulative effect, because 2015-2016 harvest specifications and management measures are forecast to result in increased ex-vessel revenue. Over the long term it is likely that year-on-year declines in ex-vessel revenue due to changes in target stocks yield outside of the management system. However, there is no information indicating that year-to-year revenue volatility will exceed baseline variability. External factors (trawl rationalization) could lead to greater agglomeration and ex-vessel revenue being concentrated in fewer fishing communities.

Essential Fish Habitat: Positive cumulative impact, because external actions (existing EFH protections, EFH review process) have implemented and may lead to additional measures to mitigate the adverse impacts of fishing on groundfish EFH. Changes to RCA configurations will be evaluated for potential effects on groundfish EFH that has recovered from the adverse effects of fishing.

California Current Ecosystem: Neutral, because Atlantis California Current Ecosystem Model simulations indicate that harvest policies would not result in substantial changes as measured by ecosystem indicators. External factors (climate change) could result in adverse effects, such as range shifts and changes in physical dynamics of the system (water temperature, pH, currents, upwelling) but the nature and magnitude of these effects cannot be precisely predicted.

Protected Species: Positive, because external actions (ESA Section 7 consultations, MMPA permitting) evaluates cumulative impacts and identifies mitigation measures, which may be required. Most protected species populations affected by the proposed actions are recovering.

Non-groundfish Species: Neutral, because no substantial change in bycatch of non-groundfish species is expected either from short-term (2015-2016) or long-term (Amendment 24) management of the groundfish fishery. Bycatch of non-groundfish species in negligible compared to target catch of non-groundfish species or stock yield where known.

Table 4-196. Summary effects of past, present and reasonably foreseeable future actions on the environmental components evaluated in this EIS.

Environmental Component	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Groundfish Stocks	**Mixed** Most stocks above or near target biomass; however, some stocks remain overfished	**Positive** The current management framework is effective in rebuilding stocks to the target biomass and achieving optimum yield	**Positive** No actions are identified that would reduce the effectiveness of the management framework	**Mixed** No actions are identified that would reduce the effectiveness of the management framework; however misspecification of catch limits and management error could occur; climate change may reduce local abundance
Socioeconomic (Human Communities)	**Mixed** Fishery resources have supported profitable industries but management measures associated with stock rebuilding have curtailed fishing opportunities; trawl rationalization increased operational flexibility	**Mixed** Stock status and yield have allowed fishery revenues to increase; falling participation and agglomeration may concentrate revenues in fewer communities	**Positive** No actions are identified that would accelerate falling participation and agglomeration	**Mixed** Stock status and yield have allowed fishery revenues to increase; falling participation and agglomeration may concentrate revenues in fewer communities
Essential Fish Habitat	**Positive** Evidence suggests that trawl fishing effort is falling; past actions have mitigated adverse effects of fishing on EFH	**Mixed** Trawl fishing effort stable; ongoing actions continue to mitigate adverse effects of fishing on EFH; Trawl RCA boundary change proposed	**Positive** Trawl fishing effort not likely to increase; future actions likely to enhance the mitigation of adverse effects of fishing on EFH	**Positive** Trawl fishing effort not likely to increase; future actions likely to enhance the mitigation of adverse effects of fishing on EFH
California Current Ecosystem	**Mixed** Based on simulations, the development of fisheries has had both positive and negative indirect effects on ecosystem attributes	**Neutral** Ongoing prosecution of fisheries at current levels not expected to change ecosystem attributes from the baseline; other actions likely have negligible impacts	**Mixed** Ongoing prosecution of fisheries at current levels not expected to change ecosystem attributes from the baseline; climate change likely to have moderate to severe impacts	**Mixed** Ongoing prosecution of fisheries at current levels not expected to change ecosystem attributes from the baseline; climate change likely to have moderate to severe impacts

Environmental Component	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Protected Species	**Mixed** Protected species take modest in groundfish fisheries and documented through observer program; requirements of ESA, MMPA and OAL implemented	**Positive** Most populations increasing; ESA and MMPA mitigation addressed and ongoing	**Positive** Most populations increasing; future adverse effects likely to be addressed through ESA and MMPA	**Positive** Most populations increasing; adverse effects likely to be addressed through ESA and MMPA
Non-groundfish Species	**Neutral** Bycatch in groundfish fisheries is negligible	**Neutral** Bycatch in groundfish fisheries is negligible	**Neutral** Bycatch in groundfish fisheries is negligible	**Neutral** Bycatch in groundfish fisheries is negligible

Table 4-197. Summary of the cumulative effects of the proposed actions.

Affected Resources	Baseline*	Past, Present, and Reasonably Foreseeable Future Actions	2015-2016 Harvest Specifications and Management Measures	Amendment 24 Proposed Action	Cumulative Effects
Groundfish Stocks	Positive (Section 3.1)	Mixed	Positive	Neutral	Positive
Human Communities	Mixed (Section 3.2)	Mixed	Positive	Neutral	Mixed
Essential Fish Habitat	Positive (Section 3.3)	Positive	Mixed	Neutral	Positive
California Current Ecosystem	Neutral (Section 3.4)	Mixed	Neutral	Neutral	Mixed
Protected Species	Positive (Section 3.5)	Positive	Neutral	Neutral	Positive
Non-Groundfish Stocks	Neutral (Section 3.6)	Neutral	Neutral	Neutral	Neutral

*Although the temporal scope of past and present actions for the affected resources encompasses actions that occurred after FMP implementation (1982) the baseline period is 2003-2012, the temporal context within which affected resources are described in Chapter 3.

Impact Definitions for Table 4-196 and Table 4-197:

- Positive
  - Groundfish Stocks, Non-groundfish Species, Protected Species: actions that increase stock size
  - Essential Fish Habitat: actions that improve or reduce disturbance of habitat
  - California Current Ecosystem: actions that do not substantially change ecosystem indicators (see Section 3.4.3 for a description of indicators used with the Atlantis CCE Model)
  - Socioeconomic (Human Communities): actions that increase revenue and wellbeing of fishermen and/or associated businesses
- Mixed: Both positive and negative effects that are not offsetting
- Neutral: Positive and/or negative effects are negligible or positive and negative effects are offsetting
- Negative
  - Groundfish Stocks, Non-groundfish Species, Protected Species: actions that decrease stock size
  - Essential Fish Habitat: actions that degrade or increase disturbance of habitat
  - Socioeconomic (Human Communities): actions that decrease revenue and wellbeing of fishermen and/or associated businesses

Chapter 5 CONSISTENCY WITH THE GROUNDFISH FMP AND MSA NATIONAL STANDARDS

5.1 FMP Goals and Objectives

The Groundfish FMP contains 3 broad goals and 17 objectives intended to achieve those goals. Past EISs for rebuilding plans and harvest specifications describe how the actions address each objective. The proposed actions evaluated in the current EIS address the goals and objectives in a similar fashion as described in the previous groundfish harvest specifications EISs.

5.2 National Standards

An FMP or plan amendment and any pursuant regulations must be consistent with ten national standards contained in the MSA (§301). These are:

National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the United States fishing industry.

The harvest specification action alternatives are consistent with the OY harvest management framework described in Chapter 4 of the Groundfish FMP. FMP Chapter 4 describes OY as "a decisional mechanism for resolving the Magnuson Stevens Act's multiple purposes and policies, implementing an FMP's objectives and balancing the various interests that comprise the national welfare." The OY harvest management framework (as revised by Amendment 23 to the Groundfish FMP) is consistent with revised National Standard 1 Guidelines. The OFL is the estimate of catch level above which overfishing is occurring, or the estimate of MFMT applied to a stock's abundance. The ABC is a level of annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty. Chapter 4 in the Groundfish FMP describes an ABC control rule, ABC values described in this document were determined following that control rule. The ACL is the level of annual catch that serves as the basis for invoking Accountability Measures. The ACL may equal but may not exceed the ABC. The ACL may be set lower than the ABC to account for a wide range of factors. The application of the OY harvest management framework to the specifications described in this document should result in ACLs that reduce the likelihood of overfishing.

The revised National Standard 1 guidelines set forth principles on which stock complexes should be organized, including that stocks within a complex should be similar in terms of geographic distribution, life history, and vulnerability to the fishery. Changes to the Shelf Rockfish and Other Fish stock complexes were considered as part of the proposed action. The Council determined that reorganizing the Shelf Rockfish complexes, by removing rougheye and blackgill rockfish and creating a coastwide complex is not the most effective way to address current conservation concerns. Instead, increased monitoring coupled with inseason management changes, if necessary, are proposed. The Other Fish stock complex is reduced to three stocks that share greater similarity in terms of life history and fishery susceptibility. Spiny dogfish is removed and managed with its own ACL to address conservation concerns with catch of this species. Other species are designated EC species, because active management is unnecessary but monitoring of their catch will continue.

Because of past overfishing seven groundfish stocks are currently declared overfished. Widow rockfish was determined to be rebuilt in 2011 and will no longer be managed under a rebuilding plan beginning in 2013. Petrale sole was declared overfished in 2010 based on a revision to the OY harvest management framework that incorporates estimates of B_{MSY} of $B_{25\%}$ and MSST of $B_{12.5\%}$ for flatfish. Petrale sole is estimated to be rebuilt in 2015, but will be managed under its rebuilding plan for the 2015-16 biennial cycle. The rebuilding plan species the 25-5 precautionary reduction from the ABC to set the rebuilding ACL.

The remaining overfished species will be managed under the current rebuilding plan SPR harvest rate. The Council will choose a new target year for cowcod but has established a precautionary ACL of 10 mt associated with a median rebuilding year of 2020. Catches will be managed to a 4 mt ACT in recognition of uncertainty about current stock assessment results.

Section 304(e) introduces a tradeoff formulated as specifying a time to rebuild "as short as possible, taking into account the status and biology of any overfished stocks, the needs of fishing communities, … and the interaction of the overfished stock of fish within the marine ecosystem…" The proposed action is evaluated based on these considerations in Chapter 4 of this EIS.

National Standard 2 states that conservation and management measures shall be based on the best scientific information available.

The best available science standard applies to the following areas in relation to this proposed action: stock assessments, rebuilding analyses, and methods for determining management reference points (OFL, ABC, ACL, etc.), which forms the basis for determining harvest levels, and the evaluation of socioeconomic impacts. The supporting science is discussed below.

The harvest specifications (specifically, ACLs) considered under the proposed action (the action alternatives, including the Preferred Alternative), are based on the most recent stock assessments, developed through the peer-review STAR process. As part of the management cycle the Council recommends which stocks should be assessed in advance of current decision-making. Only a small proportion of the 80+ managed groundfish species are regularly assessed, because of a combination of factors. For many stocks there may not be enough data to support a full assessment (the FMP describes a classification system based on the availability of data). For unassessed stocks proxy methods must be used to determine reference points. Stocks may be subjected to little or no fishing pressure, or determined to have low vulnerability, and thus less in need of regular assessment. Finally, there is a limit on the institutional resources needed to carry out the assessments (i.e., fishery scientists). In some cases a previous assessment may be updated; this means that the underlying model is not reevaluated but the model is re-run with the addition of more recent data from the period since the last full assessment. The 2014 Groundfish SAFE document reviews the basis for alternative harvest specifications and references the stock assessments that were used. It also describes the methods that were used to determine reference points for harvest specifications (OFL, ABC, ACL, etc.) for stocks and stock complexes.

The No Action Alternative specifications do not benefit from the new assessments and updates conducted as part of the current management cycle. For those stocks No Action does not represent the best available science.

The NWFSC has developed a model application, called IO-Pac, for estimating personal income impacts of commercial fishing on the west coast. This model is documented in Appendix A.

National Standard 3 states that, to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

Groundfish ACLs are set for management units, which include stocks, stock complexes, or geographic subdivisions thereof. Stock complexes group co-occurring species, many of which have not been formally assessed. The 2014 Groundfish SAFE document describes how ACLs for stock complexes are developed based on ABC estimates of component stocks. Stocks within these complexes are not managed individually for a variety of reasons including the lack of assessments, lack of reliable catch data at the species level, or they constitute a small portion of catches. If a stock within a complex is individually assessed it may be managed under a separate harvest limit, when practicable.

Stocks with their own ACLs are managed throughout the range of that stock (as opposed to the species), although issues do arise in the case of stocks straddling international borders. For this reason, allocation of the harvestable surplus of Pacific whiting between the U.S. and Canada is subject to international agreement.

Separate ACLs may be set for geographic subcomponents of a stock for management purposes. However, the development of subcomponent ACLs is based on managing these stocks throughout their range within U.S. waters. As part of the proposed action the Council is considering a change in the scope of subcomponent ACLs for lingcod that would better reflect biological and fishery characteristics. Currently lingcod is managed in two area components, north and south of 42° N. lat.. Under the proposed action the dividing line would be moved to 40°10’ N. lat., near Cape Mendocino. Cape Mendocino is a biogeographic boundary and as such 40°10’ N. lat. is commonly used in groundfish fishery management for the differential application of management measures.

National Standard 4 states that conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishers, such allocation shall be (A) fair and equitable to all such fishers; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The proposed measures will not discriminate between residents of different states.

Allocation decisions are also made as part of the biennial harvest specifications process for those stocks for which formal allocations have not been established under the FMP. Section 4.2 describes these allocation decisions. Emphasis is placed on equitable division while ensuring conservation goals. Decision-making on these allocations occurs through the Council process, which facilitates substantial participation by state representatives. Generally, state proposals are brought forward when alternatives are crafted and integrated to the degree practicable.

National Standard 5 states that conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

Measures have been taken to reduce fishing capacity in the limited entry trawl fleet and nontrawl fleets, including: fixed gear permit stacking program implemented by FMP Amendment 14, the trawl vessel buyback program, and catch share management implemented by FMP Amendment 20. Reducing excess capacity is expected to improve the efficiency in the utilization of fishery resources as well as reduce the levels of incidental catch.

Catch share management in the at-sea whiting sectors and the shorebased IFQ fishery promote efficiency of utilization by reducing regulatory discards. Vessels in these fisheries are subject to 100 percent observer coverage, which improves catch accounting.

National Standard 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

Management measures reflect differences in catch, and in particular bycatch, of overfished species, among different fisheries. For example, different RCA configurations are established for different gear types (trawl versus fixed gear) and the catch control tools also differ. For example, at-sea whiting fisheries are managed by co-ops, the shorebased IFQ fishery by IFQs, and limited entry fixed gear fishery for sablefish by vessel-level allocations (permit stacking). Within these fisheries and in the open access sector cumulative trip limits are used for particular management units and/or during certain times of the year. Recreational fisheries are managed with area closures and bag limits proposed by the states and appropriate to the catches and characteristics of each state's recreational fishery.

National Standard 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

Generally, by coordinating management, monitoring, and enforcement activities between the three west coast states, duplication, and thus cost, is minimized. Appendix B evaluates proposed management measures in detail, including consideration of associated costs and duplication.

National Standard 8 states that conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), … take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

This document evaluates the effects of the alternatives on fishing communities (see section 4.3). These effects were taken into account in choosing the preferred "integrated alternative" (incorporating harvest specifications and related management measures). The alternatives are structured to allow a comparison of the tradeoffs between the requirements of the MSA. The requirements in Section 304(e)(4)(A) of the MSA include rebuilding overfished stocks in as short a time possible, taking into account the needs of fishing communities, and minimizing adverse economic impacts to fishing communities. Each integrated alternative contains a suite of ACLs for overfished species associated with a particular rebuilding strategy (target year and harvest rate) and management measures needed to constrain catches to these harvest levels. Target species catch for each alternative is projected based on these management measures, which allows an estimate of resulting ex-vessel revenue and personal income impacts at the community level (with the port group area the unit of analysis for community impacts). In this way the 'rebuild in as short a time as possible' standard can be contrasted with the 'needs of fishing communities' standard to demonstrate what level of catch or bycatch of overfished species is necessary to address adverse impacts to fishing communities.

National Standard 9 states that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

Minimizing bycatch, of overfished species in particular, is an important component of the alternatives. Through the use of GCAs fishing effort is reduced in areas where overfished species are most abundant, thereby reducing potential bycatch. As noted above, catch share management, particularly in the shorebased IFQ fishery, has reduced bycatch by eliminating most regulatory discards (some non-target species are managed with cumulative trip limits, which may induce some level of regulatory discards). Nontrawl sectors use cumulative trip limits as the principal catch control tool. Because trip limits are based on landings, when they are set at a low level to discourage directed and incidental catch of overfished species, this can result in regulatory discards.

The petrale sole rebuilding plan established objectives reflecting that it is an important target species for vessels using groundfish bottom trawl gear (managed under the shorebased IFQ fishery). The rebuilding plan allows a limited target fishery to continue, which in concert with IFQ management minimizes discards.

The at-sea whiting sectors are managed under bycatch limits for selected overfished species. Mandatory co-ops in the mothership sector are allocated a portion of these sector bycatch limits and are accountable for keeping catch of these species within their allocation. The catcher-processor operates as a single, voluntary co-op responsible for the bycatch limit assigned to the sector.

As noted above, the at-sea whiting sectors and shorebased IFQ fishery are subject to 100 percent observer coverage. While necessary for catch accounting under IFQ/co-op management, observers also allow complete monitoring of total catch (including bycatch). The limited entry fixed gear sector and directed open access fisheries are subject to partial observer coverage. This observer data is used to develop bycatch rate estimates, which can be used to forecast and account for total catch of all managed species.

National Standard 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

RCAs may affect safety if more vessels elect to fish seaward of the closed areas and are more exposed to bad weather conditions. Individual accountability under catch share management has resulted in vessels fishing more often seaward of the RCA in order to avoid catch of species such as canary and yelloweye rockfish, for which the allocations and resulting available QP are limited. As harvesters gain experience with the management program they may be able to develop opportunities to fish shoreward of RCAs while avoiding catch of these species, resulting in more inshore fishing.

The moratorium on quota share trading is expected to sunset beginning in 2013, which may lead to further capacity reduction and increased profits in the trawl sector. This may result in more investment in vessels and equipment that would enhance safety. Less efficient vessels are expected to leave the trawl fishery as part of this consolidation, which may eliminate older, less safe vessels.

For vessels electing to increase the amount of time fishing seaward of RCAs, implementing a VMS capable of sending distress calls could provide some mitigation. Although units with this capability have been approved for use, vessel owners are not required to purchase a unit with this capability. Also, by providing near real-time vessel position data, VMS could aid in search and rescue operations.

5.3 Other Applicable MSA Provisions

Harvest specifications are set based on targets established in overfished species rebuilding plans, which conform to Section 304(e) Rebuild Overfished Fisheries. Rebuilding plans contain the elements required by Section 304(e)(4) and discussed in the NS1 Guidelines (50 CFR 600.310).

NMFS prepared an EIS evaluating programmatic measures designed to identify and describe west coast groundfish EFH (NMFS), and minimize potential fishing impacts on west coast groundfish EFH. The Council took final action amending the groundfish FMP to incorporate new EFH provisions in November 2005. NMFS partially approved the amendment in March 2006. Implementing regulations became effective in June 2006. The effects of the proposed actions on groundfish EFH are within the scope of effects evaluated in the programmatic groundfish EFH EIS. The Council commenced a 5-year review of its groundfish EFH designation in December 2010. Section 4.1.4 in this EIS describes impacts of the proposed action on EFH, consistent with the EFH assessment requirements of 50 CFR 600.920 (e)(3).

5.4 Public Scoping under MSA

The Council process, which is based on stakeholder involvement and allows for public participation and public comment on fishery management proposals during Council, subcommittee, and advisory body meetings, is the principal mechanism to scope the biennial specifications process. The advisory bodies involved in groundfish management include the GMT, with representation from state, Federal, and tribal fishery scientists; and the Groundfish Advisory Subpanel (GAP), whose members are drawn from the commercial, tribal, and recreational fisheries, fish processors, and environmental advocacy organizations. Meetings of the Council and its advisory bodies constitute the Council scoping process, involving the development of alternatives and consideration of the impacts of the alternatives. In addition to Council-sponsored meetings, the Washington Department of Fish and Wildlife (WDFW), ODFW and CDFG held public hearings to solicit input on the formulation of management measures.

Table 5-1 summarizes Council decision-making steps in developing biennial harvest specifications and management measures.

Table 5-1.Summary of Council decision-making during biennial harvest specifications process.

Council meeting	Council Actions
June 20-25, 2013	Set schedule for developing 2015-16 harvest specifications and conduct preliminary review of stock status information.
September 12-17, 2013	Adopt new stock assessments for use in management, OFLs, and a range of ABC values; prioritize a range of new management measures for preliminary analysis.
November 1-6, 2013	Adopt overfished species rebuilding analyses; adopt ABCs for analysis; identify tentative range of allocation alternatives. Review exempted fishing permits for 2015-16. Adopt new management measures for detailed analysis.
April 5-10, 2014	Adopt preferred alternative ACLs and narrow the range of allocations and management measures under consideration.
June 20-25, 2014	Adopt final preferred alternative including all elements for the 2015-16 management program.

Chapter 6 NEPA AND OTHER APPLICABLE LAWS

This chapter will be updated as necessary.

6.1 National Environmental Policy Act

The CEQ has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), and NOAA's agency policy and procedures for NEPA can be found in NOAA Administrative Order 216-6 (NAO 216-6). The required elements of an Environmental Impact Statement (EIS) and the public process associated with an EIS are specified in both CEQ's regulations and NAO 216-6.

The required elements of an EIS are as follows (as per NAO 216-6 5.04b):

- A cover sheet and table of contents;
- A discussion of the purpose and need for the action;
- A summary of the EIS, including the issues to be resolved, and in the FEIS, the major conclusions and areas of controversy including those raised by the public;
- Alternatives, as required by Sections 102(2)(C)(iii) and 102(2)(E) of NEPA;
- A description of the affected environment;
- A succinct description of the environmental impacts of the proposed action and alternatives, including cumulative impacts;
- A listing of agencies and persons consulted, and to whom copies of the EIS are sent;
- A ROD, in the case of a FEIS, and;
- An index and appendices, as appropriate.

Comments received on this DEIS will be considered and responded to in the FEIS. After the comments are considered, NMFS will publish a Notice of Availability for a 30-day public comment period for the FEIS and will conclude the NEPA process with a Record of Decision documenting whether to approve, partially approve, or disapprove this proposed action under the MSA.

6.2 Notice of Intent and Public Scoping Under NEPA

The National Marine Fisheries Service in coordination with the Pacific Fishery Management Council published a Notice of Intent (NOI) on August 22, 2013 (78 FR 52133), to announce the intent to develop and prepare an EIS. This EIS will include analysis of the long-term impacts of setting harvest specifications (including OFLs, ABCs, and ACLs) and management measures including the 2015-16 biennial period, pursuant to the Pacific Coast Groundfish Fishery Management Plan.

The purpose of the NOI was to alert the interested public of the commencement of the scoping process and to provide for public participation in compliance with the National Environmental Policy Act. The scoping process is the first and best opportunity for the public to raise issues and concerns for the Council and NMFS to consider during the development of the harvest specifications and management measures. The Council and NMFS rely on input during scoping to both identify management measures and develop alternatives that meet the objectives of the Pacific Coast Groundfish FMP.

The public comment period was open for thirty days, ending on September 23, 2013. One comment was received during the thirty-day public comment period from the National Park West Coast Region. The comments focus on west coast marine areas managed by the National Park Service.

6.3 Related NEPA documents

The following NEPA documents provide information and analyses related to the effects of this proposed action:

- Trailing Actions for the Pacific Coast Groundfish Trawl Rationalization Program, Including 1. Pacific Halibut Trawl Bycatch Mortality Limit (Amendment 21-1); 2. Exemption from the Prohibition on Processing At Sea in the Shorebased IFQ Program, DRAFT Environmental Assessment. Published by the Pacific Fishery Management Council in July 2011. (http://www.pcouncil.org/groundfish/fishery-management-plan/amendment-21-1/)
- Proposed Harvest Specifications and Management Measures for the 2013-2014 Pacific Coast Groundfish Fishery and Amendment 21-2 to the Pacific Coast Groundfish Fishery Management Plan; Final Environmental Impact Statement. Published by the Pacific Fishery Management Council and NMFS in September 2012. (http://www.pcouncil.org/groundfish/fishery-management-plan/amendment-21-2/)
- Amendment 23: Considerations for a New Harvest Specification Framework that Incorporates Revised National Standard 1 Guidelines to Prevent Overfishing, Environmental Assessment. Published by the Pacific Fishery Management Council and NMFS in September 2010. (http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-23/)
- Allocation of Harvest Opportunity between Sectors of the Pacific Coast Groundfish Fishery (Amendment 21 to the Groundfish FMP); Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Published by the Pacific Fishery Management Council and NMFS in June 2010.(http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-21/)
- Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery (Amendment 20 to the Groundfish FMP); Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Published by the Pacific Fishery Management Council and NMFS in June 2010. (http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-20/#EIS)

Information may be incorporated by reference from these documents into this EIS. Council on Environmental Quality (CEQ) regulations (40 CFR 1502.21) state "Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described." When information from the above document is incorporated, these procedures are followed within the body of this EIS.

6.4 Preparers and Listing of Agencies and Persons Consulted

The following people wrote the EIS:

- Kelly Ames, Pacific Fishery Management Council: Sections

- Christopher "Kit" Dahl, Pacific Fishery Management Council: Sections
- John DeVore, Pacific Fishery Management Council: Sections
- Kerry Griffin, Pacific Fishery Management Council: Sections
- Becky Renko, National Marine Fisheries Service, Northwest Region: Sections
- Edward Waters, Contracting Economist: Sections

This EIS was prepared and evaluated in consultation with the National Marine Fisheries Service and the Pacific Fishery Management Council. In addition, members of the Groundfish Management Team (GMT) and the Scientific and Statistical Committee (SSC) prepared and reviewed portions of the analyses and provided technical advice during the development of the EIS. Members of Council advisory bodies are listed in rosters available at http://www.pcouncil.org/council-operations/council-and-committees/council-and-committee-rosters/. In addition the following persons were consulted or were involved in reviewing drafts of the document:

- Sarah Biegel, NMFS NWR, NEPA Coordinator
- Ryan Couch, NOAA GC, Attorney
- Kevin Duffy, NMFS NWR, Groundfish Section
- Mariam McCall, NOAA GC, Attorney
- Sarah Williams, NMFS NWR, Groundfish Section
- Becky Renko, NMFS NWR, Groundfish Section

6.5 DEIS Distribution List

The Council makes the EIS available on its website so anyone with computer access may download a copy of the document. Electronic copies on CD-ROM and paper copies are made available upon request. The Council distributes a notice of availability for the EIS through its electronic mail list, which includes state and Federal agencies, tribes, and individuals. Copies of the FEIS are sent to anyone who comments on the DEIS. In addition, NMFS distributes copies of the EIS to the following agencies:

- Department of Interior,
- Department of State,
- U.S. Coast Guard Commander Pacific Area,
- Marine Mammal Commission,
- Pacific States Marine Fisheries Commission, and
- Environmental Protection Agency.

As part of the review process for consistency with applicable laws such as the CZMA, NMFS also distributes the EIS to the following coastal states and agencies:

- Washington Coastal Zone Management Program, Shoreline Environmental Assistance, Department of Ecology, Washington State;
- Ocean-Coastal Management Program, Department of Land Conservation and Development, State of Oregon; and
- California Coastal Commission.

Members of the public may also request to be on the distribution list. The following individuals have requested copies of the EIS:

TBD

In addition, a Notice of Availability of the DEIS is also published in the *Federal Register*. The DEIS is available for a 45-day public comment period. During this time, any member of the public may call the Council office and request a copy of the DEIS for their review.

Questions concerning this document and requests for additional copies of this document may be addressed to:

Ms. Becky Renko
National Marine Fisheries Service, Northwest Region
7600 Sand Point Way
Seattle, WA 98115
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(206) 526-6110

6.6 Addressing NEPA in Subsequent Biennial Cycles

The adoption and adjustment of regulations for managing the groundfish fishery (including harvest specifications and management measures) is an ongoing, adaptive process. Changes in the type and intensity of environmental impacts tend not to differ substantially from one period to the next. With this view in mind this EIS evaluates the impacts of the ongoing action over a longer time period than 2 years. Biennial changes to the management program may then be subject to more focused analyses, as described below based on Council on Environmental Quality (CEQ) guidelines for supplementing and/or tiering from a previously prepared NEPA document.

When harvest specifications (and related management measures) are periodically adjusted, NMFS will determine whether to supplement this EIS or prepare a tiered NEPA analysis. These methods and the circumstances where they could be applied are discussed below.

CEQ regulations identify two conditions that trigger the need to "supplement" a NEPA document: (1) Has the agency made substantial changes in the proposed action that are relevant to environmental concerns?; (2) Are there significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts? (See 40 CFR 1502.9(c)(1)). If the answer to these questions is "no," then no additional NEPA analysis is needed. The rationale for the agency's "no" finding must be adequately documented in the administrative record. Agencies, including NMFS, have used a "supplemental information report" (SIR) format to document these findings. Circumstances where this EIS would be supplemented could arise if the Council makes substantial changes to harvest policies, such as changing proxy values for F_{MSY} or adopting several new rebuilding plans for key stocks.

Alternatively, if circumstances have changed such that additional NEPA documentation may be required, the concept of "tiering," introduced in CEQ regulations, would be used: "Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action." (40 CFR 1502.20) If, when harvest specifications and management measures are periodically adjusted, it is determined that this EIS does not address the environmental impacts of the proposed action, a subsequent tiered NEPA document would be prepared. The tiered NEPA document would be narrowly focused on those aspects of the proposal that may have environmental impacts different from those identified in this EIS. For example, the tiered NEPA document could focus on changes to harvest control rules that were not analyzed in this EIS.

6.7 Administrative Procedure Act

The Administrative Procedures Act, or APA, governs the Federal regulatory process and establishes standards for judicial review of Federal regulatory activities. Most Federal rulemaking, including regulations promulgated pursuant to the MSA, are considered "informal," which is determined by the controlling legislation. Provisions at 5 U.S.C. 553 establish rulemaking procedures applicable to the proposed action. Section 6.2 in the Groundfish FMP (PFMC 2011) specifies that biennial harvest specifications and management measures require 'full notice-and-comment rulemaking' to implement the regulations necessary to implement the Council recommendation. The rulemaking associated with this proposed action will be conducted in accordance with the APA and procedures identified in section 304 of the MSA.

6.8 Additional Laws and Executive Orders Applicable to the Proposed Action

In addition to the Magnuson-Stevens Act (see Chapter 5), the National Environmental Policy Act, and the Administrative Procedure Act there are other laws and Federal Executive Orders that may impose substantive and procedural requirements on the proposed action. These other laws and executive orders are described below.

6.8.1 Coastal Zone Management Act:

Section 307(c)(1) of the Federal Coastal Zone Management Act (CZMA) of 1972 requires all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. A determination as to whether the proposed action is would be implemented in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved coastal zone management programs of Washington, Oregon, and California will be submitted to the responsible state agencies for review under Section 307(c)(1) of the CZMA. The relationship of the groundfish FMP with the CZMA is discussed in Section 11.7.3 of the Groundfish FMP. The Groundfish FMP has been found to be consistent with the Washington, Oregon, and California coastal zone management programs.

6.8.2 Endangered Species Act

The Endangered Species Act of 1973 (ESA) was signed on December 28, 1973, and provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. The ESA replaced the Endangered Species Conservation Act of 1969; it has been amended several times.

A "species" is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become an endangered species within the foreseeable future.

Federal agencies are directed, under section 7(a)(1) of the ESA, to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Federal agencies must also consult with NMFS or USFWS, under section 7(a)(2) of the ESA, on activities that may affect a listed species.

These interagency consultations, or section 7 consultations, are designed to assist Federal agencies in fulfilling their duty to ensure Federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat. Should an action be determined to jeopardize a species or result in the destruction or adverse modification of critical habitat, NMFS or USFWS will suggest Reasonable and Prudent Alternatives (RPAs) that would not violate section 7(a)(2).

Biological opinions document whether the Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of critical habitat. Where appropriate, biological opinions provide an exemption for the "take" of listed species while specifying the extent of take allowed, the Reasonable and Prudent Measures (RPMs) necessary to minimize impacts from the Federal action, and the Terms and Conditions with which the action agency must comply.

This section will be updated with finding from the most recent BiOps.

6.8.3 Marine Mammal Protection Act

The MMPA of 1972 is the principle Federal legislation that guides marine mammal species protection and conservation policy in the United States. Under the MMPA, NMFS is responsible for the management and conservation of 153 stocks of whales, dolphins, porpoise, as well as seals, sea lions, and fur seals; while the USFWS is responsible for walrus, sea otters, and the West Indian manatee.

Off the west coast, the Steller sea lion (*Eumetopias jubatus*) eastern stock, Guadalupe fur seal (*Arctocephalus townsendi*), and Southern sea otter (*Enhydra lutris*) California stock are listed as threatened under the ESA. The sperm whale (*Physeter macrocephalus*) Washington, Oregon, and California stock, humpback whale (*Megaptera novaeangliae*) Washington, Oregon, and California - Mexico Stock, blue whale (*Balaenoptera musculus*) eastern north Pacific stock, and Fin whale (*Balaenoptera physalus*) Washington, Oregon, and California stock are listed as depleted under the MMPA. Any species listed as endangered or threatened under the ESA is automatically considered depleted under the MMPA.

Pursuant to the MMPA, the List of Fisheries (LOF) classifies U.S. commercial fisheries into one of three Categories according to the level of incidental mortality or serious injury of marine mammals:

I. frequent incidental mortality or serious injury of marine mammals
II. occasional incidental mortality or serious injury of marine mammals
III. remote likelihood of/no known incidental mortality or serious injury of marine mammals

The Marine Mammal Protection Act (MMPA) mandates that each fishery be classified by the level of serious injury and mortality of marine mammals that occurs incidental to each fishery is reported in the annual Marine Mammal Stock Assessment Reports for each stock. On the 2012 List of Fisheries the WA/OR/CA sablefish pot fishery is listed as a category II fishery due to interactions with humpback whales. All other west coast groundfish fisheries are listed as category III fisheries. (See http://www.nmfs.noaa.gov/pr/interactions/lof/final2012.htm. [update with Final 2013 LOF when available].)

Commercial fishing vessels participating in Category I or II fisheries must be covered by a Federal permit under the MMPA. For most fisheries, including all west coast fisheries, a blanket permit is issued for all Federal or state permits authorizing participation in the fishery.

6.8.4 Migratory Bird Treaty Act

The MBTA of 1918 was designed to end the commercial trade of migratory birds and their feathers that, by the early years of the 20th century, had diminished the populations of many native bird species. The MBTA states that it is unlawful to take, kill, or possess migratory birds and their parts (including eggs, nests, and feathers) and is a shared agreement between the United States, Canada, Japan, Mexico, and Russia to protect a common migratory bird resource. The MBTA prohibits the directed take of seabirds, but the incidental take of seabirds does occur.

6.8.5 Paperwork Reduction Act

The Paperwork Reduction Act requires that agency information collections minimize duplication and burden on the public, have practical utility, and support the proper performance of the agency's mission.

6.8.6 Regulatory Flexibility Act

The Regulatory Flexibility Act requires government agencies to assess the effects that regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those effects. A fish-harvesting business is considered a “small” business by the Small Business Administration if it has annual receipts not in excess of $4.0 million. For related fish-processing businesses, a small business is one that employs 500 or fewer persons. For wholesale businesses, a small business is one that employs not more than 100 people. For marinas and charter/party boats, a small business is one with annual receipts not in excess of $6.5 million. If the projected impact of the regulation exceeds $100 million, it may be subject to additional scrutiny by the Office of Management and Budget

6.8.7 Executive Order12866 (Regulatory Impact Review)

EO 12866, Regulatory Planning and Review, covers a variety of regulatory policy considerations and establishes procedural requirements for analysis of the benefits and costs of regulatory actions. It directs agencies to choose those approaches that maximize net benefits to society, unless a statute requires another regulatory approach. The agency must assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only after reasoned determination the benefits of the intended regulation justify the costs. In reaching its decision, the agency must use the best reasonably obtainable information, including scientific, technical and economic data, about the need for and consequences of the intended regulation. NMFS requires the preparation of a regulatory impact review (RIR) for all regulatory actions of public interest. The purpose of the analysis is to ensure the regulatory agency systematically and comprehensively considers all available alternatives, so the public welfare can be enhanced in the most efficient and cost-effective way. The RIR addresses many of the items in the regulatory philosophy and principles of EO 12866.

6.8.8 Executive Order 12898 (Environmental Justice)

EO 12898 obligates Federal agencies to identify and address “disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States” as part of any overall environmental impact analysis associated with an action. NOAA guidance, NAO 216-6, at Section 7.02, states that “consideration of EO 12898 should be specifically included in the NEPA documentation for decision-making purposes.” Agencies should also encourage public participation, especially by affected communities during scoping, as part of a broader strategy to address environmental justice issues.

6.8.9 Executive Order 13132 (Federalism)

EO 13132, which revoked EO 12612, an earlier federalism EO, enumerates eight "fundamental federalism principles." The first of these principles states "Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people." In this spirit, the EO directs agencies to consider the implications of policies that may limit the scope of or preempt states' legal authority. Preemptive action having such "federalism implications" is subject to a consultation process with the states; such actions should not create unfunded mandates for the states; and any final rule published must be accompanied by a "federalism summary impact statement."

6.8.10 Executive Order 13175 (Consultation and Coordination with Indian Tribal Government)

EO 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. In Section 302(b)(5), the MSA reserves a seat on the Council for a representative of an Indian tribe with Federally-recognized fishing rights from California, Oregon, Washington, or Idaho.

The U.S. government formally recognizes the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes' U and A fishing areas (described at 50 CFR 660.324). Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives.

6.8.11 Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)

EO 13186 supplements the MBTA (above) by requiring Federal agencies to work with the USFWS to develop memoranda of agreement to conserve migratory birds. NMFS is in the process of implementing a memorandum of understanding. The protocols developed by this consultation will guide agency regulatory actions and policy decisions in order to address this conservation goal. The EO also directs agencies to evaluate the effects of their actions on migratory birds in environmental documents prepared pursuant to the NEPA.

6.9 Findings

The Council process and this EIS are intended, where possible, to meet the public involvement requirements and provide the information and analysis necessary to address the mandates described above. Mandates that require additional analysis, documentation, and process not met through NEPA are discussed in section 6.10 below. The information and analysis in this EIS supports the following findings with respect to other applicable law.

<u>Coastal Zone Management Act</u>: Harvest specifications and management measures for 2015-2016 are not expected to affect any state's coastal management program.

ESA: NMFS and USFWS conducted a section 7 consultations to determine whether activities authorized under groundfish regulations in 2013 and subsequent years are likely to jeopardize the continued existence of any species listed under the ESA. Findings (Incidental Take Statements, Reasonable and Prudent Measures, etc.) are summarized here.

Marine Mammal Protection Act: Section 4.x describes new information about the incidental take of marine mammals and section 4.x assesses the effects of the proposed action on marine mammals. Although the operation of groundfish fisheries may differ from previous management cycles there is insufficient information to predict whether the effects on marine mammals will differ from previous management cycles.

Migratory Bird Treaty Act: The proposed action is unlikely to cause the incidental take of seabirds protected by the Migratory Bird Treaty Act to differ substantially from levels in previous years. Past EISs evaluating the impact of groundfish harvest specifications evaluated impacts to seabirds and concluded that the proposed action will not significantly impact seabirds. (Section 4.x evaluated impacts of the proposed action on protected species)

Paperwork Reduction Act: The proposed action, as implemented by any of the alternatives considered in this EIS, does not require collection-of-information subject to the Paperwork Reduction Act.

Executive Order 12898 (Environmental Justice): The proposed action will not result in disproportionate adverse impacts to low income and minority communities (see section 4.x).

Executive Order 13132 (Federalism): The proposed action does not have federalism implications subject to EO 13132.

Executive Order 13175 (Consultation and Coordination with Indian Tribal Government): Harvest specifications and management measures for 2015-2016 have been developed in consultation with the affected tribe(s) and, insofar as possible, with tribal consensus.

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds): See the finding for the Migratory Bird Treaty Act, above.

6.10 Mandates Addressed Through Separate or Parallel Processes

6.10.1 ESA

NMFS Northwest Region Sustainable Fisheries Division consulted with the Protected Resources Division and with the USFWS pursuant to section 7(a)(2) of the ESA on the effects of the operation of the Pacific coast groundfish fishery in 2013 and subsequent years. Outcomes implemented outside of the biennial harvest specifications process are summarized here.

6.10.2 Executive Order 12866 (Regulatory Impact Review) and the Regulatory Flexibility Act

NMFS develops the necessary analysis and documentation needed to address these mandates as part of the Federal rulemaking process implementing groundfish harvest specifications and management measures. These analyses rely substantially on the contents of this EIS and the socioeconomic impact evaluation in Chapter 4 and baseline information in Chapter 3, which have been developed in conjunction with NMFS NWR staff to provide information needed for the Regulatory Impact Review and Regulatory Flexibility Act analyses.

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Appendix B

Proposed Harvest Specifications and Management Measures for the 2015-2016 Pacific Coast Groundfish Fishery and Amendment 24 to the Pacific Coast Groundfish Fishery Management Plan Preliminary Draft Environmental Impact Statement

Prepared by
The Pacific Fishery Management Council
And The National Marine Fisheries Service

June 2014

Contents

Management Measures under the Preferred Alternative

B.1 Changes to Rockfish Conservation Area Coordinates

Need for Action

Rockfish Conservation Areas (RCA) are a type of commercial and recreational fishery management measure used to keep catches within annual catch limits (ACLs). RCAs affect the collective behavior of harvesters by preventing fishing in areas where bycatch of overfished species is particularly high. Their extent varies by area, season and gear type to allow access to target species while minimizing bycatch. The boundaries of RCAs are described by depth contours since a correlation between depth and the distribution (or catch) of overfished species has been demonstrated through an analysis of trawl logbook and survey data. The boundary depth contours defined by waypoints in Federal regulations (at 50 CFR 660.71-660.74) only approximate actual isobaths for two reasons. First, the waypoints defining the lines were defined using available bathymetry data, which have improved over time. Second, for enforcement purposes the lines defined by the waypoints are a more generalized, or simplified, representation of isobaths. Often, changes to the coordinates that define RCA are often recommended during the biennial cycle to more closely align with the latest data on bathymetry.

Other measures more directly constrain catch on an individual vessel level. These are:

- Individual fishing quota (IFQ) management for the shoreside trawl fleet (with cumulative landing
- limits for some non-target, non-overfished management units)
- Co-op allocations to the at-sea whiting fleets (catcher vessels delivering to at-sea processors and
- catcher-processors)
- Permit-based sablefish allocations to vessels in the limited entry fixed gear fleet during the
- primary season
- Daily and cumulative landing limits for the open access fixed gear sectors and limited entry fixed
- gear outside the primary season
- State restricted access permit programs for the non-trawl fixed-gear sectors, such as the nearshore fisheries for Oregon and California

Only catch share management directly controls total catch of most management unit species (including all overfished species) in the trawl sectors with all catch monitored by observers. Daily trip limits and 2-month limits in other sectors only control landings; overfished species total catch (mostly bycatch) must be imputed based on partial observer coverage. RCAs add another layer of precaution by affecting collective behavior and their use is more important in managing those sectors not under catch shares since overfished species bycatch cannot be directly controlled.

Inseason management allows measures to be periodically adjusted during the biennial period based on new information and catch projections. These management measures are described in more detail in Section 2.3 of the EIS.

B.1.1 Oregon: Adjustments to the 200 fm Modified Line

Coordinates for the 200 fathom (fm) RCA line in Oregon were revised beginning January 1, 2013 to better align with depth contours (See 2013-2014 FEIS). However, coordinates for the 200-fm modified RCA, which are modified to provide access to shallower waters where petrale sole concentrations are greater (called petrale cut-outs), were not simultaneously adjusted. The result was areas where the petrale cut-outs on the 200 fm modified line were deeper than the 200 fm RCA (Figure B-1).

Management Options

No Action: The RCA coordinates currently in regulation would remain and in some areas the 200 fm modified line with petrale cut-outs would be deeper than the 200 fm line.

Option 1 (Preferred): Revise coordinates such that the 200 fm modified line is not deeper than the 200 fm line (Table B-1).

Table B-1. Coordinate list for proposed modification to 200 fm-modified RCA coordinates.

ID	Name	Degrees, decimal minutes	Decimal degrees
79	Current waypoint	44°46.87'N, 124°38.20'W	44.781243, -124.636738
1	OR proposed modification	44°48.25'N, 124°40.61'W	44.8041, -124.6769
2	OR proposed modification	44°42.24'N, 124°48.05'W	44.704, -124.8008
3	OR proposed modification	44°41.35'N, 124°48.03'W	44.6892, -124.8005
4	OR proposed modification	44°40.27'N, 124°49.11'W	44.6712, -124.8185
5	OR proposed modification	44°38.52'N, 124°49.11'W	44.642, -124.8185
6	OR proposed modification	44°21.73'N, 124°49.82'W	44.362167, -124.830333
7	OR proposed modification	44°17.57'N, 124°55.04'W	44.292833, -124.917333
80	Current waypoint (Deleted)	44°48.25'N, 124°40.62'W	44.804115, -124.676919
81	Current waypoint (Deleted)	44°41.34'N, 124°49.20'W	44.688998, -124.819945
82	Current waypoint (Deleted)	44°23.30'N, 124°50.17'W	44.388395, -124.8361781
83	Current waypoint	44°13.19'N, 124°58.66'W	44.219879, -124.977606

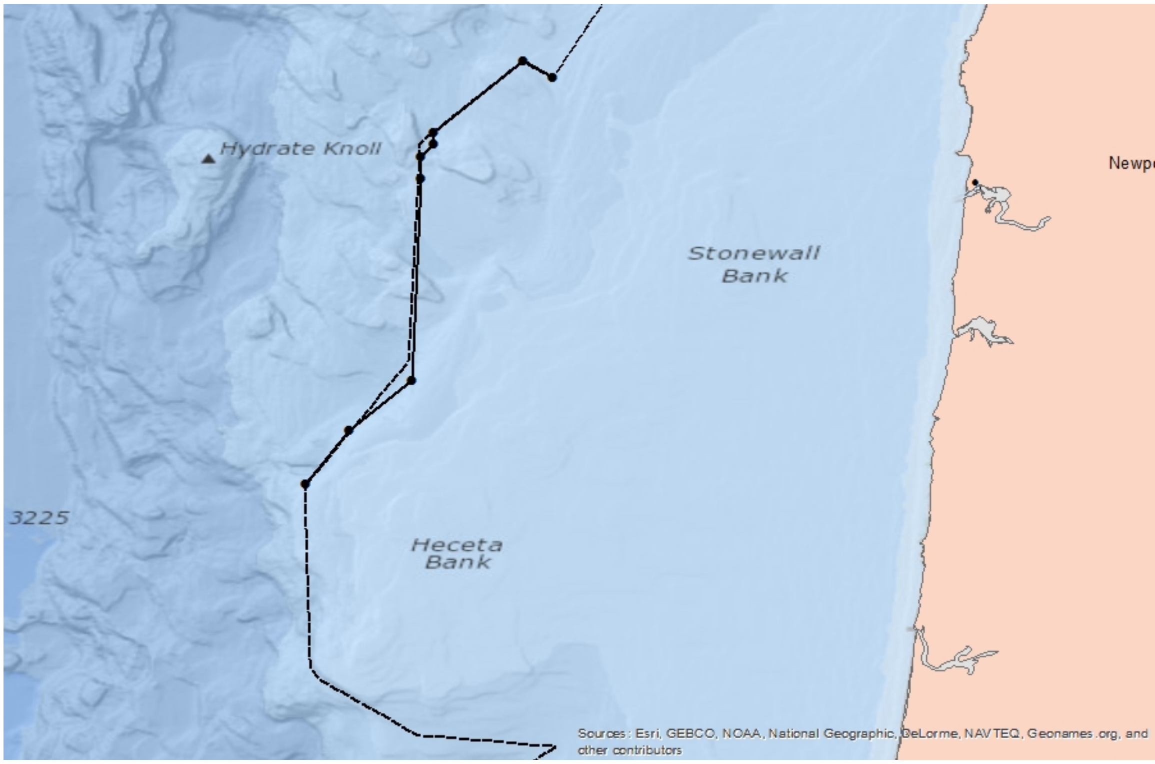

Figure B-1. Modification to the 200 fm "modified" (with petrale cut outs) depth contour. Dashed line represents the original 200 fm petrale line. Solid line represents proposed changes (which mimic the 200 fm line (without petrale cut outs).

B.1.2 Modifications to the Boundaries Defining Rockfish Conservation Areas off California

The following proposed modifications to current RCA boundary waypoints were adopted by the Pacific Fishery Management Council, at its April 2014 meeting, for analysis:

- Adjustments to the 60 fm RCA boundary waypoints off Del Mar and San Diego, California (Agenda Item H.3.b GMT Report, November 2013 and Agenda Item C.9.b GAP Report, April 2014)

An additional analysis is included that addresses a proposal for RCA boundary waypoint adjustments around the northern Channel Islands, California.

B.1.2.1 Modifications of the 60 fm Depth Contour: Two Southern California Bight Proposals

During the 2013-2014 biennial management cycle, the 60 fm depth contour was used as the shoreward boundary of the non-trawl RCA south of 34°27' N. lat. The depth contours defining the boundaries of RCAs are listed in trip limit tables published in Federal regulations and in periodic Public Notices announcing changes to groundfish management measures (see http://tinyurl.com/lty84jx). This boundary is intended to reduce bycatch of overfished species (OFS) such as bocaccio, canary, cowcod, and yelloweye rockfishes while providing access to target species.

Need for Action

The current 60 fm depth contour specified in regulation at 50 CRF 660.72(f) approximates the 60 fm isobath. To allow better access to non-trawl fishing areas for target species while maintaining the intent of the 60 fm line, better alignment of the 60 fm line with the 60 isobath is necessary for waters off California.

<u>Management Options</u>

<u>No Action</u>: Under No Action (described in section 2.4.1 of the 2013-2014 EIS) the 60 fm depth contour created by the waypoints currently listed at 50 CRF 660.72(f) would be retained in 2015-2016 and beyond.

<u>Options</u>: Under the Options, the 60 fm depth contour would more closely align with actual bathymetry in one of the two 60 fm proposals. These changes are based on proposals submitted by industry to modify the 60 fm RCA by modifying existing waypoints and/or adding new waypoints to the existing set(s). One sub-proposal addresses modifications west of Del Mar, California and the second-sub proposal addresses a modification west of San Diego, California.

Del Mar Option

- Modify the 60 fm contour between waypoints #198 and 199 by adding five new waypoints, and
- Modify the 60 fm contour between waypoints #198 and #200 by adjusting waypoint #199

Industry submitted the above proposed adjustments to allow increased access to fishing areas currently closed as a result of the existing RCA shoreward boundary. However, as proposed (see above reference, and Table B-2 and Figure B-2), the proposed boundary adjustments off the Del Mar area would move a section of the shoreward 60 fm RCA shoreward boundary into waters deeper than 75 fm. Additionally, one waypoint that is proposed to be edited (#199) actually moves the 60 fm RCA shoreward boundary to waters less than 50 fm. Given that these are the waypoint coordinates that were submitted as is and analyzed as such, it does not appear that such adjustments should be accommodated. It appears that there is no alternate way to address industry's proposal at this time. In the future, however, industry may wish to re-submit a different set of coordinates for consideration.

For this proposal, had the adjustments been deemed reasonable (at least from the initial analysis standpoint), fishing opportunities would have been increased for those members of the fleet fishing out of the greater San Diego area. Also, there would have been no conflicts with existing MPAs.

San Diego: Option A and Option B

Industry also submitted another proposal to accommodate an adjustment to the 60 fm RCA shoreward boundary west of San Diego that would allow better access to a tip of a reef. This proposal was submitted to consider one of two options.

- Option A: Modify the 60 fm contour between waypoints #205 and #207 by adjusting waypoint #206, or
- Option B: Modify the 60 fm contour between waypoints #206 and #207 by adding a new waypoint

As proposed, Option A requests that the 60 fm waypoint #206 be moved whereas Option B requests that a new waypoint be inserted between waypoint #206 and #207. Moving the existing waypoint #206, as proposed, results in a move of approximately 228 meters (approximately 250 yards).

Table B-2 through Table B-4 show the waypoint adjustments outlined above for both proposals. Figure B-2 and Figure B-3 also show the waypoint adjustments with Figure B-3 restricted to the Option A proposal. At the April 2013 Council meeting, the GAP recommended two Southern California Bight adjustments be analyzed by the Groundfish Management Team (GMT) for consideration by the Council. The Groundfish Advisory Subpanel (GAP) pointed out that with existing lines; it is difficult to fish a particular reef in this area in a prevailing current. The GAP also pointed out that there is some room to the south and west of the reef that would fix this problem if either of the two options were implemented for the San Diego proposal.

Upon review and analysis, an alternate option is presented here. This alternate option better aligns the RCA shoreward boundary to the 60 fm contour and eliminates the proposed access to fishing areas that are much deeper than 60 fm. Under this alternate option proposal, one new waypoint is added (proposed waypoint #5) between existing waypoint # 198 and existing waypoint #199. It removes the addition of new waypoints #1, #2, #3, and #4 and eliminates modifying existing waypoint # 199. The detailed adjustments for this new set of coordinate adjustments are presented in Table B-3 and Figure B-3.

Comparison of the Management Options

Biological Impacts: The non-trawl fixed-gear fisheries do not require logbooks to be completed and as such, it is very difficult to determine the species that may be taken in the proposed area and/or adjacent areas. Reporting of fishing areas is limited to documentation of Fish and Wildlife catch block numbers on the commercial landings receipts. These, however, cover 10x10 mile grids and do not lend themselves to accurate accounting of what species were caught from any specific areas. To the degree that there is not enough precise correlation between recorded catch by species and recorded fishing areas (blocks) under the action alternatives, there could be an increase of OFS, other fish species, and the take of protected species in the opened areas.

Under Option B, the issue of having access to fishing areas much deeper than 60 fm in this area is eliminated. The industry proposed option would have allowed fishing in an area as deep as 195 fm (Figure B-2). This alternate option better aligns the RCA shoreward boundary to the 60 fm contour. Under this alternate option, no biological impacts would be expected.

Socioeconomic Impacts: The changes proposed under the action alternatives may have a marginal socioeconomic benefit for the shoreside non-trawl fixed gear fishery managed under an RCA with a 60 fm contour as its shoreward boundary. Access to this additional small area would be beneficial to the fishing community from the greater San Diego area. The change in management cost, primarily those associated with law enforcement of the RCA boundaries, may be problematic.

Table B-2. Coordinate list for proposed modifications to the 60 fm RCA shoreward boundary off Del Mar, California.

	Boundary Line	Coordinates
ID	**Name**	**Degrees, decimal minutes**
198	Current waypoint (keep)	32°57.39' N, 117°18.72' W
--	Proposed modification (add after #198)	32°56.50' N, 117°19.80' W
--	Proposed modification (add after #198)	32°56.50' N, 117°19.72' W
--	Proposed modification (add after #198)	32°56.36' N, 117°19.06' W
--	Proposed modification (add after #198)	32°56.24' N, 117°19.04' W
--	Proposed modification (add after #198)	32°56.00' N, 117°19.16' W
199	Proposed modification (modify #199)	32°55.64' N, 117°18.46' W
200	Current waypoint (keep)	32°52.81' N, 117°17.09' W

Table B-3. Alternate option for the Del Mar proposal that modifies the 60 fm RCA shoreward boundary off Del Mar, California.

	Boundary Line	Coordinates
ID	**Name**	**Degrees, decimal minutes**
198	Current waypoint (keep)	32°57.39' N, 117°18.72' W
--	Proposed modification (add between waypoints #198 and #199)	32°56.00' N, 117°19.16' W
199	Current waypoint (keep)	32°55.64' N, 117°18.46' W

Table B-4. Coordinate list for proposed modifications to the 60 fm RCA shoreward boundary south of Del Mar, west of San Diego, California. This proposal is made under two Options: Option A would adjust waypoint #206 and Option B proposes to add a waypoint between waypoints #206 and #207.

	Boundary Line	**Coordinates**
ID	**Name**	**Degrees, decimal minutes**
Option A		
205	Current waypoint (keep)	32°45.58' N, 117°22.38' W
206	Proposed modification (modify #206)	32°44.89' N, 117°21.89' W
207	Current waypoint (keep)	32°43.52' N, 117°19.32' W
Option B		
206	Current waypoint (keep)	32°44.98' N, 117°22.87' W
--	Proposed modification (add between #206 and #207	32°44.89' N, 117°21.89' W
207	Current waypoint (keep)	32°43.42' N, 117°19.32' W

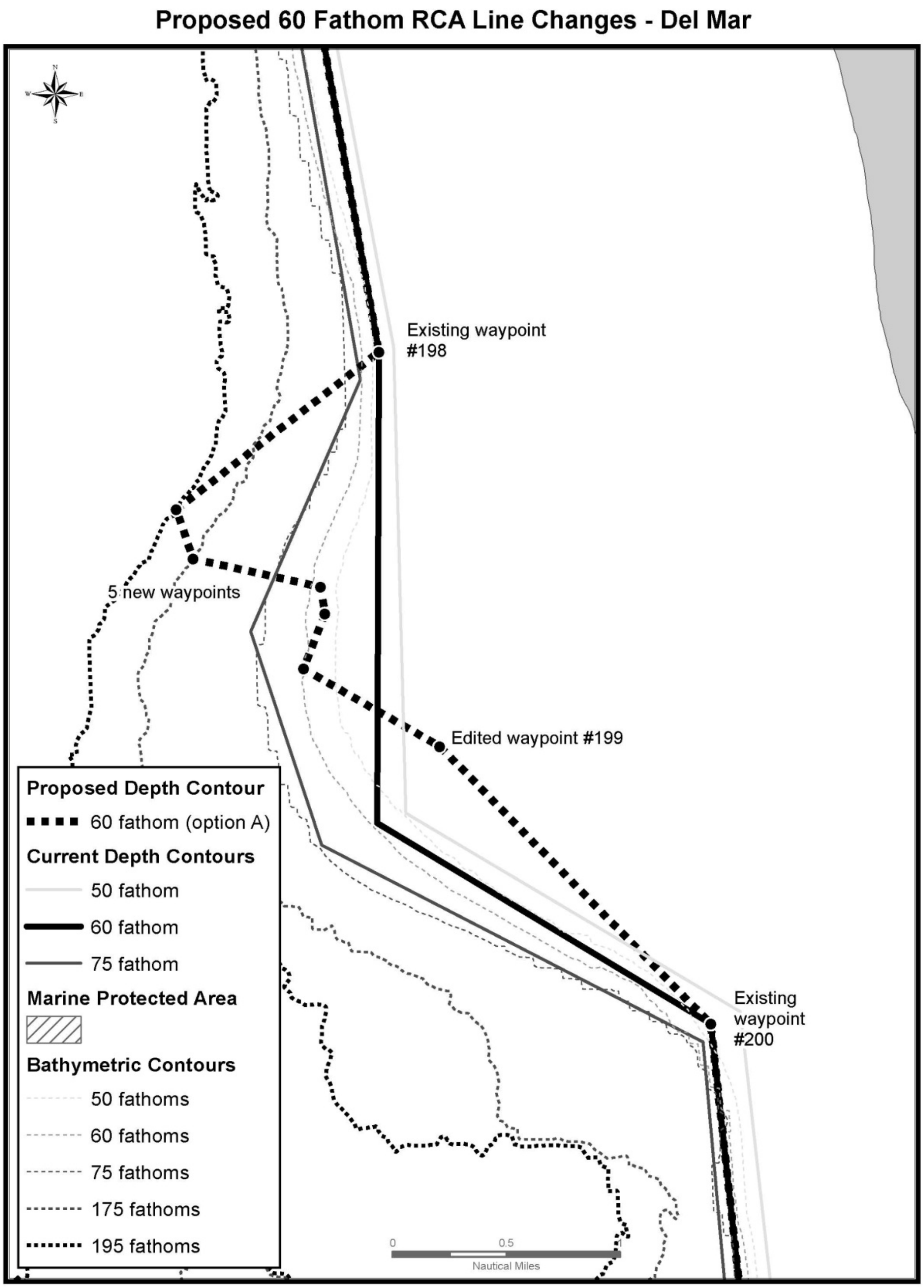

Figure B-2. Modification to the 60 fm contour off Del Mar, California, proposed by industry. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

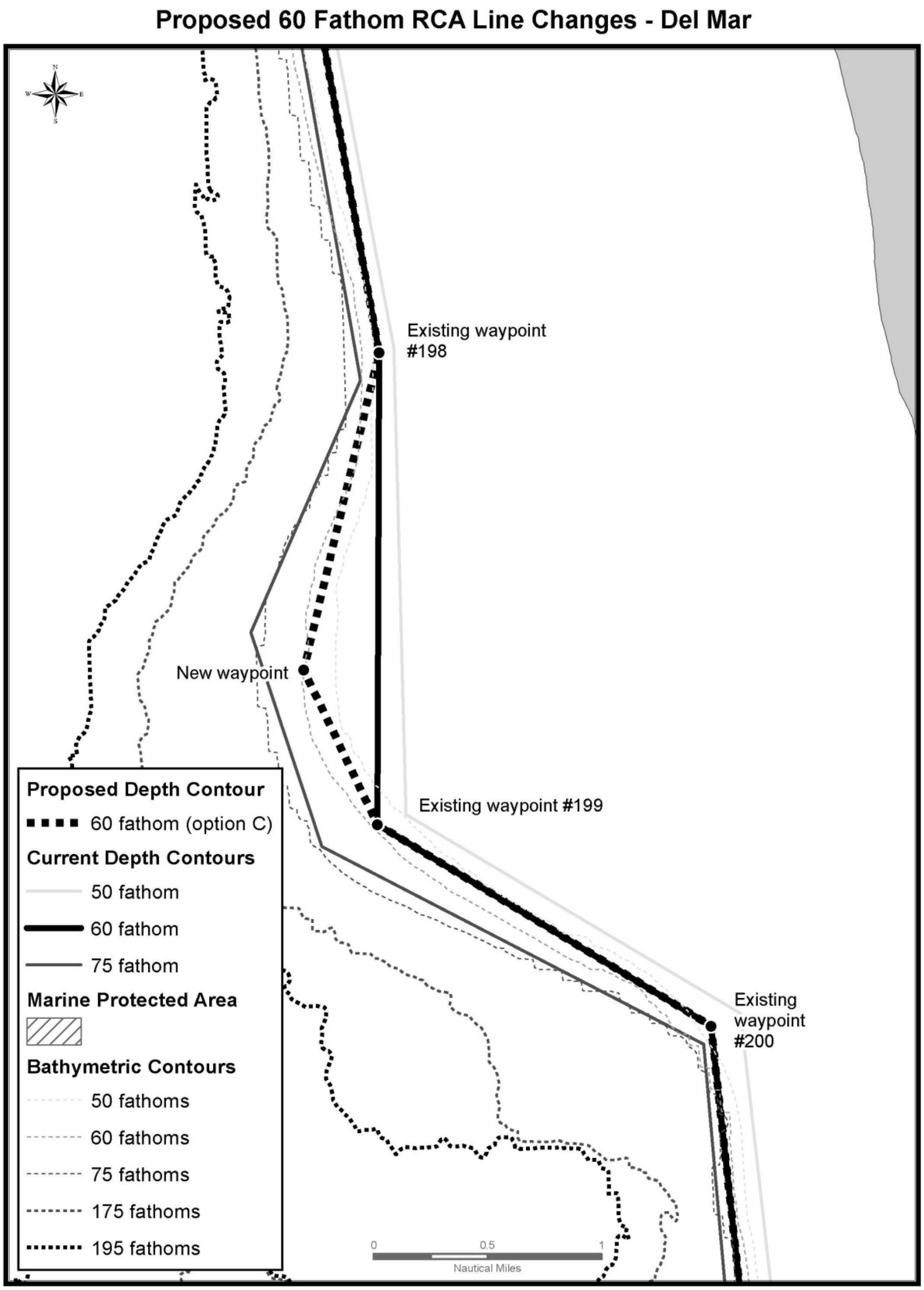

Figure B-3. Modification to the 60 fm contour off Del Mar, California, proposed by CDFW. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

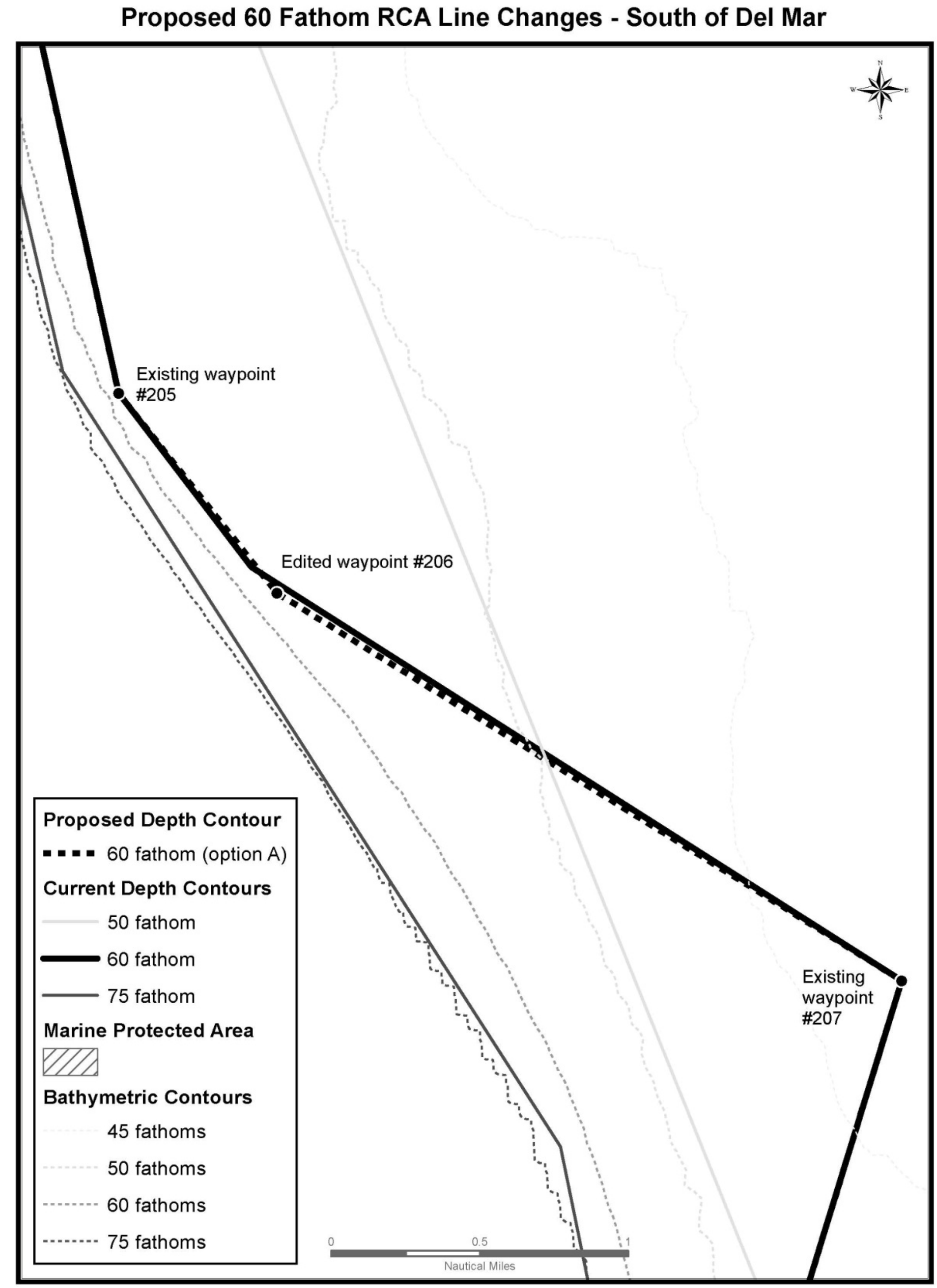

Figure B-4. Modification to the 60 fm contour south of Del Mar, west of San Diego, California, proposed by industry. This version shows waypoint #206 as an edited adjustment (Option A). Option B would be to add this waypoint between waypoints #206 and #207. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

B.1.2.2 Modifications of the 50 fm Depth Contour: Northern Channel Islands Proposal

During the 2013-2014 biennial management cycle, the 50 fm depth contour was used as the shoreward boundary of the recreational RCA (660.360). This boundary is intended to reduce bycatch of overfished species (OFS) such as bocaccio, canary, cowcod, and yelloweye rockfishes.

Need for Action

The current 50 fm depth contour specified in regulation at 50 CRF 660.72(c) approximates the 50 fm isobath around the north Channel Islands – San Miguel, Santa Rosa, and Santa Cruz. To allow better access to non-trawl fishing areas for non-OFS species while maintaining the intent of the 50 fm line, better alignment of the 50 fm line with the 50 isobath is necessary for waters off California.

<u>Management Options</u>

<u>No Action</u>: Under No Action (described in section 2.4.1 of the 2013-2014 EIS) the 50 fm depth contour created by the waypoints currently listed at 50 CRF 660.72(c) would be retained in 2015-2016 and beyond.

<u>Options</u>: Under the Options the 50 fm depth contour would more closely align with actual bathymetry in one of the two 50 fm proposals. These changes are based on proposals submitted by industry to modify the 50 fm RCA by modifying existing waypoints and adding new waypoints to the existing set(s).

- Modify the 50 fm depth contour between waypoints #2 and #4 by adjusting waypoint #3 with a new set of coordinates,
- Modify the 50 fm depth contour between waypoints #4 and #5 by adding five new waypoints,
- Modify the 50 fm depth contour between waypoints #20 and #21 by adding a new waypoint,
- Modify the 50 fm depth contour between waypoints #21 and #23 by adjusting waypoint #22,
- Modify the 50 fm depth contour between waypoints #23 and #25 by adjusting waypoint #24, and
- Modify the 50 fm depth contour between waypoints #25 and #26 by adding a new waypoint.

One problem to note is that the new point inserted between waypoint 25 and 26 causes the modified 50 fm line to cross over the 60 fm line.

Table B-5 shows the revised coordinates for the proposed changes as outlined above. Figure B-4 also shows the waypoint adjustments.

Upon review and analysis, an alternate option is presented here. For the Northern Channel Islands, this new alternate proposed option would better align the RCA shoreward boundary to the 50 fm contour around the Northern Channel Islands. In doing so, it would also provide more fishing areas. This proposal would adjust existing waypoint #3 and add a new waypoint between the existing waypoint #2 and the adjusted waypoint #3. All the other proposed industry adjustments are left as proposed. The details of this alternate option are given in Table B-6 and Figure B-6.

Northern Channel Islands

Industry submitted a proposal to make a number of waypoint adjustments around the northern Channel Islands, California, to accommodate increased fishing opportunities. This proposal was not part of the April 2014 Council meeting motion, but is included in this analysis to address an additional proposal that was received late. The GMT did note in their November 2013 statement (<u>Agenda Item H.3.b GMT Report, November 2013</u>) that it did not have the time (at that time) to determine if there were other waypoints that should be added to the list (the Del Mar and San Diego proposals). This Channel Islands proposal should be considered in reference to that comment.

The proposed waypoint adjustments do overlap with some existing MPAs around the Channel Islands. Also, Essential Fish Habitat (EFH) areas need to be considered, although none were specifically cross-referenced for this analysis. Specific coordinates of EFH area may be found in Federal Regulations 50 CFR 660.75-79. Aside from concerns regarding MPAs and EFHs, access to these areas would be beneficial to the fishing community from the greater Santa Barbara area.

Comparison of the Management Options

Biological Impacts: Increased opportunity for the recreational sector would be accommodated by these changes. The likelihood that increased encounters with overfished species may also occur, would probably be minimal. However, no quantitative evaluations have been made to explore this possibility. When the 50 fm contour was implemented, it eliminated some confusion about fishing the 14 mile bank and 60 mile bank for rockfish (as these seamounts are both between 50 and 60 fm deep).

Under the alternate option, more fishing area would be allowed, without an expected increase in overfished species encounters. This is surmised because the increased area does not extend into appreciably deeper habitat where increased encounters of overfished species could potentially occur.

Socioeconomic Impacts: The changes proposed under the action alternatives may have a marginal socioeconomic benefit for the recreational fishery managed under an RCA with a 50 fm contour as its shoreward boundary. Access to this additional small area would be beneficial to the fishing community from the greater Santa Barbara area, but to what degree it is unknown. The change in management cost, primarily those associated with law enforcement of the RCA boundaries, may be problematic.

Table B-5. Coordinate list for proposed modifications to the 50 fm boundary around the northern Channel Islands, California.

	Boundary Line	Coordinates
ID	Name	Degrees, decimal minutes
2	Current waypoint (keep)	34°07.80' N, 120°30.99' W
3	Proposed modification (modify #3)	34°08.770' N, 120°25.740' W
4	Current waypoint (keep)	34°05.85' N, 120°17.13' W
--	Proposed modification (add after #4)	34°05.73' N, 120°05.93' W
--	Proposed modification (add after #4)	34°06.140' N, 120°04.860' W
--	Proposed modification (add after #4)	34°05.700' N, 120°03.170' W
--	Proposed modification (add after #4)	34°05.670' N, 119°58.980' W
--	Proposed modification (add after #4)	34°06.340' N, 119°56.780' W
5	Current waypoint (keep)	34°05.57' N, 119°51.34' W
20	Current waypoint (keep)	33°50.97' N, 119°57.03' W
--	Proposed modification (add between #20 and #21)	33°50.250' N, 120°00.00' W
21	Current waypoint (keep)	33°50.03' N, 120°03.00' W
22	Proposed modification (modify #22)	33°51.060' N, 120°03.730' W
23	Current waypoint (keep)	33°54.49' N, 120°12.85' W
24	Proposed modification (modify #24)	33°58.900' N, 120°20.150' W
25	Current waypoint (keep)	34°00.71' N, 120°28.21' W
--	Proposed modification (add between #25 and #26)	34°02.200' N, 120°30.370' W
26	Current waypoint (keep)	34°03.60' N, 120°30.60' W

Table B-6. Coordinate list for alternate option modifications to the 50 fm boundary around the northern Channel Islands, California.

	Boundary Line	Coordinates
ID	**Name**	**Degrees, decimal minutes**
2	Current waypoint (keep)	34°07.80' N, 120°30.99' W
--	Proposed modification (add after # #2)	34°08.42' N, 120°27.92' W
3	Proposed modification	34°09.31' N, 120°27.81' W
4	Current waypoint (keep)	34°05.85' N, 120°17.13' W
--	Proposed modification (add after #4)	34°05.73' N, 120°05.93' W
--	Proposed modification (add after #4)	34°06.140' N, 120°04.860' W
--	Proposed modification (add after #4)	34°05.700' N, 120°03.170' W
--	Proposed modification (add after #4)	34°05.670' N, 119°58.980' W
--	Proposed modification (add after #4)	34°06.340' N, 119°56.780' W
5	Current waypoint (keep)	34°05.57' N, 119°51.34' W
20	Current waypoint (keep)	33°50.97' N, 119°57.03' W
--	Proposed modification (add between #20 and #21)	33°50.250' N, 120°00.00' W
21	Current waypoint (keep)	33°50.03' N, 120°03.00' W
22	Proposed modification (modify #22)	33°51.060' N, 120°03.730' W
23	Current waypoint (keep)	33°54.49' N, 120°12.85' W
24	Proposed modification (modify #24)	33°58.900' N, 120°20.150' W
25	Current waypoint (keep)	34°00.71' N, 120°28.21' W
--	Proposed modification (add between #25 and #26)	34°02.200' N, 120°30.370' W
26	Current waypoint (keep)	34°03.60' N, 120°30.60' W

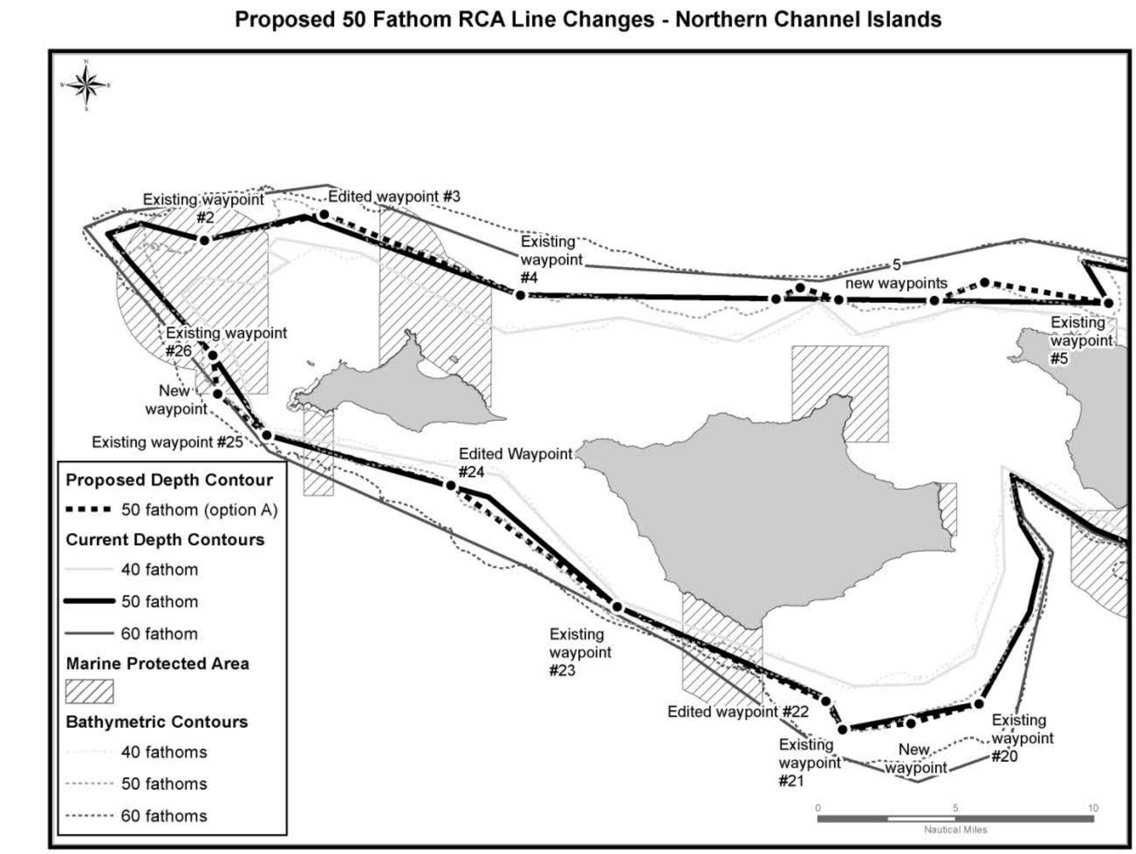

Figure B-5. Modifications to the 50 fm contour around the northern Channel Islands of San Miguel, Santa Rosa, and Santa Cruz Islands, California, proposed by industry. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May 4, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

Proposed 50 Fathom RCA Line Changes - Northern Channel Islands

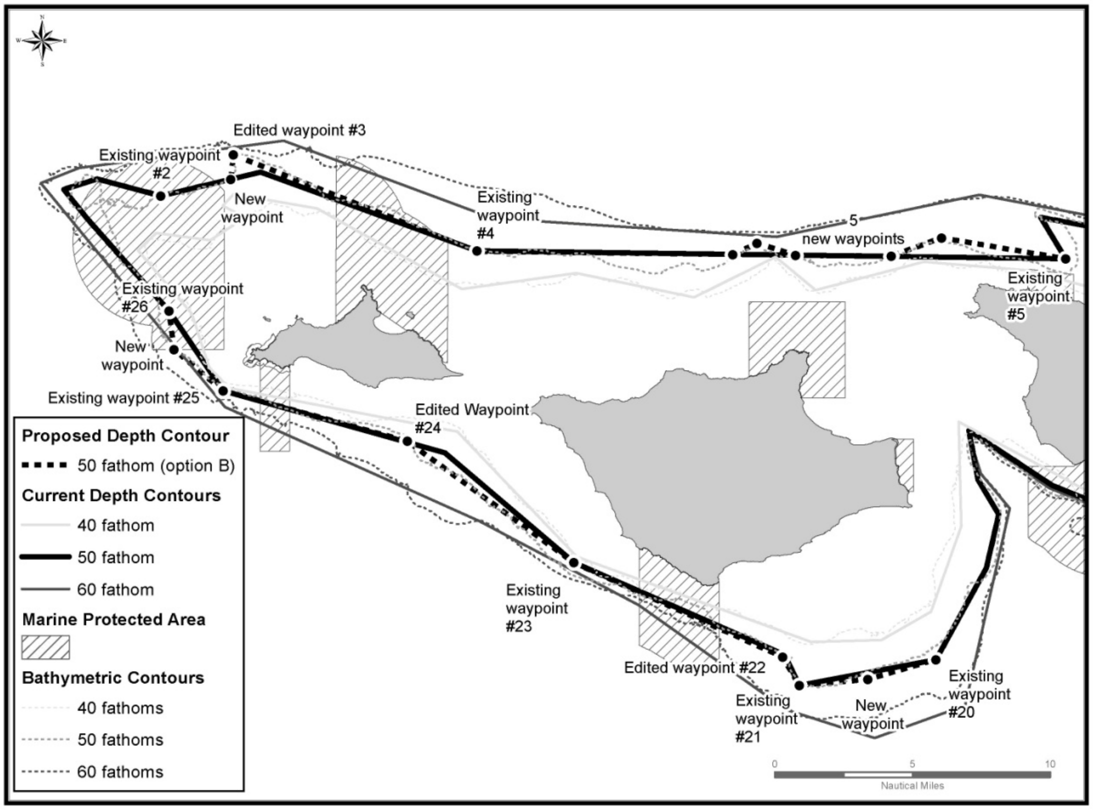

Figure B-6. Modification to the 50 fm contour around the northern Channel Islands of San Miguel, Santa Rosa, and Santa Cruz Islands, California, proposed by CDFW. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

B.2 Establish New Rockfish Conservation Area Coordinates – 300 and 350 fm

Need for Action

The Pacific Fishery Management Council (the Council) requested that the Groundfish Management Team (GMT) propose coordinates for and analyze possible 300 and 350 fm Rockfish Conservation Areas (RCAs) north of 40°10' N. latitude. These RCAs were proposed as possible management measures to aid in reducing catch of rougheye and blackspotted rockfish during the 2015-16 biennium and could potentially be applied to all sectors through routine or inseason action. The GMT intends to provide analysis of these areas by sector for the June 2014 Council meeting. Other analysis regarding RCA changes can be found in the Final Environmental Assessment for Trawl RCA Boundary Modifications, completed by the National Marine Fisheries Service (NMFS) in February 2014.

Management Options

No Action: The deepest RCA boundaries available in regulation would be 250 fm.

Options: At this time, the following latitude and longitude coordinates (i.e., waypoints) are provided as a starting point for the discussion that is needed to refine and identify possible 300 and 350 fm lines (Table B-7 and Table B-8). These waypoints were developed using geographic information system (GIS) software (ArcGIS 10.1) and are based on 300 and 350 fm bathymetry contours.[1] More information, such as the files used to create these lines, will be available for the public at the following FTP site: ftp://ftp.pcouncil.org/pub/GMT/Proposed_300_350_RCAs/. Given other workload, the GMT was not able to produce an analysis of impacts resulting from these lines for the June Briefing Book. The GMT aims to produce a supplemental report at the June Council meeting focused on logbook and observer data to characterize how catch of target species and bycatch of rougheye and other species would be altered by the RCA boundary lines. The proposed waypoints are provided now to get feedback from the fishing industry regarding how these lines may affect their operations and how the lines might be improved to achieve objectives (e.g., reduce rougheye rockfish catch while retaining productive fishing grounds for other species).

Figure B-7 provides an example of issues that emerged when developing these proposed waypoints. First, the 300 and 350 fm bathymetry contours are very detailed and creating RCA lines directly following these contours would not be practical. Therefore, these contours were approximated and straightened using several tools available in ArcGIS.[2] Second, there were several areas where the existing 250 fm RCA line (unmodified for petrale, defined in regulation at §660.74) touched or overlapped the 300 and 350 fm bathymetry contours.[3] When this occurred, the GMT analyst visually and manually adjusted these lines to pull them outside of the 250 fm RCA (Figure B-8 provides an example). More information about where these manual adjustments were made can be provided in June if requested.

Given the availability and resolution of the data and the complexity of certain features like undersea canyons, matching RCA boundary lines to actual bathymetry is difficult. The original and current purpose of boundary lines is not to match the bathymetry perfectly, but to create regulatory lines that

[1] Source of bathymetry contours: NOAA National Geophysical Data Center, http://www.ngdc.noaa.gov/mgg/bathymetry/relief.html (accessed 5/19/14).

[2] The following ArcGIS 10.1 tools were used to develop, simplify, and straighten the 300 fm and 350 fm bathymetry contour lines: “Neighborhood Selection (Geostatistical Analyst)”, “Simplify Line (Cartography)”, and the “Edit Vertices” tools.

[3] The coordinates of existing RCA boundary lines, including the 250 fm line, can be downloaded from the NMFS West Coast Region’s website: http://www.westcoast.fisheries.noaa.gov/fisheries/management/groundfish_closures/rockfish_areas.html

approximate depth contours, would be enforceable, and would be effective at lowering bycatch to the desired degree. To overcome this difficultly when the currently existing RCAs were first developed, RCA lines such as the 250 fm line were manually adjusted after feedback from the fishing industry, enforcement, and the GMT (i.e., RCAs were designed to approximate bathymetry contours).

The 300 and 350 fm RCA lines and waypoints shown in this document could be viewed as the first of many steps. Adjusting these lines could be the next step of the process. Various methods can be used to adjust these lines to approximate the depth contours while at the same time being enforceable, understandable, logical, and be effective at lowering bycatch. One approach that may be used to adjust these base lines is the traditional approach that was used when RCAs were first created (i.e., through consultations with NMFS, States, Tribes, GAP, GMT, EC, etc.). Various analytical tools can be applied to help this process and ensure that existing RCA lines that are shallower (e.g., 250 fm line) do not cross the new “deeper” RCA lines (i.e., the 300 and 350 fm lines). One approach that can be applied to ensure that lines do not cross is to set the RCAs equal at those locations. That is, when the 300 or 350 fm line crosses the 250 fm line, the 300 or 350 fm line would simply follow the 250 fm line. This approach is often used now to correct RCA lines that cross. An example of this approach is shown in Figure B-9. Other approaches could also be applied. For example, one could simply extend the existing 250 fm line in increments (e.g., by 0.5 nm, 1 nm, 3 nm, etc.) to create new RCAs that do not necessarily approximate depth contours but instead, follow the pattern of shallower RCA lines that currently exist. An example of this novel approach is shown in Figure B-10.

Table B-7. Proposed waypoints (decimal degrees) for the proposed 300 fm RCA line.

	latitude	longitude		latitude	longitude		latitude	longitude		latitude	longitude
1	48.23805	-125.722	40	46.53289	-124.586	79	44.22716	-125.008	118	40.62666	-124.653
2	48.2233	-125.684	41	46.52164	-124.55	80	43.95658	-124.98	119	40.56284	-124.714
3	48.15031	-125.764	42	46.47564	-124.544	81	43.89512	-124.934	120	40.51873	-124.696
4	48.09913	-125.794	43	46.30289	-124.676	82	43.815	-124.916	121	40.4207	-124.621
5	48.07393	-125.696	44	46.29164	-124.667	83	43.78082	-124.794	122	40.37395	-124.546
6	47.89843	-125.635	45	46.2417	-124.566	84	43.65907	-124.729	123	40.28916	-124.542
7	47.89191	-125.586	46	46.22092	-124.648	85	43.49788	-124.739	124	40.31489	-124.854
8	47.89583	-125.548	47	46.17638	-124.703	86	43.43511	-124.862	125	40.29333	-124.838
9	47.91317	-125.49	48	46.10217	-124.768	87	43.38396	-124.752	126	40.26391	-124.753
10	47.96345	-125.41	49	46.08716	-124.831	88	43.33254	-124.778	127	40.24733	-124.651
11	48.02782	-125.363	50	46.05116	-124.842	89	43.33052	-124.888			
12	47.84189	-125.331	51	46.00373	-124.835	90	43.02533	-124.909			
13	47.76836	-125.132	52	45.93873	-124.77	91	42.94672	-124.942			
14	47.71967	-125.127	53	45.79726	-124.77	92	42.81248	-124.93			
15	47.5583	-125.164	54	45.7633	-124.788	93	42.7113	-124.868			
16	47.5248	-125.036	55	45.74414	-124.778	94	42.72986	-124.835			
17	47.45409	-124.97	56	45.56331	-124.768	95	42.71373	-124.769			
18	47.47689	-124.915	57	45.39798	-124.713	96	42.63573	-124.738			
19	47.46197	-124.876	58	45.39849	-124.743	97	42.53415	-124.829			
20	47.40913	-124.82	59	45.27022	-124.778	98	42.5064	-124.777			
21	47.33607	-124.813	60	45.13998	-124.658	99	42.48499	-124.855			
22	47.33427	-124.855	61	45.13577	-124.702	100	42.33332	-124.744			
23	47.30371	-124.91	62	45.17175	-124.748	101	42.30082	-124.808			
24	47.23329	-124.918	63	45.10914	-124.782	102	42.20673	-124.696			
25	47.25581	-125.027	64	45.03192	-124.772	103	41.92915	-124.628			
26	47.09323	-125.027	65	44.96264	-124.714	104	41.79916	-124.558			
27	47.05663	-124.969	66	44.94028	-124.755	105	41.55749	-124.538			
28	46.99229	-125.022	67	44.95702	-124.818	106	41.51464	-124.556			
29	46.91509	-125.038	68	44.92048	-124.846	107	41.46701	-124.528			
30	46.858	-125.006	69	44.90414	-124.942	108	41.33499	-124.511			
31	46.84235	-124.95	70	44.84668	-124.906	109	41.1206	-124.426			
32	46.8258	-124.958	71	44.79168	-124.953	110	40.92916	-124.562			
33	46.67913	-124.861	72	44.62085	-124.888	111	40.80083	-124.561			
34	46.6369	-124.861	73	44.54914	-124.932	112	40.81164	-124.615			
35	46.61414	-124.819	74	44.47665	-124.945	113	40.74833	-124.553			
36	46.63994	-124.734	75	44.36959	-124.933	114	40.69422	-124.559			
37	46.56586	-124.639	76	44.36968	-124.885	115	40.68908	-124.641			
38	46.5224	-124.713	77	44.32161	-124.911	116	40.67205	-124.643			
39	46.49695	-124.677	78	44.25498	-125	117	40.66271	-124.593			

Table B-8. Proposed waypoints (decimal degrees) for the proposed 350 fm RCA line.

	latitude	longitude		latitude	longitude		latitude	longitude		latitude	longitude
1	48.20789	-125.821	40	46.80554	-125.088	79	44.77745	-124.983	118	41.99173	-124.696
2	48.20766	-125.791	41	46.80914	-124.972	80	44.69275	-124.921	119	41.55916	-124.553
3	48.23371	-125.727	42	46.67414	-124.889	81	44.60287	-124.908	120	41.51402	-124.566
4	48.20757	-125.714	43	46.64865	-124.909	82	44.52987	-124.952	121	41.45619	-124.54
5	48.12996	-125.794	44	46.6096	-124.87	83	44.47795	-124.967	122	41.32876	-124.524
6	48.09757	-125.798	45	46.60958	-124.82	84	44.30117	-124.965	123	41.16406	-124.447
7	48.06944	-125.708	46	46.62941	-124.726	85	44.2578	-125.003	124	41.11057	-124.456
8	47.96539	-125.669	47	46.57146	-124.652	86	44.22915	-125.014	125	41.04448	-124.505
9	47.93788	-125.703	48	46.56145	-124.685	87	43.92831	-125.002	126	40.96423	-124.637
10	47.92745	-125.702	49	46.5183	-124.737	88	43.90044	-124.947	127	40.85553	-124.64
11	47.89265	-125.642	50	46.48883	-124.683	89	43.78876	-124.922	128	40.82421	-124.656
12	47.8835	-125.587	51	46.51937	-124.613	90	43.75253	-124.828	129	40.73507	-124.567
13	47.89996	-125.5	52	46.51381	-124.554	91	43.59856	-124.755	130	40.73426	-124.567
14	47.98708	-125.361	53	46.47654	-124.55	92	43.57113	-124.774	131	40.69786	-124.566
15	47.86287	-125.342	54	46.31247	-124.679	93	43.61883	-124.832	132	40.69509	-124.649
16	47.82184	-125.368	55	46.31978	-124.741	94	43.60081	-124.851	133	40.66907	-124.65
17	47.76433	-125.14	56	46.28832	-124.745	95	43.5546	-124.792	134	40.66434	-124.617
18	47.7158	-125.133	57	46.25437	-124.618	96	43.50623	-124.815	135	40.56374	-124.718
19	47.62014	-125.174	58	46.11664	-124.777	97	43.49837	-124.858	136	40.52059	-124.702
20	47.60496	-125.213	59	46.0912	-124.835	98	43.41441	-124.898	137	40.42083	-124.626
21	47.48363	-125.21	60	46.05164	-124.852	99	43.37613	-124.848	138	40.36875	-124.55
22	47.46343	-125.167	61	45.96473	-124.837	100	43.29472	-124.928	139	40.29397	-124.566
23	47.52303	-125.037	62	45.92786	-124.798	101	43.04086	-124.916	140	40.32119	-124.868
24	47.4408	-124.965	63	45.80497	-124.779	102	42.939	-124.952	141	40.28373	-124.851
25	47.46202	-124.942	64	45.78564	-124.828	103	42.81507	-124.95	142	40.24422	-124.775
26	47.45998	-124.88	65	45.76029	-124.808	104	42.68156	-124.88	143	40.24391	-124.682
27	47.40857	-124.823	66	45.72083	-124.842	105	42.6686	-124.848			
28	47.34138	-124.821	67	45.6871	-124.825	106	42.70941	-124.847			
29	47.33828	-124.859	68	45.69054	-124.779	107	42.71691	-124.833			
30	47.29996	-124.921	69	45.48589	-124.8	108	42.68499	-124.786			
31	47.24007	-124.933	70	45.40154	-124.748	109	42.63387	-124.757			
32	47.26666	-125.047	71	45.3675	-124.79	110	42.53112	-124.846			
33	47.09044	-125.036	72	45.26751	-124.781	111	42.51059	-124.797			
34	47.05555	-124.973	73	45.22428	-124.766	112	42.48839	-124.865			
35	47.01889	-125.007	74	45.05831	-124.828	113	42.43829	-124.833			
36	46.98667	-125.029	75	44.98262	-124.792	114	42.33006	-124.776			
37	46.91473	-125.044	76	44.95035	-124.951	115	42.30914	-124.861			
38	46.85661	-125.013	77	44.9005	-124.966	116	42.11665	-124.753			
39	46.85164	-125.081	78	44.84664	-124.933	117	42.0409	-124.779			

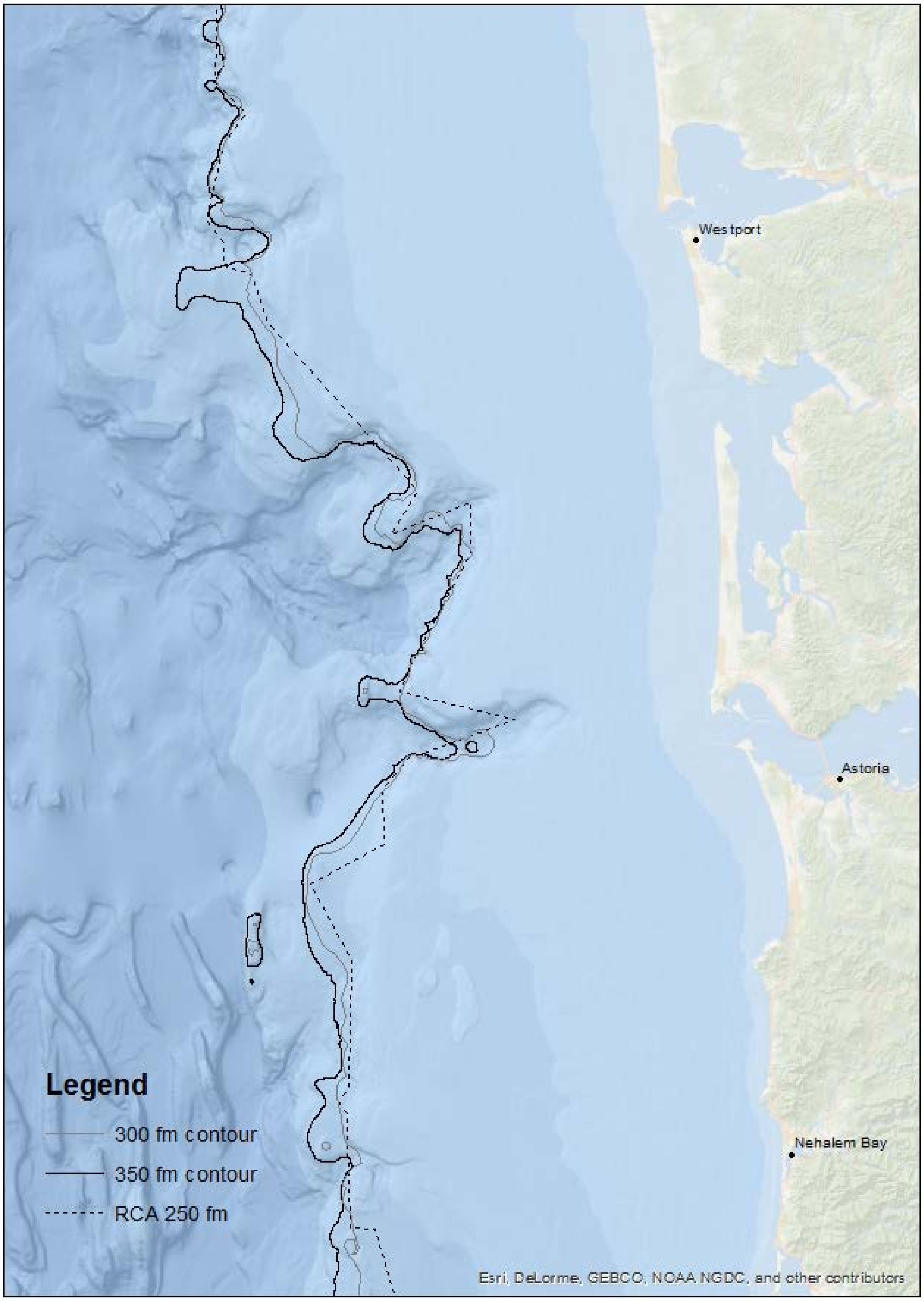

Figure B-7. An example of where the existing 250 fm Trawl RCA (unmodified for petrale sole) overlaps with the 300 and 350 fm bathymetry contours

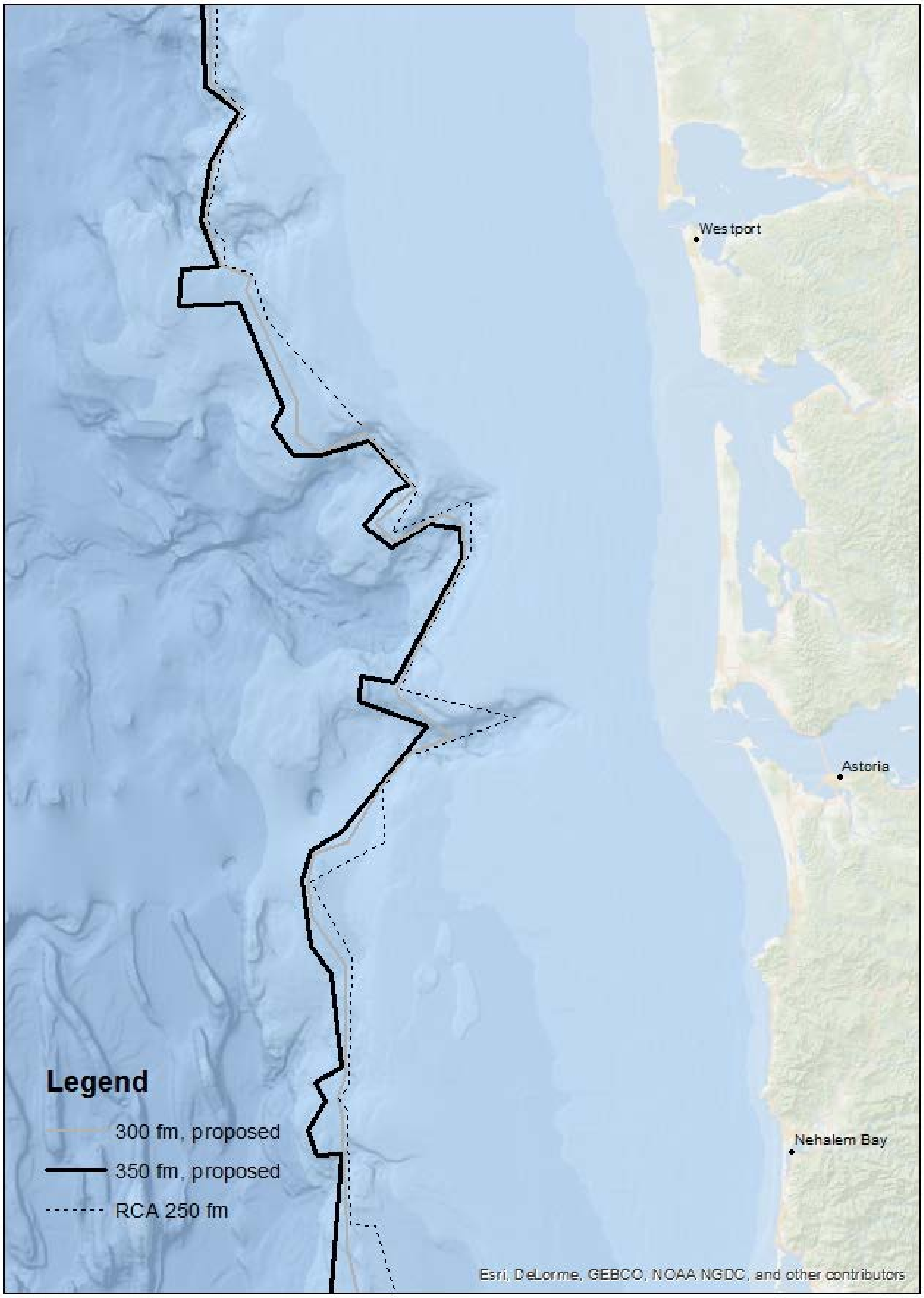

Figure B-8. An example of manual adjustments to the proposed 300 and 350 fm lines where they overlap with the existing 250 fm RCA line (unmodified for petrale sole).

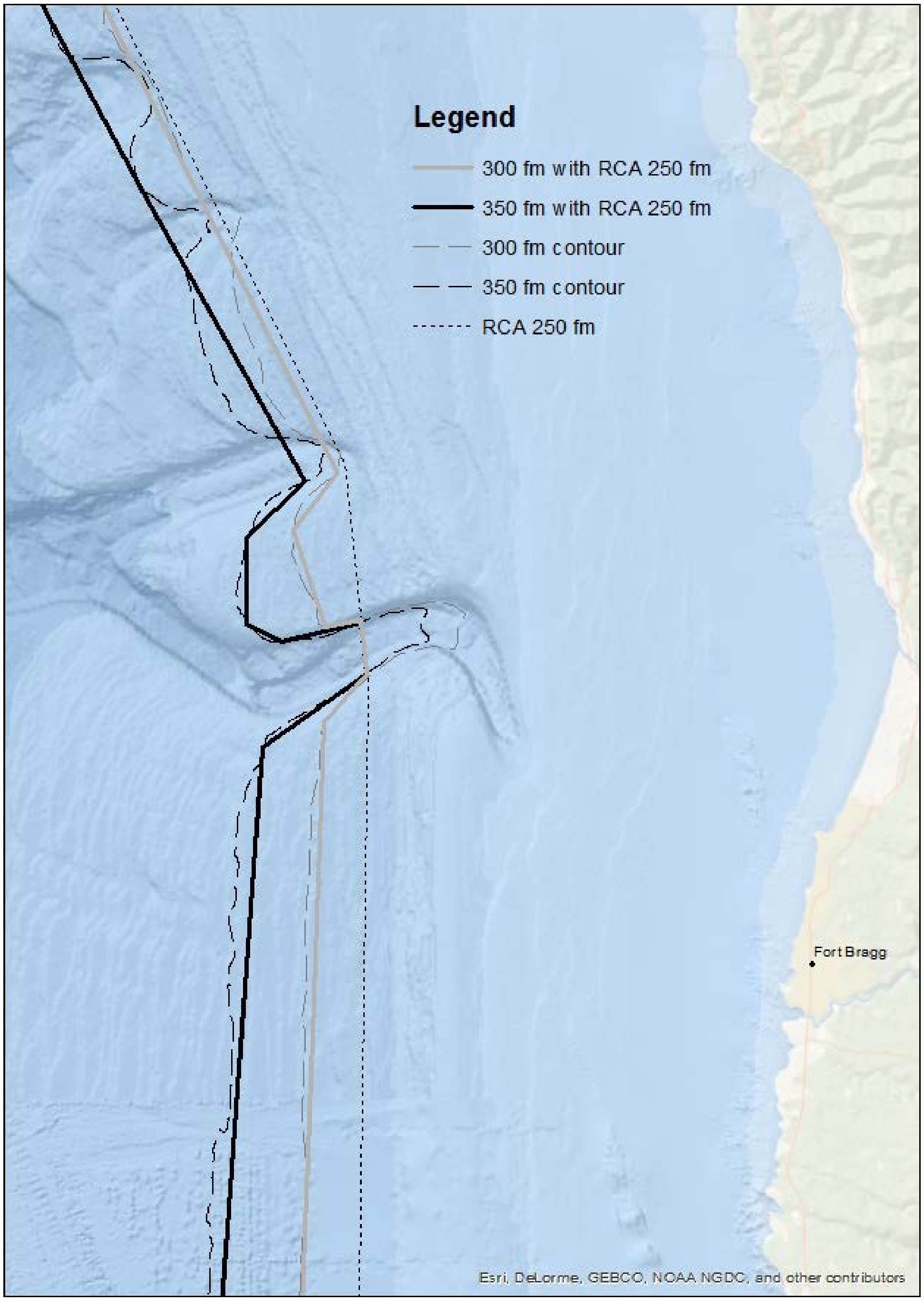

Figure B-9. An example of an approach to deal with areas where new RCA lines, based on 300 and 350 fm bathymetry contours, cross an existing RCA line (e.g., 250 fm line). In these areas, the new RCA lines could follow the existing RCA line.

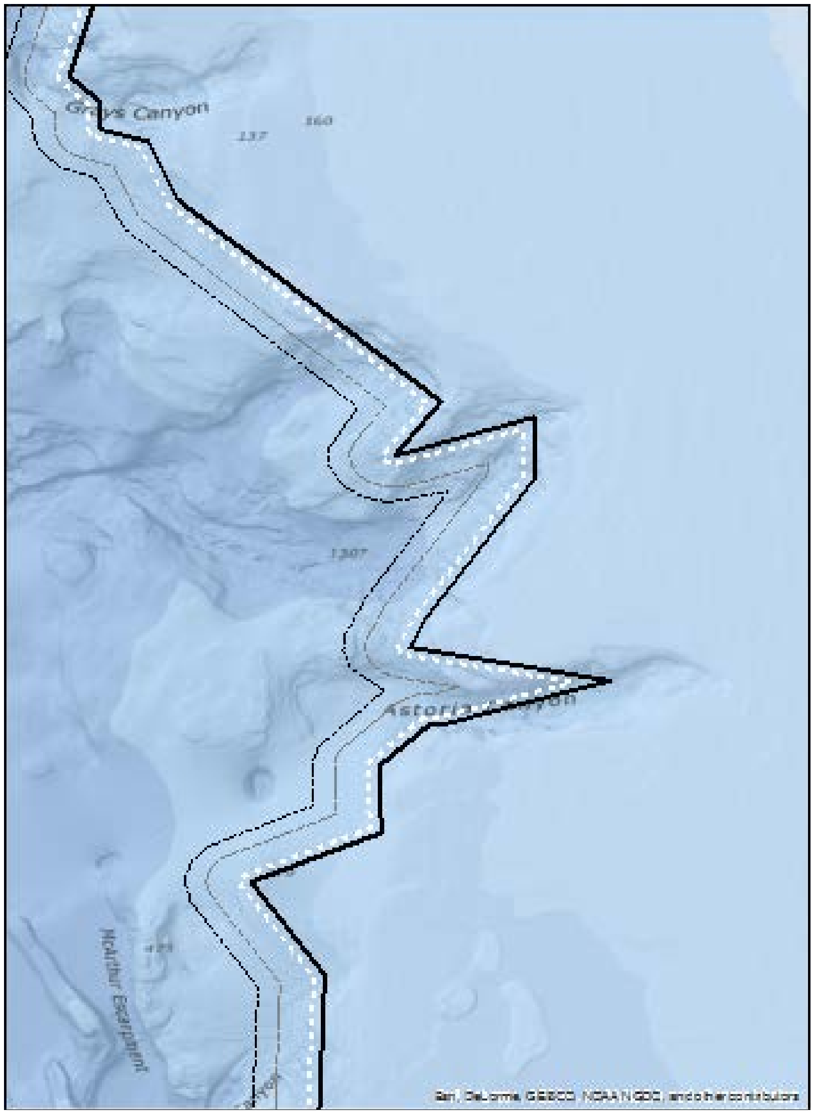

Figure B-10. An example of an approach to create new RCA lines by extending an existing 250 fm line in increments (e.g., by 0.5 nm, 1.5 nm, and 3 nm). These lines would follow the pattern of the existing RCA line which does not approximate bathymetry contours in all areas.

B.3 Trawl: Set-asides to cover carryover if trawl allocation exceeded

Analysis of this management measure was not received by the Advanced Briefing Book deadline; it is expected to be delivered as a Supplemental GMT Report.

B.4 Within Non-Trawl: Two-Year Yelloweye Sharing - Evaluating uncertainty of yelloweye catches in the nearshore and non-nearshore commercial fixed gear sectors

Need for Action

The Council is considering transferring 0.6 mt of the yelloweye rockfish non-trawl allocation fishery harvest guideline (HG) from the non-nearshore sector to the nearshore sector. Nearshore sector landings are often constrained due to amount of yelloweye rockfish provided to the nearshore sector. Further, shoreward adjustments of the non-trawl RCA (e.g., changing from 30 to 20 fm) are implemented when the yelloweye rockfish nearshore share or the non-trawl HG is projected to be exceeded. The Council considers the two-year allocations for yelloweye rockfish every biennial cycle based on the projected impacts, i.e., forecasts of total fishing mortality, provided by the GMT and other factors. The nearshore and non-nearshore sectors are assigned a "share" of the non-trawl allocation. The sectors' shares and projected impacts (i.e., total fishing mortality) for yelloweye are shown in Table B-9.

Table B-9. The sector shares and project impacts of yelloweye rockfish with and without the transfer of 0.6 mt.

		Without transfer		With transfer	
		2015	2016	2015	2016
non-nearshore	share	1.1	1.2	0.5	0.6
	projection	0.5	0.5	0.5	0.5
	difference	0.6	0.7	0.0	0.1
nearshore	share	1.2	1.3	1.8	1.9
	projection	1.1	1.1	1.1	1.1
	difference	0.1	0.2	0.7	0.8

The projected impacts and projection methods of yelloweye catch for 2015-2016 are more fully discussed in section 4.2.2.5 and Appendix A of the DEIS. The nearshore projected impacts are under discussion as well and may be subject to change depending on the Council's recommendations on the harvest guideline for the nearshore rockfish stock complex and related management measures.

The GMT has advised the Council, most recently in April that the catch estimates and model projections are subject to considerable uncertainty that the team has yet to fully evaluate.[4] This analysis uses a Monte Carlo simulation approach based on West Coast Groundfish Observer Program (WCGOP) sampling rates and observed patterns of yelloweye catch in these sectors to gauge the relative level of uncertainty surrounding yelloweye catches. This uncertainty is relevant here because, as shown in Table B-9, the 0.6 mt transfer would completely remove the buffer between the projected catch and the sector share in the non-nearshore sector and increase the buffer in the nearshore sector. And as it stands now, there is only a 0.1 to 0.2 mt buffer between the nearshore sectors' share and projected catch.

Background and Context

The GMT has been focused on the uncertainty in two separate but related estimates: (1) the retrospective annual estimates of total mortality produced by the Northwest Fisheries Science Center (NWFSC); and (2) the GMT's forecasts/projected impacts. The simulations used here focus primarily on evaluating the first. The uncertainty seen in the simulation results can then be related to the projected impacts and aid with interpretation of how confident we can be in those forecasts.

[4] PFMC Briefing Book April 2014, Agenda Item C.8.b, Supplemental GMT Report.

For highly discarded species like yelloweye, catch is not known with certainty because not all catch is observed. Annual mortality estimates are produced with statistical sampling and estimation methods that are inherently uncertain. The purpose of the GMT's catch projections is to inform the Council on what the annual catch estimates might be under a given management measure scenario. Like most all forecasts, they involve uncertainty as well. With the non-nearshore and nearshore projection models, the GMT provides the Council with point estimates of catch without any quantitative measure of uncertainty around those estimates. The Council, recognizing that the forecasts are uncertain, has often taken a precautionary approach in establishing sector shares and more formal sector allocations. The level of precaution or tolerable risk is a key policy decision. With increased access to and additional years of data from WCGOP, the GMT has begun attempts at better quantifying the uncertainty and informing the Council of the risks.

As brief background, uncertainty in measurements and estimation can be thought of in terms of accuracy and precision. These two terms are used differently among technical disciplines, but here we think of accuracy in terms of bias.[5] An unbiased estimate will accurately reflect the true value yet do so subject to some level of precision. Absent perfect precision, repeated estimates/measurements will vary from one another with the degree of variability proportional to the precision of the estimate/measurement. Highly imprecise estimates will vary widely, but if repeated and unbiased, the average of the estimates will reflect the true value accurately. In contrasting circumstances, it would be possible to have highly precise but inaccurate estimates/measurements. In such cases, repeated estimates/measurements would vary little but vary around something other than the true value.

WCGOP sampling and catch estimation methods are designed to produce unbiased, accurate estimates. There is little that can be done easily to evaluate if the accuracy is being achieved (the observer effect/bias where fishing vessels operate differently when an observer is aboard making the observations non-representative). Here we assume that are indeed accurate and that precision is the main source of uncertainty.

The precision of an estimate will vary largely based on two main variables: (1) the sampling rate/coverage level, and; (2) the variability and frequency of the event being measured. In general, precision will be greater with higher sampling coverage and regular, frequent catch events. In contrast, for a given level of sampling coverage, precision will be lower to the degree that the event is rare and variable.

Lastly, sampling uncertainty from limited precision would exist even if the unit being measured is fixed or static (e.g. the circumference of the Earth). The event we are focused on here is the yelloweye catch over a year, which is not likely to be fixed. Catch is expected to vary from year to year depending on fishing effort, the areas fished, changes in management regulations, etc. Moreover, the expectations for a rebuilding stock like yelloweye is that the catch rate will increase as the stock increases in abundance and expands its distribution, increases in density, or both. Imprecision in estimates makes upward trends difficult to detect. Increases in catch from one year to the next might be signal or could just be sampling noise. The same is true for downward trends where the encounter rate may have truly decreased. Making predictions about future catch with noisy historical data makes the forecasting challenge even more so.

Patterns of Yelloweye Catch and Observer Coverage in the Nearshore and Non-nearshore Sectors
As shown in Table B-10, annual estimates of yelloweye catch have shown a high degree of variability in both the nearshore and non-nearshore fixed gear sectors. As highlighted above, sampling error is likely a major component of the variability. Consistent with the latter, variability has been higher in the nearshore sector where sampling coverage levels have been lower (Table B-11 and Table B-12).

[5] For example, see Box 1.2 in National Research Council. Review of Recreational Fisheries Survey Methods. Washington, DC: The National Academies Press, 2006.

Variability can be described in absolute terms (i.e., in the unit of measurement), which in this case is catch weight expressed as metric tons (mt), or in relative terms (e.g. the coefficient of variation, which expresses the variability relative to the average value). Considering variability in absolute terms is important because the Council considers and recommends allocations and less formal apportionments of catch in terms of metric tons. Table B-10(c) displays the variability seen in metric tons by comparing the annual estimates against the grand mean (i.e., the average across all available annual estimates).

Relative measures of variability are also useful, especially for comparing variability between the sectors. For example, an estimate that is truly more imprecise than another may appear more precise when viewed in absolute terms simply because its average value is smaller. Table B-10 (b) shows one form of relative variability by comparing the annual estimates in each sector to the estimates made in the previous years. In the nearshore sector, estimates have dropped by 80 percent and increased by more than 800 percent. The non-nearshore sector has experience less variability in this measure, yet has seen a 75 percent drop and a 50 percent gain. Table B-10 (d) shows the percent difference of the annual estimates compared to the average over the timeframe ("grand mean"). This measure is of interest because such grand means of bycatch ratios currently serve as the foundation for the GMT's projection models for these sectors. Both sectors show wide variability on this measure as well further underscoring the challenge of forecasting yelloweye catches.

Table B-10. Variability of total mortality estimates for yelloweye rockfish in the nearshore and non-nearshore commercial fixed gear sectors, 2003-2012.

(a) NWFSC Total Mortality Estimate (source: GMMultiYr_DataProduct Dec. 23, 2013)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	0.3	1.1	0.9	0.8	1.9	2.5	0.5	0.1	0.8	1.8
Non-nearshore	1.6	1.1	0.6	0.7	0.7	0.8	1.2	0.3	0.3	0.3

(b) Annual estimate relative to estimate of previous year

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	--	3.67	0.82	0.89	2.38	1.32	0.20	0.20	8.00	2.25
Non-nearshore	--	0.69	0.55	1.17	1.00	1.14	1.50	0.25	1.00	1.00

(c) Difference (mt) between annual estimate and 2003-2012 average in each sector (nearshore = 1.1 mt, non-nearshore = 0.8 mt)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	-0.8	0.0	-0.2	-0.3	0.8	1.4	-0.6	-1.0	-0.3	0.7
Non-nearshore	0.8	0.3	-0.2	-0.1	-0.1	0.0	0.4	-0.5	-0.5	-0.5

(d) Difference between annual estimate and 2003-2012 average relative to average (i.e., the values reported in (c) divided by the average).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	0.27	1.00	0.82	0.73	1.73	2.27	0.45	0.09	0.73	1.64
Non-nearshore	2.00	1.38	0.75	0.88	0.88	1.00	1.50	0.38	0.38	0.38

Overview of the Data Used and Aim of the Simulation Methods
WCGOP provided the observer data sets matched to the data used for the GMT's nearshore and non-nearshore projection models. These datasets are considered confidential and therefore are available only to a subset of the team that have confidentiality agreements in place with WCGOP.

The basic observer coverage statistics for the non-nearshore and nearshore sectors are shown in Table B-11 and Table B-12. The WCGOP coverage rates reported in those tables were taken from a table downloadable from their Sector Data Products webpage.[6] For the non-nearshore sector, we are focused on the area north of 36° N. latitude and the observer coverage levels reported in Table B-11 combine the Limited Entry Sablefish Endorsed, Non-Sablefish-Endorsed Fixed Gear, and Open Access vessels that are classified as part of this sector.

By design, WCGOP focuses on observing a certain percentage of landings as opposed to certain percentage of trips. Likewise the bycatch ratios WCGOP uses to expand observed discard to the total fleet are expressed in terms of landed catch. However, for simplicity of modeling the simulations presented here use trip as the main unit of analysis.

If trips contributed the same level of overall landings per year, the two would be equivalent. Yet this is not the case and some trips contribute a higher portion of the landings in both the nearshore and non-nearshore sectors. If coverage levels were reported in terms of the trips observed per year, then the coverage would be lower in both sectors. Nonetheless, we do not expect our choice to focus the simulation on trips instead of landings to affect the usefulness of the simulation results. If WCGOP maintains the same sampling plan and general levels of observer coverage, then the relationship between observer coverage and landings per trip would be expected to hold. And if so, the simulations should provide means to evaluate the general patterns we should expect to continue into the future.

The frequency with which yelloweye have been encountered by trip is one of the main variables in the simulations. Figure B-11 and Figure B-12 report the total number of trips with yelloweye catch observed ("non-zero" trips) divided by total observed trips for the nearshore and non-nearshore sectors. As those shown, the per trip frequency of yelloweye catch in the nearshore sectors has been over double of that seen in the non-nearshore sectors. The per trip frequency has varied in both over the time series.

The other main variable of interest is the magnitude of catch on non-zero trips. Whereas the frequency of yelloweye catch on a trip in the non-nearshore sectors is half of that in the nearshore sectors, the magnitude of catch on non-zero trips is over twice, on average, of the catches in the nearshore sectors (Figure B-13 and Figure B-14). The distribution of non-zero catches across all years of the non-nearshore and nearshore data are further displayed in Figure B-15 thru Figure B-18.

[6] http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm

Table B-11. Summary of nearshore sector WCGOP observations used to establishing the frequency with which yelloweye are encountered on a trip and the level at which the sector is observed each year. The "*" in 2003 indicates that the statistic could not be displayed because of confidentiality.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Trips Observed	--	108	367	308	341	303	225	239	253	349	386
Trips w/ yelloweye	--	*	34	16	25	45	29	17	11	38	65
% of observed trips with yelloweye	--	*	9%	5%	7%	15%	13%	7%	4%	11%	17%
WCGOP coverage %	--	2%	7%	5%	7%	6%	4%	4%	5%	6%	8%

Table B-12. Summary of non-nearshore sector WCGOP observations used to establishing the frequency with which yelloweye are encountered on a trip and the level at which the sector is observed each year.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2013
Trips Observed	102	269	256	251	275	358	335	304	512	443	304
Trips w/ yelloweye	21	25	13	18	13	10	10	8	4	7	9
% of observed trips with yelloweye	21%	9%	5%	7%	5%	3%	3%	3%	1%	2%	3%
WCGOP coverage %	18%	17%	12%	27%	17%	22%	29%	7%	22%	22%	22%

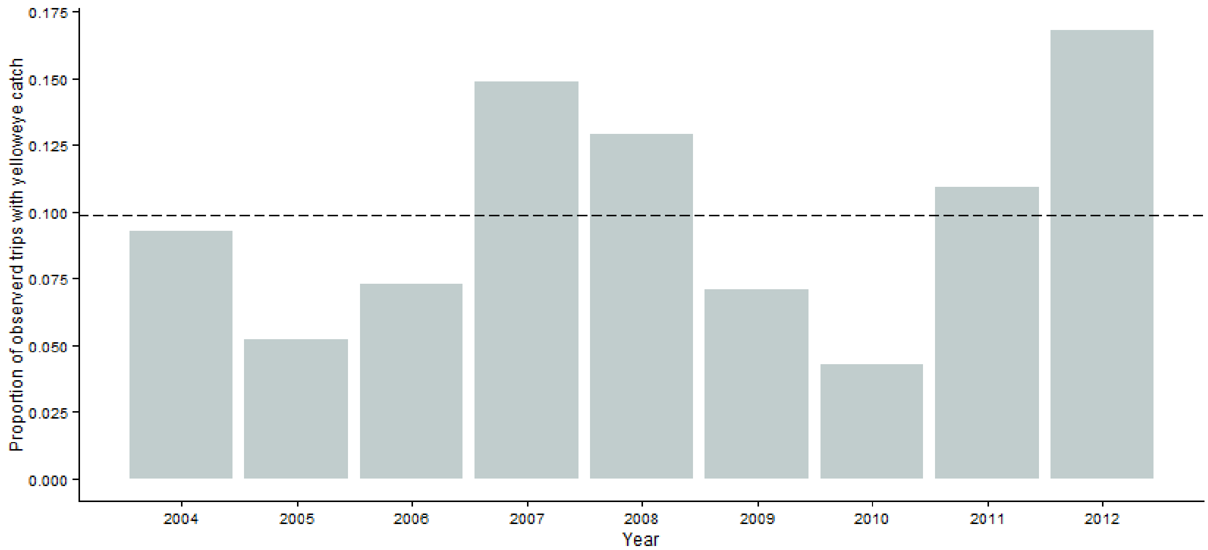

Figure B-11. Annual proportion of observed trips in the nearshore commercial fixed gear sectors where yelloweye were encountered. The 2004-2012 average is displayed by the dashed line (2003 was excluded because of confidentiality).

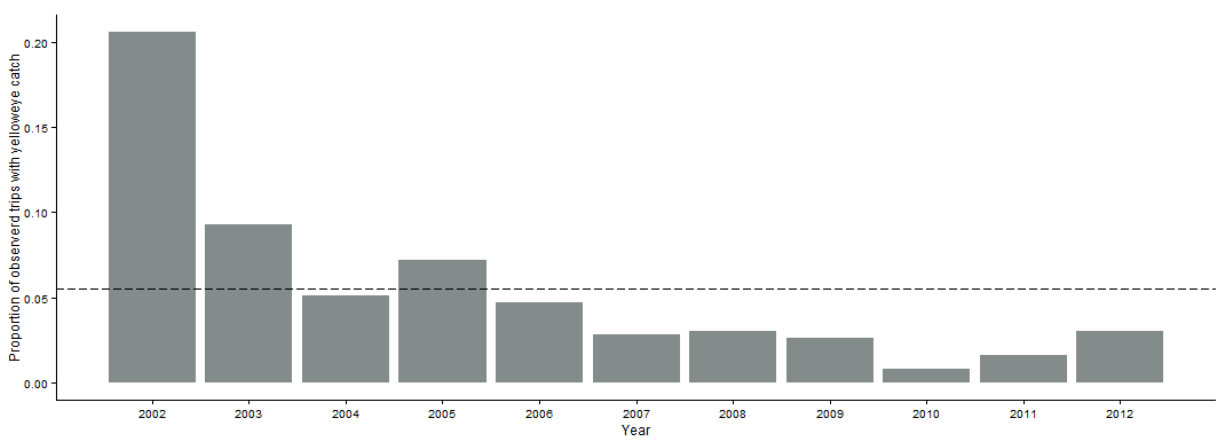

Figure B-12. Annual proportion of observed trips in the non-nearshore commercial fixed gear sectors where yelloweye were encountered. The 2002-2012 average displayed by the dashed line.

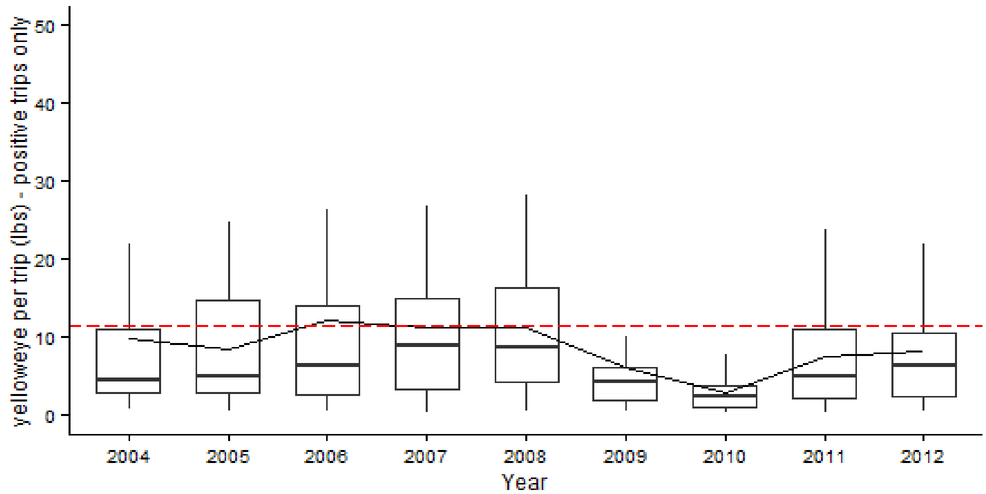

Figure B-13. Boxplots of yelloweye catches (zeros excluded) by trip and year in the nearshore commercial fixed gear sectors. Outer edges of the boxes show the 25th and 75th percentile levels with the middle line representing the median value. The solid line connects the average value for each year. In all but 2010, the averages are noticeably larger than the median because of large catch events. The dashed line shows the 2004-2012 average ("grand mean"). Outliers are not displayed because of confidentiality. A y-axis extending to 200 would display all outliers with room to spare. To give some sense of the range of the outliers, the average of the top 5 percent of all trips, across all years is 68 lb.

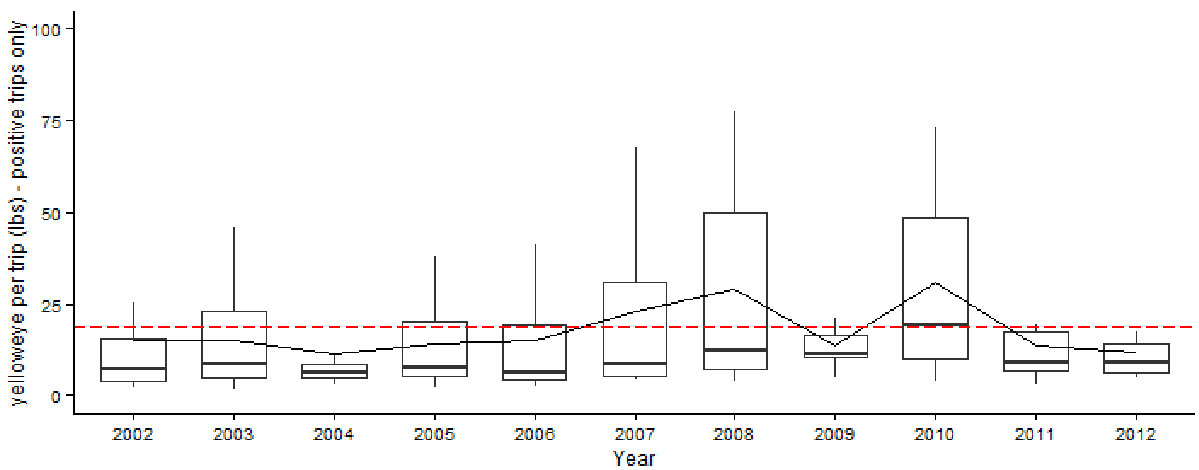

Figure B-14. Boxplots of yelloweye catches (zeros excluded) by trip and year in the non-nearshore commercial fixed gear sectors. See Figure B-13 for explanation of boxplots and lines. Outliers are not displayed because of confidentiality. A y-axis extending to 175 would display all outliers with room to spare. To give some sense of the range of the outliers, the average of the top 5 percent of all trips, across all years is 103 lb.

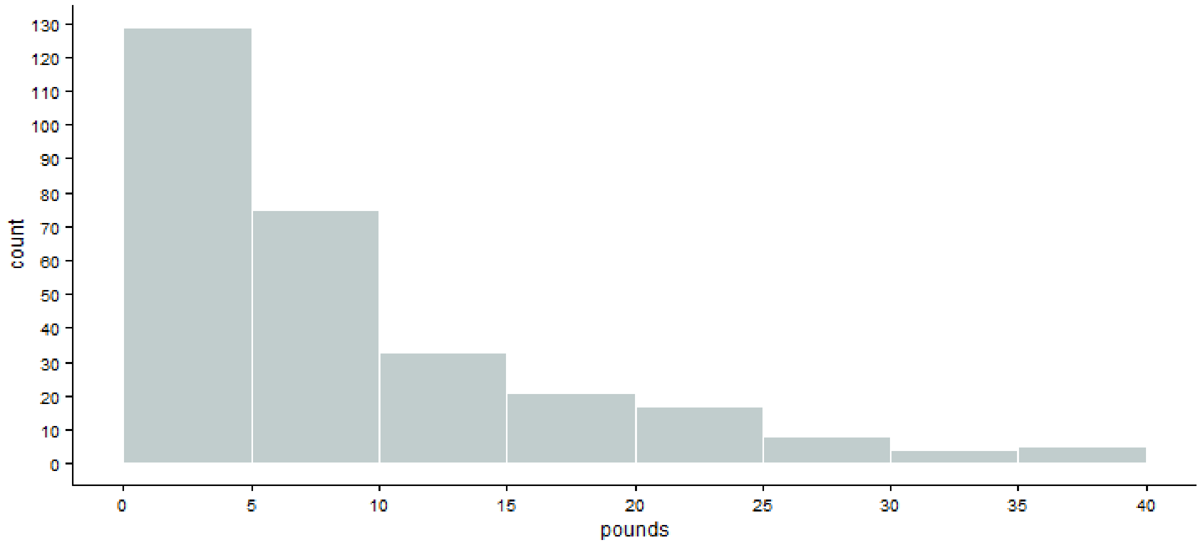

Figure B-15. Histogram showing nearshore catches of yelloweye rockfish over 2002-2012 on observed non-zero trips for catches less than 40 lb (lb) (bins are in increments of 5 lb).

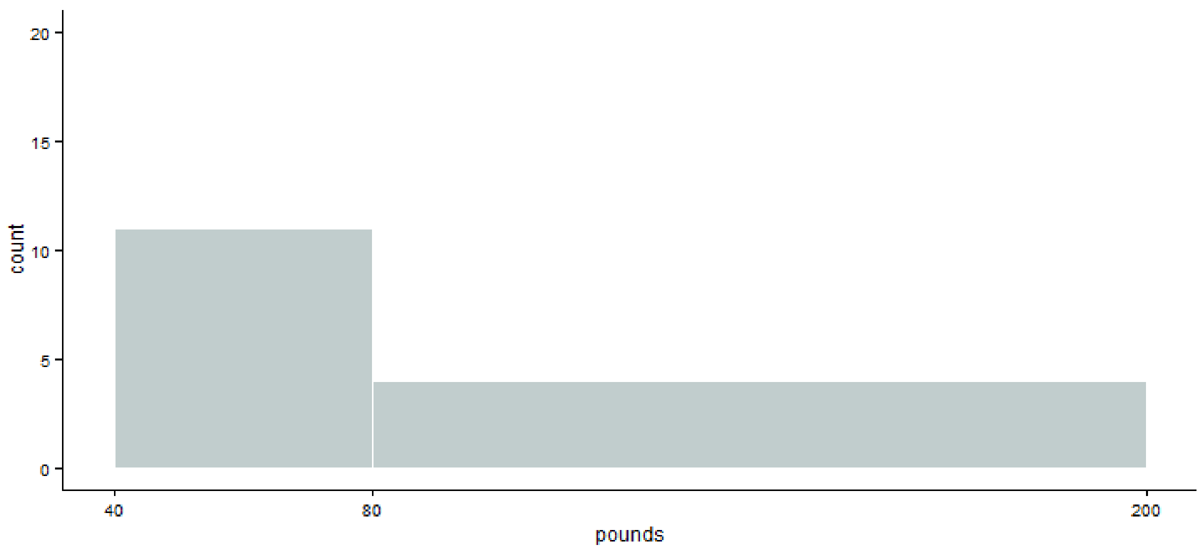

Figure B-16. Histogram showing nearshore catches of yelloweye rockfish 2002-2012 on observed non-zero trips for catches greater than 40 lb over (irregular bins of 40-80 lb and 80-200 lb were chosen to preserve confidentiality).

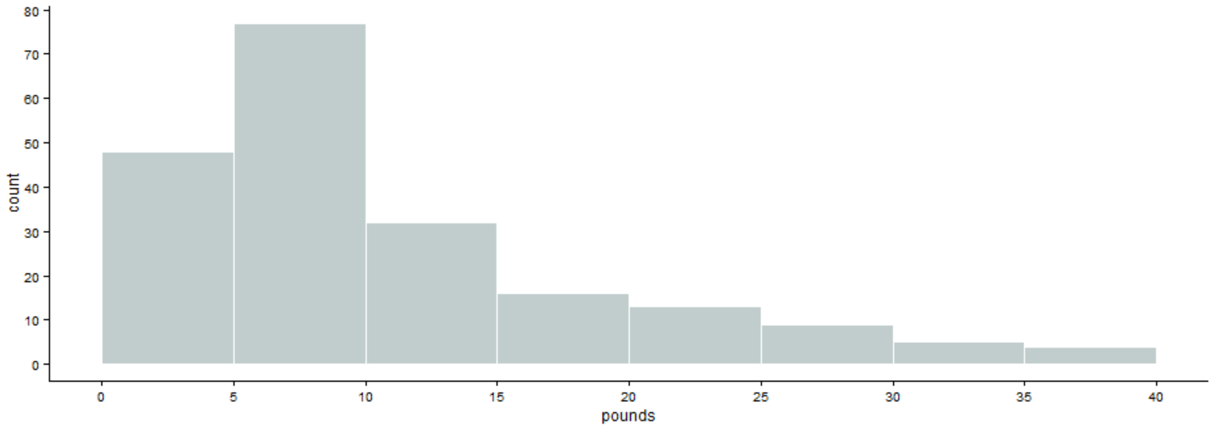

Figure B-17. Histogram showing non-nearshore catches of yelloweye rockfish over 2002-2012 on observed non-zero trips for catches less than 40 lb (bins are in increments of 5 lb).

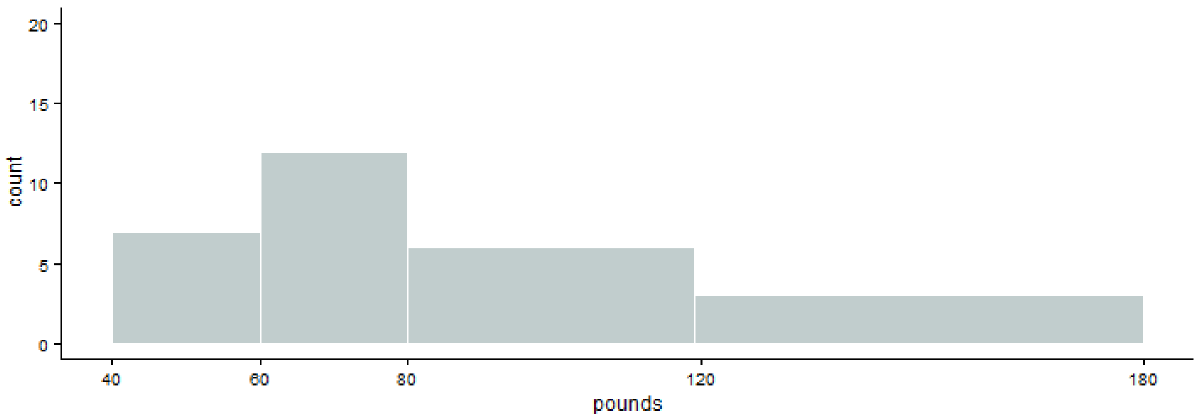

Figure B-18. Histogram showing non-nearshore catches of yelloweye rockfish 2002-2012 on observed non-zero trips for catches greater than 40 lb over (irregular bins of 40-60 lb, 60-80 lb, 80-120 lb, 120-180 lb were chosen to preserve confidentiality).

The Simulation Steps
There are two main parts to the simulations. The first constructs a universe of 100,000 fishing trips where the yelloweye catch per trip is the main variable of interest. The second involves randomly sampling from this set of trips. Each involves several steps described in the following list. The simulation was conducted in the program R.

1. Simulate the universe of 100,000 trips and yelloweye catch per trip for each sector based on the pattern of non-zero trips and the magnitude of catches observed on those trips:
   - Generate 100,000 binomial runs representing whether the trip caught yelloweye or not (i.e., 1 = yelloweye caught, 0 = no yelloweye caught). The binomial probability of a non-zero trip was itself randomly drawn from a random normal distribution based on the mean and standard deviation observed over the relevant time periods in each sector. The draws were truncated to prevent negative numbers using the "truncnorm" package.
   - The magnitude of catch per trip was drawn from a random lognormal distribution generated from the mean and standard deviation of actual trip level catches observed by WCGOP over the full data series of non-zero yelloweye trips.
   - The simulated catch per trip was produced by multiplying the catch per trip by the 1 or 0 drawn from the binomial random draws.
   - The simulated trip catch was capped at twice the observed maximum catch because the lognormal random distribution with a large number of draws produces a few implausibly large catches.

2. Sample from the universe of simulated trips based on varying coverage levels and produce a simulated "true" and estimated annual catch for 10,000 runs:
   - The total number of trips and observer coverage level per simulation run were randomly drawn from normal distributions based on the means and standard deviations from the actual WCGOP data.
   - The total number of trips drawn then set the sample size for the run (i.e., if the total number of trips was 100, 100 samples would be drawn from the set of 100,000 trips). The "true" annual catch was then calculated by summing the catches from all the selected trips.
   - This draw of the total trips per run was then sampled with the sample size set to the number of observed trips (the total trips multiplied by the coverage percentage drawn for the run). The simulated estimated annual catch was the calculated by summing the catch from these trips divided by the coverage level.

The simulated samples were all taken using R's sample function. All samples were taken without replacement. The input parameters for the random draws and years of data used for each are identified in Table B-13. In the nearshore sectors, observer coverage was low in 2003 and therefor data from that year was excluded. All years of data were used for the non-nearshore sectors except for the binomial probability of non-zero yelloweye trips. As can be seen in Figure B-12, there appears to be a downward trend in the number of trips encountering yelloweye in those sectors, and so based on this apparent trend, we chose to use data from only 2004-2012.

Table B-13. Input values for the simulations.

		Nonearshore	Nearshore
binomial probability of non-zero trip (normal)	*mean*	3.6%	9.0%
	s.d.	2.0%	5.0%
	truncated	0% - 20%	0% - 25%
	years used	2004-2012	2004-2012
non-zero catch events (lognormal)	*mean/mean.log*	27.4 / 2.77	11.6 / 1.78
	s.d./s.d.log	31.6 / 1.03	17.7 / 1.18
	years used	2002-2012	2004-2012
total trips per run (normal)	*mean*	1,776	4,995
	s.d.	923	1,533
	truncated	500-5000	500-10,000
	years used	2002-2012	2004-2012
observer coverage per run (normal)	*mean*	19.5%	5.8%
	s.d.	6.3%	1.3%
	truncated	5% - 30%	2%-20%
	years used	2002-2012	2004-2012

Table B-14. The first ten of the 100,000 simulated trips from the nearshore simulation provided to show the basic structure of the simulations. The second step of the simulation involved drawing random samples of varying sizes from the "Lb. Caught" column.

Trip	Encounter?	Lb. if Yes	Lb. Caught
1	1	16.5	16.5
2	0	31.3	0.0
3	0	17.1	0.0
4	0	2.6	0.0
5	0	6.3	0.0
6	0	4.8	0.0
7	1	1.3	1.3
8	0	3.0	0.0
9	0	7.6	0.0
10	0	4.3	0.0

Simulation Metrics and Results

The metrics produced by the simulations focus on the relative degree of precision and variability that we should expect with the annual catch estimates of yelloweye. The metrics reported here, each calculated as a ratio, include:

- *Variability in the "true" catch* (*"True" Variability*): this metric reports how the simulated "true" catch in each run differed from the average across all runs. It is calculated as the simulated true catch in each run divided by the average.
- *Annual fluctuation* (*"True" Ann. Fluctuation and Estimated Ann. Fluctuation*): this metric was calculated by dividing the simulated true catch and catch estimate in a run by

the same in the prior run. This metric allows some evaluation of the year to year variation we might expect in actual catch rates and in the catch estimates.

- *Sampling error* (*Estimated Error*): represents the ratio of the simulated estimate of catch and the simulated true catch in each run (i.e., a value over 1 indicates an overestimate and under 1 is an underestimate).
- *Annual Estimate relative to the 10 Year Average* (Estimated to 10 Year Avg.): this ratio expresses how far the simulated catches in each run differed from a 10 year average. The 10 year average was calculated by dividing the 10,000 runs into increments of 10. This metric is meant to tbe comparable to the long-term average catch ratios t serves as the basis for the GMT's current catch projection models.

We do not report metrics of the simulated catches in absolute terms, i.e., pounds or metric tons, because we did not attempt to reproduce WCGOP's actual sampling design and catch estimation methods in the simulations. WCGOP uses a more complicated multi-stage, stratified sampling design and employs catch estimation methods intended to support the areas and sector of interest to the Council. In addition, in the nearshore sectors yelloweye that are released with certain fishing gears are assumed to survive depending on depth. The simulations do not attempt to model the depth or gear of catch. For this and other reasons, the simulated catch amounts are therefore not expected to precisely match the real catch estimates.

The simulated estimates of annual catch are, however, close in terms of general magnitude to the estimates produced over 2003-2012. The metrics of relative variability should therefore provide useful insight into the relative precision of the existing WCGOP catch estimates and the GMT's projection model outputs.

At the same, sampling theory holds that WCGOP's stratified sampling design should produce more precise estimates than the simple random sampling we use in the simulation. We view the metrics of relative precision as rough measures of the degree of variability we might expect under the range of observer coverage and patterns of yelloweye experienced to date. Understanding how these factors influence the general magnitude of uncertainty and variability is our primary aim. We did not attempt to precisely quantify the statistical variance in the data and the simulations may overstate the variability to some degree. Yet as seen below, the results are not inconsistent with the level of variability actually seen in the sectors over 2003-2012 (Table B-10).

The results are shown in Table B-15 and Table B-16. We report multiple statistics for each metric, including the mean and median and the 10th and 90th percentile values. We also provide information about a number of other percentile levels constructed as intervals. For example, the 50 percent interval is bounded by the 25th and 75th percentiles and the 90 percent interval is bounded by the 5th and 95th percentile. To contrast the way the values can be read: the 90th percentile reports a "one-sided" look and indicates that 90 percent of all runs fell below that value, and in turn, that only 10 percent fell above it. The 90 percent interval, on the other hand, provides a "two-sided" look and indicates that 90 percent of the runs fell within that interval, and in turn, that only 10 percent of the runs were either higher or lower than the values on each end of the interval. Likewise, the intervals could be viewed in a "one-sided" manner by looking to only one end (e.g., the upper end of the 50 percent interval is the 75th percentile, therefore only 25 percent of the runs came in larger than the value it reports).

Table B-15. Results from the nearshore simulation. See the bulleted list in the text for the definition of the metrics.

	"True"		Estimated		
	Variability	Ann. Flucuation	Error	Ann. Fluctuation	to 10 Year Avg.
Median	1.000	1.000	0.950	0.995	0.950
Mean	1.000	1.160	0.997	1.430	1.000
10th percentile	0.600	0.541	0.570	0.381	0.440
90th percentile	1.400	1.873	1.490	2.633	1.620

Intervals	"True"				Estimated					
	Variability		Ann. Flucuation		Error		Ann. Fluctuation		to 10 Year Avg.	
50% (*25th - 75th*)	0.79	1.21	0.74	1.36	0.73	1.19	0.62	1.61	0.67	1.27
75% (*12.5th - 87.5th*)	0.65	1.36	0.58	1.73	0.60	1.41	0.43	2.37	0.49	1.54
90% (*5th - 95th*)	0.46	1.51	0.42	2.34	0.47	1.71	0.28	3.72	0.32	1.85

Table B-16. Results from the non-nearshore simulation. See the bulleted list in text for the definition of the metrics.

	"True"		Estimated		
	Variability	Ann. Flucuation	Error	Ann. Fluctuation	to 10 Year Avg.
Median	0.960	0.993	0.960	0.991	0.917
Mean	1.000	1.294	1.002	1.880	1.000
10th percentile	0.440	0.409	0.490	0.285	0.323
90th percentile	1.590	2.484	1.550	3.478	1.602

Intervals	"True"				Estimated					
	Variability		Ann. Flucuation		Error		Ann. Fluctuation		to 10 Year Avg.	
50% (*25th - 75th*)	0.66	1.29	0.63	1.57	0.71	1.23	0.54	1.88	0.58	1.34
75% (*12.5th - 87.5th*)	0.49	1.52	0.46	2.25	0.54	1.48	0.33	3.03	0.37	1.70
90% (*5th - 95th*)	0.35	1.80	0.31	3.33	0.37	1.79	0.19	5.36	0.22	2.07

Discussion

We only give brief discussion of the results here so as to aid the reader and illustrate how we envisioned the simulation metrics could be used. The full GMT will review and comment on this analysis at the June meeting and provide the Council with additional interpretations relevant to the decision on the potential 0.6 mt transfer. The GMT will also provide information on the potential management measure changes (e.g., trip limits and changes to RCA boundaries) that the transfer might involve.

As to the results here, we begin by noting that the average sampling error metric shows a high degree of accuracy in both sectors, as is expected with random sampling. Across all runs, the catch estimate was 1.002 times the true estimate in the non-nearshore and 0.997 in the nearshore (i.e., 0.2 percent and 0.3 percent off).

At the same time, the catch estimates showed variability across individual runs. Under the conditions run in the simulations , we would expect catch estimates to be within ~30 percent of the true catch half of the time in the non-nearshore sectors, and ~20 percent in the nearshore sectors. Looking more toward the extremes, 10 percent of the runs in the non-nearshore simulations fell higher or lower than 0.37 and 1.86 times the true value (i.e., 63 percent lower and 86 percent higher). That same interval for the nearshore simulations is 0.47 to 1.71. Somewhat counter intuitively, the nearshore simulation shows more precision than the non-nearshore simulation despite having lower coverage levels. It may be that the lower frequency of non-zero trips in the non-nearshore counteracts the expected effect of higher observer coverage.

While the sampling error is an important consideration, in reality the “true” catch is never known and the Council can only respond to the estimates of the true catch. So understanding the expected year to year variability in the catch estimates is of most interest here.

Considering the degree of year to year fluctuation in the estimates, the results show that on average the estimates were 1.43 times the previous’ years estimate in the nearshore and 1.88 times in the non-nearshore. The use of ratios and the influence of large outliers may make the mean values of limited value here. The intervals provide a fuller picture. Looking at the 50 percent interval, we see that half of the runs fluctuated between 0.62 and 1.61 over the previous year in the nearshore and 0.54 and 1.88 in the non-nearshore. The 8 fold increase seen in the nearshore catch estimate between 2010 and 2011 (Table B-10(b)) would have fallen within the upper 1 percent of the nearshore simulation runs (not shown in Table B-15).

With the 10 year average metric, we see half the runs in the non-nearshore coming in 0.58 to 1.34 times the size of their respective 10 year averages and 0.67 to 1.27 times in the nearshore simulation runs. Considering only the situation where the 10 year average to underestimate the catch estimate, the catch was double the average around 5 percent of the non-nearshore runs. Not reported in the table, yet the average of the upper 5th percentile values was 2.44. In the nearshore simulations, the variation was lower with the upper 5th percentile populated by values greater than 1.85 times their respective 10 year average with an average value of 2.15.

Lastly, as can been seen in the metrics reported for the simulated true catches, the simulated true catches showed considerable variation as well. The variability in the probability of encountering yelloweye on trip and variability in the size of the catch when encountered created a range of simulated annual catches. This variable signal in the annual catches drives a lot of the noise seen in the simulated catch estimates.

B.5 Within Non-Trawl: Consideration of State-Specific Nearshore Rockfish Harvest Guidelines North of 40°10' N. latitude

Need for Action

In April 2014, the Council requested analysis of options for allocation of the Nearshore Rockfish complex north of 40°10' N. latitude to keep morality at or within the ACL including 1) No Action, 2) utilizing the miles of coastline north of 40°10' N. Lat., 3) the recent recreational and commercial historical catch from 2004-2012 (Agenda Item C.4.b, Supplemental GMT Report 2), and 4) a hybrid allocation method which uses miles of coastline for copper, China and quillback rockfishes and historical catch from 2004-2012 for the remaining species. In options 1 and 2, blue rockfish apportionment was initially based on stock assessment lines (California vs. Washington-Oregon assessment), with subsequent allocation between Oregon and Washington based on recreational and commercial historical catch from 2004-2012. Miles of coastline was not used to apportion blue rockfish between Oregon and Washington because of the large disparity in historical catch (Agenda Item C.4.b, Supplemental GMT Report 2, Tables 2 and 3) which indicated a decline in relative abundance along the coast not reflected when allocation is conducted using miles of coastline.

Catch data used to apportion the coastwide annual catch limit (ACL) under the two harvest guideline (HG) options using historical catch have been updated since the April meeting. Prior RecFIN queries for recreational catch data included inland areas in Washington not managed by the Pacific Fishery Management Council. The updates resulted in changes to the Nearshore Rockfish complex harvest guideline options (i.e., proportions of the ACL distributed among states), primarily to the historical catch option, but still reflect the range of HG Options recommended for analysis by the Council in April.

This analysis provides information on the implications of state-specific Nearshore Rockfish complex HG for the area north of 40°10' N. Lat. Options for the state-specific HGs are based on historical catch and miles of coastline in California, Oregon and Washington, as described above. Management under HGs from alternate allocation options are compared to the No Action alternative of status quo management for the Nearshore Rockfish complex with an ACL north of 40°10′ N. Lat.. The management measures needed to prevent mortality from exceeding complex level HGs and the implication for stock status and fishery participants are analyzed for each option.

Background

Under No Action, the Nearshore Rockfish complex overfishing limit (OFL) consists of contributions of the component stocks to the entire complex, stratified at 40°10′ N. Lat. Under status quo management, a complex level ACL is assigned to each region north and south of that management boundary (see the draft environmental impact statement; DEIS). This analysis provides the implications for the nearshore fisheries from instituting a HG in each state (Table B-17). Note that Nearshore Rockfish complex mortality from the tribal fishery is negligible and the tribes will notify the Council if this is expected to change in the future.

We evaluate three options for implementing HGs, in addition to No Action, for each state north of 40°10′ N. Lat. The first is stratified on the basis of miles of coastline, using the length of the three nautical mile boundary line delineating state and federal waters as a proxy for coastline length in each state (see Appendix 1). The second method is based on average historical catch for all sectors between 2004 and 2012. The third is based on a hybrid method applying miles of coastline to stocks that are ubiquitously distributed along the coast (i.e., China, quillback and copper rockfish), while the historical catch method is applied to those remaining species that show a cline in abundance also noted in scientific literature, including blue rockfish allocated by assessed areas north and south of the California-Oregon border and allocated between Oregon and Washington using historical catch. This analysis is intended to help better understand the needs of the fishing community relative to the constraints from management under state-specific harvest guidelines.

Ideally, allocating catch would involve a measure of relative abundance along the coast, but no such index is currently available for nearshore rockfish. In the absence of these data, two proxy methods of allocating have been presented; historical catch from 1916-2012 and the miles of coastline within the assessed area (Agenda Item C.4.b, GMT Report 2, April 2014; Agenda Item C.9.b, GMT Report 2, April 2014). The three options analyzed herein were developed after considerations were made regarding these original allocation methods. There are implications of these decisions for the commercial nearshore and recreational sectors in each state that make this a contentious issue. There are, however, scientific principles that can help inform sound decisions in the selection of allocations resulting in harvest guidelines. Examples of considerations for the three options analyzed in this paper are described below.

Considerations for Allocation Options

Considerations for Option 2: Miles of Coastline

Allocation using miles of coastline within each assessed area may prevent potential over-allocation to over-harvested areas that can result when historical catch is used. This method provided an alternative to catch based allocation alternatives. The primary assumption of this method is that the relative abundance is consistent along the coast. This assumption may not be valid for species that decline in abundance toward the ends of their range, or if habitat is not proportional to coastline distance or if stocks have been overharvested in a given sub-region. Although, for species such as China, quillback, copper and blue rockfishes that are relatively common throughout the assessed range, the distribution of habitat is unlikely to be perfectly uniform between states. Hence, this method may over-allocate or under-allocate, depending on which assumptions are violated. In instances where regulations and mortality for ubiquitously distributed species varies greatly among states, and a declining trend in catch per unit effort (CPUE) or assessments results in a portion of the species range, the historical catch method may be preferred over miles of coastline to prevent over allocation of fish at the edge of their range. Thus the assumption of uniform distribution is likely violated when miles of coastline is applied to species such as blue, olive, brown, gopher, black and yellow and grass rockfish, as indicated by the distribution of catch in PacFIN and RecFIN, and in published literature showing the range of each species indicating that they are less common or absent to the north (Love et al. 2002).

Considerations for Option 3: Average Historical Catch

When historical catch is employed to allocate among states, there is potential for over-allocation to states that harvested the most fish. Table B-17 contains commercial mortality (the average landings (mt) in the commercial fishery from PacFIN plus discard mortality estimated from the nearshore projection model) and recreational mortality (mt) (RecFIN) of nearshore rockfish stocks north of 40°10′ N. Lat. from 2004-2012. The Scientific and Statistical Committee (SSC) advised that "historical catches of nearshore species by state may not reflect biomass by state because of major differences in the management among states" (Agenda Item D.5.b., SSC Report, March 2014). Allocation using historical catch assumes that catch is proportional to abundance, which may not be the case due to differences in management among states. The annual catch by sector (Figure B-19) and annual, average, and range of catches by sector from 2004-2012 (Table B-17) reflect a combination of regulations, permitting systems, participation, constraints from overfished species and relative abundance of each species.

Overfished species constraints affected regulations on target stocks (e.g., seasons, depth restrictions and trip limits), limiting harvest to varying degrees among states from 2004 to 2012. A description of how regulations have varied over this period in each state and sector is provided in Appendix 2. Notable changes in regulations to reduce yelloweye rockfish mortality include a shallower depth restriction in the California and southern Oregon nearshore commercial fisheries starting in 2009 when the shoreward rockfish conservation area (RCA) boundary was moved from 30 fm to 20 fm to reduce yelloweye rockfish mortality. This adversely affected the ability of the fishery participants in California and Oregon to access deeper nearshore species. Depth restrictions and season lengths in the California recreational fishery have been severely limited by yelloweye rockfish mortality since 2008 after overages in 2007 necessitated inseason action to reduce season lengths and shallower depth restrictions to 20 fm (Appendix 2), which has continued in order to minimize yelloweye rockfish mortality. In addition, the Oregon recreational fishery was limited to shallower depth restriction of 20 fm from 40 fm part of the year starting in 2007, shifting effort onto Nearshore Rockfish habitat. The Washington recreational fishery has had consistent regulations since 2005, when depth restrictions of 20 fm and 30 fm went into place during part of the year shifting effort onto shallower depths.

Differential management among states shown above may differentially affect catch among states. It should be noted that other factors may also affect catch (e.g., environment, markets, distribution, and abundance). Figure B-19 provides annual catch patterns for the various sectors among states. For example, Nearshore Rockfish mortality in the California recreational and commercial fisheries declined abruptly in the years after their respective 20 fm depth restrictions were implemented. The Washington recreational catch has remained relatively steady over the 9-year period shown Figure B-19, as it was shown above that regulations have remained somewhat constant since 2005 (see Appendix 2). Interestingly, Oregon commercial and recreational Nearshore Rockfish catches have shown increases since many restrictions shown in Appendix 2 were put in place. It should be pointed out that much of this Oregon Nearshore Rockfish increase may be attributed to blue rockfish catch.

The differential management among states, along with differing degrees of participation in each sector among states, affects historical catch and thus allocation, which may cause it to deviate from representation of relative abundance along the coast. For example, Washington prohibited their commercial nearshore fishery and reduced their bag limit to ten fish in 1995 as a precautionary measure to preserve recreational fishing opportunities for the future, which might have been subject to further restrictions if allocation were shared with a commercial fishery. The participation in angler trips between Washington, Oregon and California are expected to vary affecting mortality due to season lengths, perceived opportunity (bag limits, depth restrictions) and angler population size in each state. In addition, Oregon and California have differing commercial permitting systems for their fisheries. These factors, and those shown in previous paragraphs, may cause allocations based on historical catch to deviate from relative abundance. Those areas with more liberal regulations or higher participation are likely to have disproportionately high nearshore rockfish mortality compared to the actual relative abundance along the coast.

For species with strong clines in abundance along the coast, the historical catch based method may capture the trend and allocate accordingly, where allocation by miles of coastline would not due to the assumption of uniform distribution. The aforementioned changes and differences in management should be considered when evaluating the true needs of the fishing communities and potential bias in allocation in each region and provide an impetus for weighing the assumptions regarding miles of coastline as an alternative method depending on the distribution of the species among other circumstances.

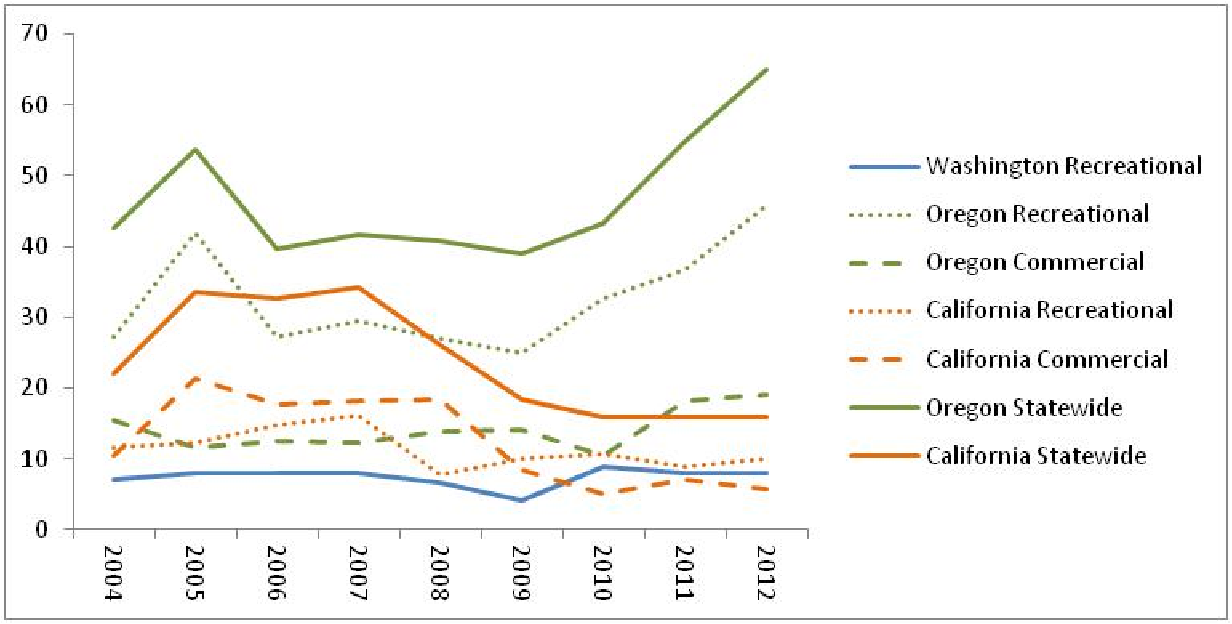

Figure B-19. Nearshore Rockfish Complex mortality estimates (mt) by state and sector in each year from 2004-2012.

Table B-17. Nearshore Rockfish Complex mortality estimates (mt) by state and sector in each year from 2004-2012 as well as the average and range of mortality from periods with less constraint (2004-2007) and greater constraint (2008-2012) from yelloweye rockfish. Recreational data were from RecFIN for Washington (ocean boat only), Oregon (ocean boat only), and California (ocean boat, shore, and estuary).

Year	Washington Recreational	Oregon Recreational	California Recreational	Oregon Commercial	California Commercial N. 40°10′ N. Lat.	Total
2004	7.06	27.18	11.61	15.40	10.46	71.71
2005	7.96	41.90	12.21	11.74	21.28	95.09
2006	8.00	27.20	14.84	12.47	17.85	80.36
2007	7.95	29.42	16.14	12.41	18.23	84.15
2008	6.72	26.91	7.69	13.84	18.38	73.54
2009	4.26	24.88	10.01	14.15	8.39	61.69
2010	8.99	32.78	10.82	10.57	5.16	68.32
2011	8.10	36.66	8.84	18.28	7.02	78.9
2012	7.93	45.88	10.10	19.06	5.84	88.81
2013	6.23	38.1	9.3	NA\1	NA\1	NA
Average 2004-2007	7.74	31.43	13.70	13.01	16.96	82.83
Range 2004-2007	7.06-8.00	27.18 - 41.90	11.61 - 16.14	11.74 - 15.40	10.46 - 21.38	71.71 – 95.09
Average 2008-2012	7.20	33.42	9.49	15.18	8.96	74.25
Range 2008-2012	4.26-8.99	24.88 - 45.88	7.69 - 10.82	10.57 - 19.06	5.16 - 18.38	61.69 – 88.81
Average 2004-2012	7.44	32.53	11.36	14.21	12.51	78.06
Range 2004-2012	4.26-8.99	24.88 - 45.88	7.69 -16.14	10.57 - 19.06	5.16 -21.28	61.69 – 95.09

Considerations for Option 4: Hybrid Method

While either method may deviate from the true relative abundance along the coast, which is unknown, consideration of which assumptions are violated for a given species may be helpful in deciding which method is more appropriate. Allocation by historical catch may be preferred in instances where a strong natural decline in abundance from the center of a species range occurs, in which case use of miles of coastline alone would cause an over-allocation to areas at the edge of their range where they are less common. This is the case for some of the nearshore rockfish species for which abundance may naturally decline or become non-existent north or south of 40°10′ N. Lat. (e.g., gopher, olive, black and yellow, brown, kelp and grass rockfish; Table B-17). Miles of coastline may be more appropriate for those species that are more uniformly distributed within the entire region over which allocations are being made (e.g., copper, China, and quillback rockfishes). Blue rockfish may be allocated according the stratifications of assessments at 42° N. latitude since two stocks have been identified and are predominantly distributed on either side with further allocation using appropriate methods discussed above depending on the trends in abundance in the region in question.

The Groundfish Management Team (GMT) provides some considerations to allow the Council an alternate way to evaluate the allocation options in a way that extends beyond the needs of the fishery. These methods attempt to approximate the relative abundance of component species given the assumptions implicit in their application to provide a logical basis for allocation. Where the range appears to reach its edge within the management area, average catch may be a more reasoned approach and where large differences in catch occur along the range of an otherwise ubiquitously distributed species in the region, miles of coastline may be preferable, to avoid violation of assumptions implicit in each method. Future off-year scientific research designed to quantify catch and abundance relative to available habitat would greatly improve allocation methods.

Pros and Cons of Each Option in Light of Considerations Presented

The pros and cons of each method given considerations regarding allocation with each are described in Table B-18.

Table B-18. Comparison of the pros and cons of each Nearshore Rockfish complex allocation option.

Allocation Option	Pro	Con
Miles of Coastline	Less potential for over allocation to depleted areas than historical catch if harvest is more reflective of management policies than fish abundance. Provides an alternative to catch based allocation methods	Some species are far less common at the edge of their range and would be over-allocated to some areas since the method assumes abundance is proportional to miles of coastline.
Historical Catch (2004-2012)	Reflects the recent historical pattern of commercial and recreational fisheries. Accounts varying trends in abundance with latitude at the edge of a species range.	Potential for over-allocation to areas that are more depleted. Overfished species constraints limited harvest to varying degrees between states affecting allocations. Doesn't address areas where commercial fisheries are prohibited.
Hybrid Option	Minimizes allocation biases presented by application of historical catch to areas with higher removals/depletion and miles of coastline for species at the edge of their range.	Still does not reflect differences in reef habitat and relative abundance across states, but neither do the other options. Still subject to the biases of each method, but attempts to minimize the degree of bias given apparent trends in abundance and distribution of component stocks.

Comparison of Historical Mortality and Projected Mortality under the Preferred Alternative and No Action to Nearshore Harvest Guideline Allocation Alternatives

The projected mortality in each state and sector under the No Action Option, Preferred Alternative Alternative 4, the average mortality between 2004 and 2012, and the range of catch during this period are presented in Table B-19. There are no nearshore rockfish mortality projection models for the trawl and non-nearshore fishery, but based on historical data, mortality in the trawl and non-nearshore fisheries is expected to be trace (Agenda Item C.4.a, Attachment 3, Table 4-13). Mortality in 2013 is not yet available for the nearshore fixed gear fishery, but this information is available for the recreational fishery, which demonstrates that mortality in the most recent year of the recreational fishery was 6.2 mt for Washington, 38.1 mt for Oregon and 9.3 mt for California.

Projections for nearshore rockfish for all coastwide sectors north of 40°10′ N. Lat. total 76.7 mt under no action. The average catch for 2004-2012 is 81.6 mt for all sectors combined; results for each state are also provided for comparison under each alternative. The projected mortality under the Preferred Alternative is 80.0 mt without harvest guidelines or interstate coordination of catch tracking and inseason response, making it difficult to reduce mortality to prevent overages against the shared aggregate ACL. The average catch as well as projected mortality under the SQ and Preferred Alternative (Table B-19) will exceed the 2015-2016 ACL of 69 mt, indicating that management measures will likely be needed to reduce aggregate mortality. Decisions on the part of the Council relative to allocations will involve tradeoffs potentially affecting fishing opportunity in each state.

The methods used to project mortality for 2015-2016 with methods approved by the SSC in each recreational and commercial fishery are described below:

Nearshore Fixed Gear: The commercial nearshore model projects mortality of overfished species and targeted nearshore species based on the expected (e.g., landings of nearshore rockfish, black rockfish, kelp greenling, cabezon, lingcod, and California scorpionfish (S of 40°10'N Lat.). The nearshore model applies past discard rates (from the West Coast Groundfish Observer Program; WCGOP) to expected landings by depth, along with depth-specific discard mortality rates, to estimate total mortality of discarded and landed nearshore species. The GMT notes that the nearshore commercial bycatch projection model estimates discard of nearshore species based on expected landings coupled with discard rates provided by WCGOP; however, discard rates are based on past management measures. If trip limits (and expected landings) are reduced dramatically, the model may grossly underestimate discard.

Washington Recreational: The Washington recreational model uses historical catch to project total mortality of overfished and nearshore rockfish species. Nearshore rockfish projected impacts for this analysis used the historical high catch by species from the 2009 through 2013 time period as the projected impacts under the No Action Alternative. Washington does not have a nearshore commercial fishery so projections of nearshore rockfish have not been needed to ensure that catch stays within sector specific allocations. This analysis includes nearshore rockfish caught in all recreational fisheries including those targeting salmon and halibut and any restrictions to nearshore rockfish retention would be applied to all fisheries. Recreational fishing effort in salmon and halibut fisheries can vary annually contributing to variable encounter rates with nearshore rockfish. Using the 2009-2013 high catch to model projected impacts results in more conservative management measures, that are expected to keep catch of nearshore rockfish within the range of HG options for the Washington recreational fishery. Catch by month and management area during this time period was used to estimate projected impacts for the WA Nearshore Rockfish complex HG Options. The proportion of nearshore rockfish caught by depth and month for each management area was used with current surface release mortality rates to estimate discard mortality by month.

Oregon Recreational: The Oregon recreational catch projection model uses the last 3 years of data in producing projections of nearshore rockfish mortality. Table B-19 displays the results of the Oregon recreational model projections of nearshore rockfish mortality under Alternative 3.

California Recreational: The California recreational catch projection model used mortality in 2011 and 2012 as the base data for projections. Three options are available for the season structure for the California recreational fishery and the projected mortality of 15.6 mt, 15.4 mt and 6.7 mt, respectively, with the season with the highest projected mortality of Nearshore Rockfish complex displayed in Table B-17.

Table B-19. Projected Nearshore Rockfish complex mortality under the No Action Alternative, the Preferred Alternative, average mortality from 2004-2012 and, allocation under each HG alternative by state and sector (in mt).

Sector	No Action Mortality	Projected Mortality under Preferred Alt	Average Mortality and Range 2004-2012	HG Miles of Coastline	HG Historical Catch	HG Hybrid Approach
Washington Total	**10.5**	**10.5**	**7.44** (4.26 -8.99)	**15.68**	**5.05**	**7.66**
--Recreational Groundfish	*10.5*	*10.5*	*7.44 (4.26 - 8.99)*			
--Directed OA: Nearshore	*NA*[1/]	*NA*[1/]	*NA*[1/]			
Oregon Total	**45.6**	**48.9**	**46.74 (39.03-64.94)**	**29.93**	**37.94**	**36.29**
--Recreational Groundfish	*30.5*	*30.5*	*32.53 (24.88 - 45.88)*			
--Directed OA: Nearshore[2/]	*15.1*	*18.4*	*14.21 (10.57 - 19.06)*			
California Total	**20.6**	**24.5**	**23.87 (15.86 - 34.37)**	**23.15**	**25.76**	**24.80**
--Recreational Groundfish	*11.7*	*15.6*	*11.36 (7.69 -16.14)*			
--Directed OA: Nearshore [3/]	*8.9*	*8.9*	*12.51 (5.16 -21.28)*			
Total All Sectors	**76.7**	**80.0**	**78.06 (61.69 – 95.09)**	**68.75**	**68.75**	**68.75**

1/The state of Washington has not had a commercial nearshore fishery since 1995.
2/For Oregon, projected landings and additional discard mortality for each column are: No Action (15.0 mt + 0.1 mt), Preferred Alternative (18.3 + 0.1 mt), 2004-2012 average (14.21 + .08 mt), Option 1 (9.6 + 0.05 mt), Option 2 (10.7 + 0.06 mt), and Option 3 (10.4 + 0.06 mt).
3/The California commercial blue rockfish mortality estimate for 2008 from PacFIN reflected expansion of a single sample to a value of 21.6 mt, which is not representative of expected mortality from landing receipts from CFIS totaling 7.8 mt. The projected impacts and average mortality from the PacFIN estimate is provided in brackets.

Management Options

Option 1: No Action: Continue to manage the Nearshore Rockfish complex, holding impacts to the complex level ACL in each region.

Option 2: Miles of Coastline: Manage the Nearshore Rockfish complex according to state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the miles of coastline in each state.

Option 3: Historical Catch: Manage the Nearshore Rockfish complex according to state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the historical recreational and commercial catch between 2004 and 2012.

Option 4: Hybrid Method: Manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and the historical recreational and commercial catch between 2004 and 2012 for the remaining species.

Data and Examples of Available Management Measures

Washington

Recreational: The Washington recreational fishery was modeled for season structure alternatives necessary to keep total mortality of overfished species within state specific HGs in the draft DEIS. Projected moralities for nearshore rockfish were not included in that analysis. Additional management measures needed to keep nearshore rockfish catch under the WA HG alternative are explored here. For the most part, nearshore rockfish are not targeted in Washington's recreational fisheries and retention is incidental while anglers target other groundfish, salmon and halibut. The primary tool analyzed to reduce total mortality of nearshore rockfish is non-retention. Projected mortality for nearshore rockfish was analyzed based on the season structure under the Preferred Alterantive for the Washington recreational fishery. Note that mortality estimates, allocations and projections do not include mortality from the Puget Sound or Strait of Juan de Fuca since they are not managed with the Council process. In addition, mortality from shore based modes are not accounted for in estimates, projections or allocations.

Commercial: Washington has prohibited a commercial nearshore fishery since 1995.

Oregon

Recreational: The Oregon recreational fishery was modeled for various season structure scenarios to keep impacts to overfished species within the sector-specific HGs (canary and yelloweye rockfish) in the DEIS. Mortalities of key non-overfished species, given those season structures, were also projected in the DEIS. Further management measures, such as sub-bag limit or non-retention, will likely be needed to reduce impacts to the nearshore rockfish complex. Oregon intends to develop the within-Oregon commercial-recreational split through state processes. Determining which management measures are necessary to stay within that split will also occur through state processes. Note that mortality estimates, allocations and projections do not include mortality from the shore based modes as they have not been sampled in recent years. The mortality in these modes continues, though it is not reflected in estimates or allocations. Since they are excluded from allocations and estimates, it is assumed that the results are consistent with the outcome had they been included in both, though further analysis by the GMT is warranted. Discussion of their inclusion in future estimates or retrospectively for this analysis is a point of consideration for the Council and the GMT in June.

Commercial: The Oregon commercial nearshore fishery was modeled assuming the shoreward RCA at 30 fm for all options. The input for this model is estimated landings of Other Nearshore Rockfish. Discard rates were applied to these estimated landings to project discard of Nearshore Rockfish (based on WCGOP data). Depth-specific mortality rates were then applied to the discarded portion of the catch to estimate discard mortality. Total mortality may then be estimated by summing the landings and estimated discard mortality.

Management measures will likely have to be implemented to reduce mortality of Nearshore Rockfish (including blue rockfish) for each of the harvest guideline options. Under the Preferred Alternative and No Action, state trip limits for vessels with nearshore endorsed black rockfish and blue rockfish permits (i.e., nearshore permitted vessels) would remain at approximately 700 lb per 2-month period for Nearshore Rockfish (not including blue rockfish). Vessels with black rockfish and blue rockfish permits would also be allowed to retain 1,000 to 1,700 lb per period of black rockfish and blue rockfish (combined) under the Preferred Alternative. See the DEIS for more information regarding state permit system.

Landings are monitored closely during the season (i.e., near-real time), which provide the opportunity to implement and evaluate impacts of reduced (or increased) trip limits. Trip limit options may include (a) trip limit reductions to allow for year-around deliveries of Nearshore Rockfish or (b) less severe trip limits during part of the year but at some point, impose no retention (i.e., all Nearshore Rockfish encountered would be discarded). Note that separate blue rockfish trip limits may be considered, because blue rockfish and black rockfish are currently managed under a combined trip limit. It is uncertain at this point (a) when trip limits may be imposed and (b) what the trip limit levels should be under the harvest guideline options.

California

Recreational: The current California recreational catch projection model (RecFISH) was used to project mortality with a given season and depth restriction under each of the Options. These data and analytical methods allowed mortality to be projected from combinations of season lengths and bag limit that keep nearshore rockfish mortality within respective harvest guideline under each of the Options. California recreational catch estimates and projections account for mortality in all modes including shore and boat based angling and saltwater areas including bays and estuaries.

Commercial: PacFIN data were used for overall minor nearshore rockfish complex landings summaries whereby a simple five-year average (2008-2012) was used as a proxy for mortality estimates. Because PacFIN data were used, PacFIN estimates do not include discard mortality amounts. However, estimated discard mortality for nearshore rockfish have been included by using those generated by the nearshore bycatch model. California's Commercial Fishery Information System (CFIS) data were used for nearshore permit license summaries. Lastly, the GMT's nearshore bycatch projection model was used to estimate overfished species (OFS) mortality in the commercial nearshore fixed gear fishery.

Management measures for the northern California nearshore rockfish fishery, currently in place, include a shoreward RCA boundary of 20 fm, trip limits for both black rockfish and the minor nearshore rockfishes as a sub-trip limit of the overall nearshore rockfish complex, a state nearshore permit system, and a gear restriction that limits the number of hooks one may use within one mile of shore. The most obvious management measure change that may need to be considered to achieve necessary mortality reductions would be a reduction in the black rockfish/other minor nearshore rockfish trip limit structure. Under No Action, the current trip limit is set at 8,500 lb per vessel per bi-monthly period for all six periods. Of that bi-monthly amount, no more than 1,200 lb may be species other than black rockfish. It is this part that needs to be more closely examined as a possible source for a management measure change. A trip limit reduction in this sub-trip limit amount could also partially address concerns regarding the mortality of overfished species. Another trip limit option would be to design trip limits specific to each period rather than have an "across-the-boards" single amount for all six periods. Lastly, a management measure option could be to have one or possibly two periods closed to fishing. A sub-option to this seasonal closure approach may be to close the fishery for one month in one or more periods.

B.5.1 Comparison of Options under the Preferred ACL Alternative (P* 0.45)

B.5.1.1 Option 1: No Action

Continue to manage the Nearshore Rockfish complex, holding impacts to the complex level ACL in each region. Under the No Action Option (Option 1), the Nearshore Rockfish complex would be subject to the ACL for all sectors and states combined. The Nearshore Rockfish complex is stratified at 40°10′ N. Lat. with an ACL of 69 mt to the north and 1,049 mt to the south in 2015 with a P* of 0.45 under the preferred specifications.

Fishing Activity under Option 1 (No Action)

Washington

Recreational: Under the No Action Alternative, the Washington recreational fishery would be open year-round for groundfish, except lingcod. Washington would continue to prohibit the retention of canary and yelloweye rockfish in all areas. Washington has a 12 fish daily bag limit with sub bag limits of 10 rockfish, 2 lingcod and 1 (northern management area) or 2 (southern management areas) cabezon. Depth restrictions are the primary tool used to keep overfished species impacts below state HGs. Depth restrictions are more sever in the area north of the Queets River (Marine Area 3 and 4) where encounters with yelloweye and canary rockfish are the greatest. Management measures under the Preferred Alternative differ only slightly from the No Action Alternative. Under the Preferred Alternative, the depth closure in the North Coast (Marine Areas 3 and 4) would be in place from May 9th through Labor Day rather than from May 1 through September 30. In the South Coast (Marine Area 2), the prohibition on lingcod retention seaward of 30 fm in the area south of 46°58 N. latitude on Fridays and Saturdays from July to August 31 would be removed and in the Columbia River Area (Marine Area 1), the southern boundary for the year round lingcod closure would be moved three miles north.

Commercial: Closed

Oregon

Recreational: Currently the recreational fishery has a 10-fish marine bag limit in federal regulations. State regulations have reduced that bag limit to 7 fish. The fishery is open to all depth January-March and October-December and restricted to inside of 40 fm (30 fm in state rule) April-September. Blue rockfish has a state-specified landing cap and is tracked separately from the other nearshore rockfish. Other nearshore rockfish also have a state-specified landing cap (13.6 mt), in place since 2002, and are tracked inseason. When the landing cap of either are approached the state takes inseason action, usually going to non-retention of that species or group, while the remainder of the fishery season structure and regulations remain unchanged.

Commercial: As of 2014, state-specified landing caps for the commercial nearshore fishery are 14.2 mt (Other Nearshore Rockfish excluding blue rockfish) and 137.9 mt (black rockfish and blue rockfish combined). The number of limited entry permits currently issued is 51 for black and blue rockfish without the nearshore endorsement and 70 for black and blue rockfish with the nearshore endorsement.

Management measures for the Oregon commercial fishery under No Action would be similar to those described for the Preferred Alternative (see the DEIS). The RCA may remain at 30 fm because impacts to overfished species are projected to fall below the Oregon share for yelloweye rockfish and canary rockfish. Trip limits will remain low for non-permitted vessels (see DEIS) to cover incidental catch of certain nearshore species (e.g., 15 lb per trip of black rockfish, blue rockfish, other nearshore rockfish, and other nearshore species for vessels using legal commercial nearshore fishing gear; other trip limits are available for incidental catch in salmon troll fisheries and in trawl fisheries). State-regulated trip limits for permitted vessels would likely remain at current levels (i.e., 700 lb per period of Nearshore rockfish complex, excluding blue rockfish, and 1,000 lb to 1,700 lb per period for black rockfish and blue rockfish combined (Table B-20). These limits are lower than those shown in Federal regulation.

Table B-20. Oregon commercial nearshore trip limits (No Action) for permitted vessels during 2014. Limits for vessels without black rockfish and blue rockfish permits, and those without a nearshore endorsement, are much lower than shown below to accommodate incidental catch (see DEIS). These trip limits are more conservative than those shown in Federal regulation.

Oregon Commercial Nearshore Trip Limits (lb; 2014)	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Black rockfish + blue rockfish	1,000	1,200	1,700	1,600	1,200	1,000
Other nearshore rockfish (excluding blue rockfish)	700	700	700	700	700	700

California

Recreational: Currently the recreational fishery is subject to a 10 fish Rockfish Cabezon and Greenling bag limit with restricted seasons and depths in each of 5 management areas to limit mortality on overfished and target stocks. The season length in the California recreational fishery under the status quo ACL Alternative in the Northern Management Area is May 15th to October 31st with a depth restriction of 20 fm to keep mortality of yelloweye rockfish below the HG for the recreational fishery. Under the Preferred ACL Alternative, California recreational season and depth restriction Option 1 would allow a March 1 to December 31 season and 20 fm depth restrictions given harvest limits/guidelines on overfished and target stocks in 2015-2016, without limitations from a state Nearshore Rockfish complex HG.

Commercial: At present, the Nearshore Rockfish complex is managed in four regions: the North Coast Region is from 42° N. Lat. (the Oregon-California border) to 40°10' N. Lat. (near Cape Mendocino). Current trip limits and open and closed periods in each region are provided in Table B-21 below. Depth restrictions vary by region with a 20 fm depth restriction to the north of 40°10′ N. Lat., 30 fm south to Point Conception at 34°27′ N. Lat. and 60 fm south of 34°27′ N. Lat.. Currently gear restrictions restrict fishery participants to 15 hooks per line with no more than 150 hooks in use to take nearshore fish stocks within one mile of shore within certain Fish and Wildlife Districts. In addition, the fishery is a subject to a state restricted access permit system for the shallow nearshore fishery. To enter this shallow nearshore fishery, two existing permits must be purchased and transferred to a new participant within the same management region; one of those permits must then be surrendered back to the Department. The intent of this method is to achieve capacity goals for the fishery and reduce participation relative to historical levels to help prevent overharvest. There are no transferable permits for the deeper nearshore rockfish fishery, preventing new entry at the present.

Most fish are sold live for a premium relative to dead fish. This creates an impetus to fish in shallower depths where mortality is lower compared to deeper depths, thus discards are subject to a relatively low mortality compared to depths greater than 30 fm where discards are deemed 100 percent dead.

Notwithstanding the options presented in this analysis, a major factor that influenced fishing activity in California's northern management region was the change of the RCA shoreward boundary from 30 fm to 20 fm to avoid yelloweye rockfish encounters, beginning in 2009. The effects of this boundary change are apparent when examining the commercial landings over the past decade (Figure B-17). California's northern commercial fishery experienced a 55 percent decrease in harvest from 2008 to 2009 and a 39 percent decrease from 2009 compared to 2010.

Table B-21. California commercial federal cumulative two-month trip limits (No Action) for 2014 that apply to the vessel and to the permit holder for the shallow and deeper nearshore rockfish sectors. Trip limits per two-month period (reported in lb) are the same for both the federal limited entry and open access entry sectors used by the state's restricted access nearshore rockfish fishery program.

NORTH Between 42° and 40°10' N. Lat.	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Black rockfish + minor nearshore rockfishes. No more than 1,200 lb of which may be species other than black rockfish (applies to all periods)	8,500	8,500	8,500	8,500	8,500	8,500

Note: For the shallow nearshore fishery, permit holders may catch and land the two-month trip limit only in the region in which their permit is issued. Holders of a deeper nearshore rockfish permit may catch and land deeper nearshore rockfish anywhere in the state where and when fishing is permitted.

Biological Impacts under Option 1 (No Action)

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 1 are summarized in Table B-22. Further description of the mortality in each state and sector is provided in the text below.

Table B-22. Projected Nearshore Rockfish mortality (mt) north of 40°10′ N. Lat. from each state and sector under Option 1 (No Action).

	Washington		Oregon		California		Grand Total
	Rec	Com	Rec	Com	Rec	Com	
	10.5	Closed	30.5	15.1	11.7	8.9	76.7
State Total	10.5		45.6		20.6		

<u>Washington</u>

Recreational: Projected mortality of the Nearshore Rockfish complex under the No Action Option and Preferred Alternative is 10.5 mt. Season length and structure are the same for both alternatives.

Commercial: Closed

<u>Oregon</u>

Recreational: The projected landings under the No Action Option for blue rockfish is 17.5 mt, for other nearshore rockfish 13.0 mt, for total nearshore rockfish mortality of 30.5 mt.

Commercial: The projected landings of Nearshore Rockfish under the No Action Option is 15.0 mt in aggregate, and consists of blue rockfish (4.6 mt) and the remaining species of Nearshore Rockfish (10.4 mt). The nearshore projection model provides an additional estimate of discard mortality at 0.07 mt (blue rockfish and other nearshore rockfish combined), resulting in a total mortality of 15.07 mt for Nearshore Rockfish complex in the Oregon nearshore commercial fishery. This is lower than shown under the Preferred Alternative (see the DEIS), where projected landings are 18.3 mt for Nearshore Rockfish (and additional discard mortality projected at 0.1 mt).

<u>California</u>

Recreational: The aggregate mortality of Nearshore Rockfish complex in the Northern Management Area under the No Action Option would be 11.7 mt of which 2.5 mt would be blue rockfish. Under the Preferred Alternative ACL a season length as long as March 1 – December 31 could be accommodated, which would result in an aggregate mortality of Nearshore Rockfish complex of 15.6 mt of which 3.3 mt would be blue rockfish.

Commercial: The aggregate mortality in the Minor Nearshore Rockfish complex under the No Action Option is projected to be 8.9 mt. This aggregate does not include black rockfish. In the north, blue rockfish take is expected to be 4.9 mt out of the 8.9 mt aggregate total.

Projected Overfished Species Mortality under Option 1 (No Action)

<u>Washington</u>

Recreational: The projected overfished species mortality under the No Action Option and the season structure under the Washington recreational Preferred Alternative is 2.83 mt of yelloweye rockfish and 0.75 mt of canary rockfish which are below the WA recreational HG.

Commercial: Closed

<u>Oregon</u>

Recreational: The projected overfished species mortality under the No Action Option is 2.2 mt of yelloweye rockfish and 3.2 mt of canary rockfish, the same as under the Preferred Alternative. These projections are below the sector-specific HG.

Commercial: The projected overfished species mortality under No Action Option is 0.8 mt of yelloweye rockfish and 0.9 mt of canary rockfish. These projections are slightly different than shown under Preferred Alternative, where yelloweye rockfish mortality was projected at 0.9 mt and canary rockfish mortality was projected at 1.1 mt. These projections are equal to or less than the Oregon catch share.

<u>California</u>

Recreational: The overfished species mortality projected to accrue under the No Action Option are 1.7 mt of yelloweye rockfish, 16.3 mt of canary rockfish, 100.1 mt of bocaccio and 1.0 mt of cowcod. Under the Preferred Alternative overfished species mortality projected to accrue are 2.9 mt of yelloweye rockfish, 19.8 mt of canary rockfish, 117.6 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: The overfished species mortality projected to accrue under the No Action Alternative for north of 40°10' N. Lat. are 0.3 mt of yelloweye rockfish, 0.7 mt of canary rockfish, 0.4 mt of bocaccio and 0.0 mt of cowcod. Under the Preferred Alternative, overfished species mortality projected to accrue are 0.2 mt of yelloweye rockfish, 0.5 mt of canary rockfish, 0.4 mt of bocaccio and 0.0 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Stock Status

Nearshore Rockfish

None of the stocks of nearshore species are currently deemed overfished. Recent aggregate mortality for all sectors has perennially exceeded the 2015-2016 ACL of 69 mt in all but two of nine years between 2004 and 2012 (Table B-17). Steps to reduce mortality should be taken to prevent further overharvest relative to 2015-2016 ACLs and reduce the potential for stocks to be harvested down to overfished status.

Overfished Species

The mortality of overfished species is projected to remain below their respective harvest limits/guidelines. Thus the stock status and rebuilding plans for overfished species are not expected to be adversely affected under No Action Option 1.

Socioeconomic Impacts under Option 1 (No Action)

Washington

Recreational: Under the No Action Option, and the season structure under the Washington recreational Preferred Alternative, management measures necessary to keep recreational harvest of yelloweye rockfish within harvest guidelines require closure or significant restriction of the groundfish fishery in areas deeper than 20 and 30 fm along a substantial portion of the Washington coast, restrictions on groundfish retention during peak recreational fishing periods, and closed areas. While these restrictions have been effective at keeping recreational catch of overfished species under specified harvest guidelines in the past, they are limiting to recreational fishing opportunity. Under the No Action Alternative, angler trips are expected to be similar to what was seen in 2013 and 2014.

Commercial: Closed

Oregon

Recreational: Under the No Action Option, the season structure, bag limits, and most other management measures will remain the same as in 2013 and 2014. Therefore, angler trips and associated expenditures are expected to remain similar to what was seen in 2013 and 2014.

Commercial: Under the No Action Option, landing caps, trip limits, and RCA boundaries are expected to remain the same as in 2013 and 2014. Therefore, trips, expenditures, landings, and revenues are expected to remain similar to that seen in 2013 and 2014. Note that even though management measures would remain similar between Preferred Alternative and No Action, landings of Nearshore Rockfish under Preferred Alternative (18.3 mt) may be higher than that shown under No Action (15.0 mt).

California

Recreational: Under the No Action Option the season and depth restrictions will remain the same as in 2014, but 4.5 months of additional fishing opportunity (4,379 angler trips) would be forgone in the Northern Management Area relative to what could be afforded given the harvest specifications and allocations of overfished and target stocks in 2015-2016 under the Preferred Alternative ACL.

Commercial: Under the No Action Option the state restricted access permit system, federal trip limits, season and depth restrictions will remain the same as in 2014. However, routine inseason adjustments could be recommended by the Council if any of the fishery sectors displayed harvest behavior that deviate substantially from the expected amounts. As a result, no adversely affected changes to the socio-economic interests of coastal communities would be anticipated.

B.5.1.2 Option 2: Miles of Coastline

Option 2 is to manage the Nearshore Rockfish complex according to state-specific harvest guidelines stratified north and south of 40°10′ N. Lat., with apportionment north based on the miles of coastline in each state as reflected in Table B-23. The 3 nm state boundary was measured as the proxy for miles of coastline.

Table B-23. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 2 derived using miles of coastline in each state.

Species	**Contribution**	**WA%**	**OR%**	**CA%**	**WA mt**	**OR mt**	**CA mt**
Black-and-yellow	*0.01*	0.26	0.49	0.25	0.00	0.01	0.00
Blue (CA)	*17.00*	0.00	0.00	1.00	0.00	0.00	17.00
Blue (OR & WA)	*26.94*	0.34	0.66	0.00	9.26	17.68	0.00
Brown	*1.75*	0.26	0.49	0.25	0.45	0.86	0.43
Calico	*0.00*	0.26	0.49	0.25	0.00	0.00	0.00
China	*6.20*	0.26	0.49	0.25	1.60	3.06	1.54
Copper	*9.71*	0.26	0.49	0.25	2.51	4.79	2.41
Gopher	*0.00*	0.26	0.49	0.25	0.00	0.00	0.00
Grass	*0.55*	0.26	0.49	0.25	0.14	0.27	0.14
Kelp	*0.01*	0.26	0.49	0.25	0.00	0.00	0.00
Olive	*0.26*	0.26	0.49	0.25	0.07	0.13	0.07
Quillback	*6.15*	0.26	0.49	0.25	1.59	3.04	1.52
Treefish	*0.18*	0.26	0.49	0.25	0.05	0.09	0.04
Total	68.76				15.68	29.93	23.15

Fishing Activity under Option 2 Compared to Option 1 (No Action)

Washington

Recreational: The Washington HG under Option 2 is 15.68 mt which is higher than the project impacts Under No Action (Option 1). Therefore, the Washington recreational fishery would operate under the season structure described under the Preferred Alternative with no additional management measures needed to keep the catch of nearshore rockfish under the WA HG for this HG Option.

Commercial: Closed

Oregon

Under Option 2, the Oregon Nearshore Rockfish complex harvest guideline is lower than the current combined commercial and recreational state-specified landing caps and average annual catches. We showed above that expected Nearshore Rockfish mortality for Oregon fisheries combined is 45.6 mt for No Action and 48.9 mt for Preferred Alternative. The Oregon harvest guideline under this option is 29.9 mt (Table B-23), or 34 percent lower than expected mortality under No Action and 39 percent lower than expected under Preferred Alternative. State landing caps for both commercial and recreational fisheries will have to be reduced dramatically to accommodate this lower target. It is the GMT's understanding that Oregon intends to develop the commercial-recreational split of the Oregon HG through subsequent state processes.

Recreational: Once the state determines the sector-specific allocation, management measures will need to be examined, then implemented through state rules. A preliminary examination of possible management measures has begun. A bag limit analysis revealed that the majority of anglers encounter less than one nearshore rockfish per trip. Therefore changes in bag limit will likely not be a viable option. The likely measure will be non-retention for some months of the fishing season, incorporating discard mortality for the non-retention months into the impact projections. Since most anglers encounter less than one nearshore rockfish per angler trip and they are generally not targeted, prohibiting retention during certain months, is not expected to influence the number of angler trips, how often, when or where anglers go fishing. It may require anglers to be on the water longer to fill their daily bag limit, however since the majority of anglers do not fill their entire bag each day, this is anticipated to have minimal impacts.

Commercial: Under Option 2, the RCA depth restriction of 30 fm would remain in place because projected catch of overfished species would remain at or below the Oregon catch share. Measures other than depth management will have to be implemented to reduce the mortality of Nearshore Rockfish (including blue rockfish) under this option. For example, under No Action, the commercial fishery was projected to land 15 mt of Nearshore Rockfish (including blue rockfish), resulting in total mortality of 15.1 mt, including discard. Using proportions of current landing caps and average landings between Oregon recreational and commercial fisheries (see Preferred Alternative in the DEIS), the Oregon commercial fishery would receive 9.6 mt of Nearshore Rockfish (including blue rockfish), or a reduction of 36 percent relative to No Action and a 48 percent reduction relative to Preferred Alternative. These reductions may require lower trip limits, periods of non-retention, or some combination of the two. In addition, a new and separate landing cap and trip limit for blue rockfish may be required to remain within the harvest guideline under Option 2 (currently, blue rockfish is managed using landing caps and trip limits in combination with black rockfish).

It should be pointed out that trip limit reductions may not equate to a 1:1 reduction in total landings. In other words, if it were required to reduce landings by 36 percent, then it may be necessary to reduce trip limits by much more than 36 percent relative to No Action. In most fisheries, relatively few individuals or vessels reach trip limits. Most vessels land somewhat less than trip limit levels. As such, if trip limits were solely used to reduce landings, and if the Oregon recreational to commercial ratio (split) remained the same as under No Action, then trip limit reductions would likely have to be much more than 36 percent (i.e., trip limits for this fishery would need to be much lower than 700 lb x 0.64 = 448 lb per period under Option 1). There are other considerations that industry and ODFW staff must discuss and analyze before effective trip limits can be identified. For example, impacts of trip limits vary with the season in which they are applied. Finally, trip limits can be applied along with periods of non-retention, which will alter the level of the trip limit needed. Preferences by the Oregon nearshore fleet need to be identified and additional modeling is required before more specificity can be provided.

California

Recreational: Under Option 2, 23.15 mt would be allocated to California, of which, the recreational catch share is 12.9 mt, accommodating a May 1 to October 31 season with a 20 fm depth restriction in the Northern Management Area. While this would provide an additional half month of fishing opportunity relative to the status quo, the recreational fishing season would have to be reduced by four months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Under Option 2 the RCA depth restriction of 20 fm would remain in place as well as the trip limit structure. Because the minor nearshore rockfish complex harvest has been at or below the ACLs in recent years (see Figure (cite the correct figure)), it is not anticipated that Option 2 will have an adverse effect on the northern nearshore rockfish fishery; thus fishing activity is expected not to change. However, trip limit reductions could be implemented should the need arise, with possible decreases that may be as much as 30 percent less than the current trip limit amount. Another possibility to be considered is to have period closures. Additionally, California's northern management region is somewhat isolated from the adjacent region(s). Because of this, northern region participants tend not to fish in other management regions (for those holding a deeper nearshore rockfish permit), nor would they be likely to because the trip limits for the northern region are higher than any of the other regions. Also, it is not expected that holders of a deeper nearshore rockfish permit, who may also hold a shallow permit in any of the other southerly regions, would travel to the northern management region to fish because they would only be allowed to catch and land the deeper nearshore rockfishes – their shallow nearshore permit would not be valid north of 40°10' N. Lat.. In effect, it would probably not be economically justifiable for them to fish north of 40°10' N. latitude.

Biological Impacts Under Option 2 Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 2 are summarized in Table B-24. Further description of the mortality in each state and sector is provided in the text below.

Table B-24. Projected Nearshore Rockfish mortality (mt) north of 40°10′ N. Lat. from each state and sector under Option 2 (miles of coastline). Sector-specific allocations within states are provided as an example and are based on No Action. These intra-state allocations are subject to change.

	Washington		Oregon		California		Total
	Rec	Com	Rec	Com	Rec	Com	
Mortality	10.5	Closed	20.3	9.6	12.6	10.3	63.3
State Total	10.5		29.9		22.9		
Allocation	15.68		29.93		23.15		69
Projected Percent Attainment	66.9%		100%		98.9%		91.7%

Washington

Recreational: Under Option 1 the projected Washington recreational catch falls below the WA HG of 15.68 mt with catch projected to be 10.5 mt. No negative biological impacts are expected.

Commercial: Closed

Oregon

Recreational: Under this option impacts to nearshore rockfish will need to be reduced. Oregon intends to allocate between the commercial and recreational sectors, and take management measures to stay within those allocations, through subsequent state processes. The most likely management measure will be non-retention of nearshore rockfish for some months of the fishing season. Table B-25 below shows the projected landings under the preferred season structure and the projected discard mortality from non-retention by month of the other nearshore rockfish and blue rockfish. Both are calculated on a month by month basis, as that is the smallest time unit currently available in the Oregon recreational model. To project total impacts, and determine which months might need to have non-retention, the landings for months open are added to the release mortality for non-retention months.

Table B-25. Oregon recreational fishery impacts (in mt) by month under preferred season structure and non-retention for the nearshore rockfish.

Projections	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Other Nearshore Rockfish												
Landings under SQ regulations	0.19	0.24	0.58	0.90	1.64	2.13	2.59	2.91	1.22	0.43	0.10	0.06
Non-retention release mortality	0.08	0.10	0.23	0.33	0.61	0.79	0.96	1.08	0.45	0.17	0.04	0.03
Blue Rockfish												
Landings under SQ regulations	0.27	0.34	0.82	1.25	2.24	2.90	3.54	3.98	1.66	0.61	0.14	0.09
Non-retention release mortality	0.27	0.11	0.27	0.39	0.70	0.91	1.10	1.24	0.52	0.21	0.05	0.03

As one example, non-retention in the months of July and August would reduce impacts of other nearshore rockfish species (not including blue rockfish) from 13 mt to 9.5 mt, or a 27 percent reduction. It is the GMT's understanding that Oregon intends to go through their public process to get angler input on which months to have non-retention.

Commercial: Under this option, commercial management measures will be applied to reduce Nearshore Rockfish mortality to 9.6 mt (including blue rockfish), or a 36 percent reduction relative to No Action (and 48 percent reduction relative to Preferred Alternative). This value may change depending on decisions regarding the Oregon recreational-commercial split. Regardless of the management measure applied (e.g., trip limits and/or non-retention), mortality will be reduced. Therefore, no negative biological impacts are expected under this option.

California

Recreational: The projected mortality on nearshore rockfish under Option 2 with a May 1 to October 31 season in the Northern Management Area with a 20 fm depth restriction is 12.6 mt of which 2.8 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 12.9 mt under this option.

Commercial: No anticipated negative biological impacts are expected for this option compared to Option 1. Because this option (as well as Options 3 and 4) could require reductions in harvest, biological impacts could actually be reduced to a small degree depending upon the amount of the reduction. Since California's northern fishery has taken less than 10 mt per year on average during the past five years, resultant decreases would be small.

Projected Overfished Species Mortality

Washington

Recreational: Projected overfished species impacts under this Option are the same as for the season structure under the Washington recreational Preferred Alternative.

Commercial: Closed

Oregon

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 0.01 percent increase in canary and yelloweye rockfish impacts, assuming no other changes to angler behavior.

Commercial: Under Option 2, if fishermen behavior remains the same as under No Action regarding fishing locations and fishing methods, but increased discarding of Nearshore Rockfish becomes necessary, then mortality of overfished species will remain unchanged relative to No Action. If, on the other hand, selection of fishing locations changes dramatically because of changes in trip limits or required non-retention of Nearshore Rockfish, then overfished species impacts may increase or decrease, depending on geographic locations selected. The direction or level of this potential change in catch of overfished species cannot be predicted in this analysis.

California

Recreational: Assuming season lengths under Option 1 of the Preferred Alternative in Management Areas south of $40^{o}10'$ N. Lat. and the May 1 to October 31 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 2 are 2.7 mt of yelloweye rockfish, 21.4 mt of canary rockfish, 118.3 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Mortality of canary and yelloweye rockfish has been near the respective allocation amounts for these two species. As such, under Option 2 (as well as Options 3 and 4), projected mortality may have to be reduced. Using the nearshore bycatch model as a predictor, decreases in the black rockfish component may need to be considered as a means to achieve the necessary projected mortality decreases for these two overfished species so as to not exceed their allocations.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 2.

Overfished Species

Under Option 2 (miles of coastline), the overfished species mortality is expected to be below the harvest limits/guidelines. Thus stock status and rebuilding plans would not be adversely affected by management measures under Option 2.

Socio-economic Impacts compared to Option 1

Washington

Recreational: The socio-economic impacts would be the same under this Option compared to the No Action Option. Socio-economic impacts would continue to be driven by management measures necessary to keep the Washington recreational fishery within the WA HG for yelloweye and canary rockfish. Recreational fishing effort is expected to be the same under Option 2 as under the management measures and season structure for the Washington recreational Preferred Alternative.

Commercial: Closed

Oregon

Recreational: Since most anglers encounter less than one nearshore rockfish per angler trip and they are generally not targeted, management measures necessary to reduce mortality of nearshore rockfish species is not expected to impact angler behavior, angler trips, nor any other socio-economic indicators. However, additional outreach and education on species identification will likely be necessary to help anglers stay within retention/non-retention regulations. It is impossible to predict how the additive impact of adding this regulation to others already in place might impact anglers' decisions on fishing activities.

Commercial: It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may be reduced from 15.0 mt (No Action) to between 9.6 mt (maximum, if reduced trip limits resulted in avoiding Nearshore Rockfish altogether resulting in no discards, which is unlikely) to 7.2 mt (if encounters were similar to No Action and discarding was necessary, some of which will not survive. The 2013 price per pound for Other Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenarios shown here, lost ex-vessel revenue may range from $45,238 to $65,344 relative to No Action (the loss is higher relative to Preferred Alternative). Additional impacts may be incurred by vessels and crew if the decision is made to fish in less productive areas to avoid Other Nearshore Rockfish, for example. If such of a choice is made, then it may require extra time and fuel to catch other targeted species relative to No Action.

California

Recreational: Under Option 2, the season length would increase by a half month (205 angler trips) relative to the status quo fishery in the Northern Management Area, but the season would be reduced by four months (4,175 angler trips) relative to the longest proposed season with the Preferred Alternative ACLs (Option 1) resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: The northern commercial fishery is still recovering from the 2011 tsunami event and the loss of buyers during the past year or two. Currently, there is only one major active buyer in Crescent City. The economic structure of the northern area (essentially only Crescent City) is in a rebuilding phase with no expected time frame, at the present, that predicts when a return to status quo would be reestablished. This, however, is not a result of the options themselves, but an artifact of unavoidable events that have impacted this area. (See also the comments in the Change in Fishing Activity section, above.)

B.5.1.3 Option 3 Historical Catch

Option 3 is to manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the recreational and commercial historical catch between 2004 and 2012 reflected in Table B-26.

Table B-26. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 3 (historical catch) derived using the historical recreational and commercial catch between 2004 and 2012.

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black-and- yellow	0.01	0	0.21	0.79	0	0	0.01
Blue (CA)	17	NA	NA	1	0	0	17
Blue (OR & WA)	26.94	0.06	0.94	NA	1.67	25.27	0
Brown	1.75	0	0.08	0.92	0	0.14	1.61
Calico	0	NA	NA	NA	0	0	0
China	6.2	0.18	0.68	0.14	1.13	4.21	0.86
Copper	9.71	0.13	0.53	0.34	1.24	5.14	3.34
Gopher	0	0	0.29	0.71	0	0	0
Grass	0.55	0	0.49	0.51	0	0.27	0.28
Kelp	0.01	NA	NA	NA	0	0	0
Olive	0.26	0	0.03	0.97	0	0.01	0.25
Quillback	6.15	0.16	0.47	0.36	1.01	2.91	2.23
Treefish	0.18	0	0	1	0	0	0.18
Total					5.05	37.94	25.76

<u>Fishing Activity under Option 3 Compared to Option 1</u>

<u>Washington</u>

Recreational: The Washington recreational fishery would operate under season structure and management measures described under the Preferred Alternative. However because the WA HG under Option 3 is lower than the historical catch, additional management measures would be needed to keep nearshore rockfish catch under the WA HG for this option. To keep total mortality under the WA HG, retention of nearshore rockfish would not be permitted for a portion of the year. Attainment of the WA HG under this alternative is projected to occur by June 1 with retention of nearshore rockfish prohibited for the remaining 7 months of the year. Alternate combinations of months when nearshore rockfish would be prohibited may be explored.

Commercial: Closed

<u>Oregon</u>

Under Option 3, the Oregon Nearshore Rockfish complex harvest guideline is lower than the current combined commercial and recreational state-specified landing caps and average annual catches, but higher than Option 2. We showed under No Action for Nearshore Rockfish that the expected mortality for recreational and commercial fisheries combined is 45.6 mt (the expected mortality under Preferred

Alternative is 48.9 mt). The Oregon harvest guideline under this option is 37.9 mt (Table B-26), 17 percent lower than expected mortality under No Action, and 22 percent lower than expected mortality under Preferred Alternative. State landing caps for both commercial and recreational fisheries will have to be reduced to accommodate this lower target. As noted under Option 2, Oregon intends to develop or modify the commercial-recreational split of the Oregon HG through state processes.

Recreational: Similar to Option 2, a combination of months of retention and months of non-retention will likely be required to keep impacts within the Oregon recreational HG.

Commercial: Similar to No Action, the RCA depth restriction of 30 fm would remain in place. However, as shown for Option 2, trip limits and/or no-retention may be needed to reduce mortality relative to No Action or Preferred Alternative. Trip limit reductions will be less severe than shown under Option 2. For example, using proportions of current landing caps and average landings between Oregon recreational and commercial fisheries (see Preferred Alternative in the DEIS), the Oregon commercial fishery would receive 11.2 mt of Nearshore Rockfish (including blue rockfish), or a reduction of 25 percent relative to No Action and a reduction of 39 percent relative to Preferred Alternative. This reduction may require either lower trip limits, periods of non-retention, or some combination for Nearshore Rockfish (excluding blue rockfish), along with a separate landing cap and separate trip limit for blue rockfish (see Option 2 for more details).

As shown for Option 2, trip limit reductions may not equate to a 1:1 reduction in total landings. In other words, if it were required to reduce landings by 25 percent, then it may be necessary to reduce trip limits by more than 25 percent. If trip limits (and/or non-retention) were solely used to reduce landings, and if the Oregon recreational-commercial allocation remained the same as under No Action, then trip limit reductions would likely have to be much lower than 700 lb x 0.75 = 525 lb per period. How much lower is uncertain. ODFW staff will meet with industry to identify most preferred management measures, and subsequent trip limit modeling will be performed based on options selected. See Option 2 for more details.

California

Recreational: Under Option 3, 25.3 mt would be allocated to California, of which the recreational catch share is 14.07 mt, accommodating a April 15 to December 31 season with a 20 fm depth restriction in the Northern Management Area. While this would provide an additional three months of fishing opportunity relative to the status quo, the recreational fishing season would have to be reduced by one and a half months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Same as Option 2.

Biological Impacts Under Option 2 Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 3 are summarized in Table B-27. Further description of the mortality in each state and sector is provided in the text below.

Table B-27. Projected Nearshore Rockfish mortality (mt) north of 40°10′ N. Lat. from each state and sector under Option 3 (historical catch). Sector-specific allocations within states are provided as an example and are based on No Action. These intra-state allocations are subject to change.

	Washington		**Oregon**		**California**		**Total**
	Rec	Com	Rec	Com	Rec	Com	
Mortality	5.1	Closed	26.8	11.2	14.2	11.45	68.7
State Total	5.1		37.9		25.7		
Allocation	5.05		37.94		25.76		68.75
Projected Percent Attainment	100%		100%		99.7%		99.9%

Washington

Recreational: Under Option 3, additional management measures will be implemented to reduce nearshore rockfish mortality in the Washington recreational fishery by approximately 52 percent compared to Option 1 (No Action).

Commercial: Closed

Oregon

Recreational: Under Option 3, similar to Option 2, non-retention will likely be required to keep impacts within the Oregon recreational HG. Table B-25 has the projections by month for the nearshore rockfish complex minus blue rockfish for retention and non-retention.

Commercial: Under this option, commercial management measures will be applied to reduce Nearshore Rockfish mortality to 11.2 mt, or a 25 percent reduction relative to No Action and 39 percent reduction relative to Preferred Alternative. This value may change depending on decisions regarding the Oregon recreational-commercial spit. Regardless of the management measure applied (e.g., trip limits are non-retention), mortality will be reduced. Therefore, no negative biological impacts are expected under this option.

California

Recreational: The projected mortality on nearshore rockfish under Option 3 with an April 15 to December 31 season with a 20 fm depth restriction in the Northern Management Area is 14.2 mt, of which 3.0 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 14.35 mt under this option.

Commercial: The projected mortality on nearshore rockfish under Option 3 is estimated to be 5.6 mt with no other management changes implemented.

Projected Overfished Species Mortality

Washington

Recreational: No additional overfished species mortality is projected compared to the No Action alternative.

Commercial: Closed

Oregon

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 0.01 percent increase in canary and yelloweye rockfish impacts. This assumes no other changes to angler behavior.

Commercial: Same as Option 2.

California

Recreational: Assuming season lengths under Option 1 of the Preferred Alternative in Management Areas south of 40°10′ N. Lat. and the April 15 to December 31 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 3 are 2.8 mt of yelloweye rockfish, 21.4 mt of canary rockfish, 118.3 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Same as Option 2.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 3.

Overfished Species

The projected mortalities of overfished species under Option 3 are the same as No Action (Option 1), which are below the respective harvest limits/guidelines. No adverse effects on stock status or rebuilding progress are expected under Option 3.

Socio-economic Impacts Under Option 3 compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 3, recreational fishing opportunity would be further reduced. Prohibiting retention of nearshore rockfish for a portion of the season on top of other management measures already in place to protect overfished species may discourage angler participation in recreational fisheries. While it's difficult to predict angler behavior, any reduction in angler fishing effort will have negative socioeconomic impacts.

Commercial: Closed

Oregon

Recreational: Same as under Option 2 and Option 1 (No Action).

Commercial: It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see Option 2 above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may be reduced from 15.0 mt (No Action) to between 11.2 mt (maximum, if reduced trip limits result in avoiding Nearshore Rockfish altogether causing no discards, which is unlikely) to approximately 9.5 mt (if encounters were similar to No Action and discarding was necessary, some of which will not survive). The 2013 price per pound for

Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenarios shown here, lost ex-vessel revenue may range from approximately $31,834 to $46,076 relative to No Action (the loss is higher relative to Preferred Alternative). Additional impacts may be incurred by vessels and crew if the decision is made to fish in less productive areas to avoid Nearshore Rockfish, for example. If such of a choice is made, then it may require extra time and fuel to catch other targeted species relative to No Action.

California

Recreational: Under Option 4, the season length would increase by three months (1,825 angler trips) relative to the status quo fishery in the Northern Management Area, but the season would be reduced by one and a half months (2,555 angler trips) relative to the longest season afforded under the Preferred Alternative ACLs (Option 1), resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: Same as Option 2.

B.5.1.4 Option 4 Hybrid Method

Option 4 is to manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and the historical catch between 2004 and 2012 for the remaining species reflected in Table B-28.

Table B-28. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 4 derived using miles of coastline for China, quillback and copper rockfish and the historical recreational and commercial catch between 2004 and 2012 for the remaining species.

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black-and-yellow	0.01	0	0.21	0.79	0	0	0.01
Blue (CA)	17	NA	NA	1	0	0	17
Blue (OR & WA)	26.94	0.06	0.94	NA	1.67	24.27	0
Brown	1.75	0	0.08	0.92	0	0.14	1.61
Calico	0	NA	NA	NA	0	0	0
China	6.2	0.26	0.49	0.25	1.6	3.06	1.54
Copper	9.71	0.26	0.49	0.25	2.51	4.79	2.41
Gopher	0	0	0.29	0.71	0	0	0
Grass	0.55	0	0.49	0.51	0	0.27	0.28
Kelp	0.01	NA	NA	NA	0	0	0
Olive	0.26	0	0.03	0.97	0	0.01	0.25
Quillback	6.15	0.26	0.49	0.25	1.59	3.04	1.52
Treefish	0.18	0	0	1	0	0	0.18
Total					7.37	36.58	24.8

Fishing Activity under Option 4 Compared to Option 1

Washington

Recreational: The Washington recreational fishery would operate under season structure and management measures described under the Preferred Alternative. However because the WA HG under Option 4 is lower than the historical nearshore rockfish catch, additional management measures would be needed to keep nearshore rockfish catch under the WA HG. To keep total mortality under the WA HG, retention of nearshore rockfish would be prohibited for a portion of the year. The WA HG under Option 4 is higher than Option 3 and so the time period when retention of nearshore rockfish would be prohibited would be slightly shorter. Attainment of the WA HG under this alternative is projected to occur in mid-July with retention of nearshore rockfish prohibited for the remaining 5.5 months of the year. Alternate combinations of months when nearshore rockfish would be prohibited may be explored.

Commercial: Closed

Oregon

Under Option 4, the Oregon harvest guideline is similar to that shown under Option 3; Option 4 provides a harvest guideline of 36.6 mt and Option 3 shows a harvest guideline of 37.9 mt. As such, overall impacts will be similar between Option 4 and Option 3. See Option 3 for more details.

Recreational: Similar to Options 2 and 3 above, non-retention will likely be required for some months to keep impacts within the Oregon recreational HG.

Commercial: Similar to Option 3, with slightly more restrictive management measures. If the recreational-commercial split remains the same as shown under No Action, then commercial Nearshore Rockfish mortality is expected to be 10.5 mt under Option 4 (whereas expected mortality under Option 3 is 11.2 mt). This represents a reduction of 30 percent to No Action and 43 percent relative to Preferred Alternative.

California

Recreational: Under Option 4, 24.8 mt would be allocated to California, of which, the recreational catch share is 13.79 mt, accommodating a May 1 to November 30 season with a 20 fm depth restriction in the Northern Management Area. While this would provide an additional two and month and a half of fishing opportunity relative to the status quo, the recreational fishing season would have to be reduced by three months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Same as Option 2.

Biological Impacts Under Option 4 Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 4 are summarized in Table B-29. Further description of the mortality in each state and sector is provided in the text below.

Table B-29. Projected Nearshore Rockfish mortality north of 40°10′ N. Lat. from each state and sector under Option 4 (hybrid). Sector-specific allocations within states are provided as an example and are based on No Action. These intra-state allocations are subject to change.

	Washington		**Oregon**		**California**		**Total**
	Rec	Com	Rec	Com	Rec	Com	
Mortality	7.37	NA	26.13	10.45	13.34	11.2	68.49
State Total	7.37		36.58		24.54		
Allocation	7.37		36.58		24.80		69
Projected Percent Attainment	100%		100%		98.9%		99.6%

<u>Washington</u>
Recreational: Under Option 4, additional management measures will be implemented to reduce nearshore rockfish mortality in the Washington recreational fishery by 27 percent compared to Option 1.

Commercial: Closed

<u>Oregon</u>
Recreational: Similar to Options 2 and 3 above, a combination of months of retention and non-retention will be required.

Commercial: If the recreational-commercial split remains the same as shown under No Action, then commercial Nearshore Rockfish mortality is expected to be 10.5 mt under Option 4, a 30 percent reduction relative to No Action. Management measures will be used to reduce mortality to the target level. Therefore, no biological impacts are expected under this option.

<u>California</u>
Recreational: The projected mortality on nearshore rockfish under Option 4 with a May 1 to November 30 season with a 20 fm depth restriction in the Northern Management Area is 13.34 mt, of which 2.88 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 13.79 mt under this option.

Commercial: Same as Option 2.

Projected Overfished Species Mortality

<u>Washington</u>
Recreational: No additional overfished species mortality is projected compared to the No Action alternative.

Commercial: Closed

<u>Oregon</u>

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 0.01 percent increase in canary and yelloweye rockfish impacts.

Commercial: Same as Options 2 and 3.

California

Recreational: Assuming season lengths under Option 1 of the Preferred Alternative in Management Areas south of 40°10′ N. Lat. and the May 1 to October 31 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 4 are 2.8 mt of yelloweye rockfish, 21.6 mt of canary rockfish, 118.3 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Same as Option 2.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 4.

Overfished Species

The projected mortalities under Option 4 are the same as No Action (Option 1), which are below the respective harvest limits/guidelines. No adverse effects on stock status or rebuilding progress are expected under Option 4.

Socio-economic Impacts under Option 4 Compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 4, recreational fishing opportunity would be further reduced. Prohibiting retention of nearshore rockfish for a portion of the season on top of other management measures already in place to protect overfished species may discourage angler participation in recreational fisheries. While it's difficult to predict angler behavior, any reduction in angler fishing effort will have negative socioeconomic impacts.

Commercial: NA

Oregon

Recreational: Same as above Options

Commercial: Socio-economic impacts are between those shown for Options 2 and 4, if recreational-commercial split remain similar to No Action. It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see Options 2 and 3 above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may be reduced from 15.0 mt (No Action) to between 10.5 mt (maximum, if reduced trip limits result in avoiding Nearshore Rockfish altogether causing no discards, which is unlikely) to 8.6 mt (if encounters were similar to No Action and discarding was necessary, some of which will not survive). The 2013 price per pound for Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenarios shown here, lost ex-vessel revenue may range from $37,698 to $53,615 relative to No Action (the loss is higher relative to Preferred Alternative). Additional impacts may be incurred by vessels and crew if the decision is made to fish in less productive areas to avoid Nearshore Rockfish, for example. If such of a choice is made, then it may require extra time and fuel to catch other targeted species relative to No Action.

California

Recreational: Under Option 4, the season length would increase by one and a half months (589 angler trips) relative to the status quo fishery in the Northern Management Area, but the season would be reduced by three months (3,790 angler trips) relative to the longest season that can be afforded under the Preferred Alternative ACLs (Option 1) resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.
Commercial: Socio-economic impacts will be similar (slightly worse) than described under Option 3.

Discussion

Under status quo management and the Preferred Alternative seasons, the 69 mt ACL for the Nearshore Rockfish complex are projected to be exceeded. Even with coordinated interstate catch tracking of Nearshore Rockfish complex mortality, inseason action may prove difficult without harvest guidelines for each state on which to base the need for inseason action to reduce mortality as the ACL does not specify amounts to be taken by each state/sector. Establishing harvest guidelines for each state will provide a trigger for inseason action to prevent aggregate mortality from exceeding the ACL. The GMT hopes that the background information regarding proposed methods forming the basis for allocation and implications of each option for the fisheries in each state provided will help inform an allocation decision by the Council and to prevent future ACL overages, while minimizing adverse effects on the fishery.

Appendix 1. Methods used to measure the coastline for each state north of 40°10′ N. latitude.

At the March 2014 Council meeting, the Council requested that the Groundfish Management Team (GMT) calculate the length of the coastlines of California (north of 40°10′ N. latitude), Oregon, and Washington, as a way of approximating the nearshore habitat off each state. Though there may be alternative methods for approximating nearshore habitat, the GMT used the state-federal maritime boundary, i.e., the 3 nautical mile (nm) line, to estimate proportions of coastline among states (Figure B-21) as a starting point for this analysis.[7] Results of this analytical method (e.g., measurement of the 3 nm line (Table B-30) could be used as a basis for allocating Nearshore Rockfish among states. Details regarding this method are described below.

Proportion based on the 3 nm state-federal maritime boundary

Congress established the 3 nm as the boundary between state and federal jurisdiction over the seafloor with the Submerged Lands Act (SLA) of 1953 (43 U.S.C. §1301 et seq.). The 3 nm was established from the official shoreline, called the U.S. normal baseline, which "coincides with the low water line depicted on NOAA charts and includes closing lines across the entrances of legal bays and rivers, consistent with international law."[8] The baseline is approved by the interagency U.S. Baseline Committee and was last evaluated in 2002. The 200 nm exclusive economic zone (EEZ) and 12 nm Territorial Sea boundaries extend from this same baseline.

Shapefiles (i.e., files used in ArcGIS) of the 3 nm boundary, the 200 nm EEZ boundary, and the western U.S. states were downloaded and projected to allow for measurement in ArcGIS (Table B-31). An "addition" was made by the analyst to connect the northern portion of the 3 nm boundary to the EEZ boundary that the U.S. shares with Canada because the shapefiles for these two boundary lines do not connect or overlap (See Figure B-21). The connection was made based on the Bonilla-Tatoosh line defined in Washington's regulations (WAC 220-16-490). The resulting 3 nm boundary line was then measured from the U.S./Canada border to what serves as the WA/OR boundary for the purposes of groundfish management (46°16' N. lat.), to the OR/CA boundary (42° N. lat.), and to the OR/CA boundary to 40°10' N. latitude. The resulting measurements are shown in Table B-30.

This represents one of numerous methods available to measure or approximate miles of coastline. Other methods that the GMT looked at included directly measuring the shoreline (with and without inclusion of islands).[9] A visual comparison of the difference in detail between datasets (i.e., 3 nm line dataset compared to a shoreline dataset) is provided in Figure B-21, which represents a magnified excerpt of Figure B-20. Measurements of coastline may vary depending on many factors including the projected coordinate system used when measuring distances of features depicted on the map (e.g., UTM Zone 10N or WGS 1984), the spatial resolution of the map, image, or file that is used to create the shoreline dataset and the method for defining the shoreline (e.g., mean low water vs. high water). Defining the shoreline is a legal and policy matter as much as a scientific one.[10] These are matters of cartography of which GMT members have limited knowledge.

[7] If desired by the Council, the GMT could provide other methods.

[8] Source: http://catalog.data.gov/dataset/maritime-limits-and-boundaries-of-united-states-of-america

[9] The following shoreline dataset was used: NOAA et al. 1994. "NOA80K/ALLUS80K: Medium Resolution Digital Vector U.S. Shoreline shapefile Long Island Sound GIS project area." Available at: http://woodshole.er.usgs.gov/openfile/of2005-1162/data/basemaps/coastline/nos80k_faq.htm (accessed 5/21/14).

[10] According to the NOAA Shoreline Website, there is "no legal reference that designates one specific shoreline as the legal shoreline. Furthermore, there is no simple answer to this question as there are many legal, technical, and general uses of the terms related to shoreline (shoreline, coastline, baseline, mean high-water line, mean-low water line, etc.)." Source: "What is the legal U.S. shoreline?" Available at: http://shoreline.noaa.gov/faqs.html?faq=4 (accessed 5/21/14).

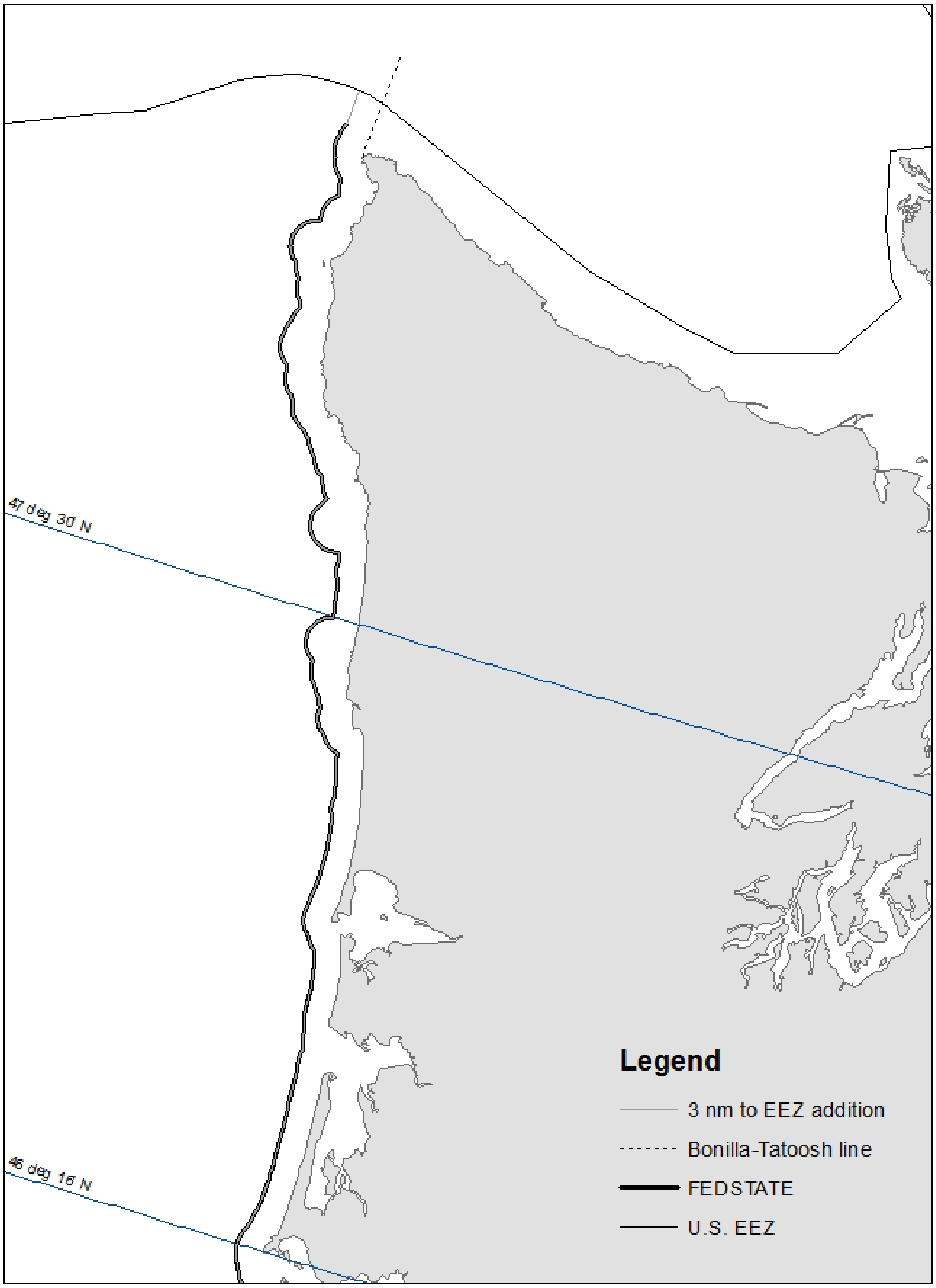

Figure B-20. Detail to show contrast between the coastline and the 3 nm state-federal maritime boundary from the U.S./Canada EEZ to the WA/OR groundfish management line (46°16' N lat.). The connection made from the 3 nm boundary with the EEZ is also shown.

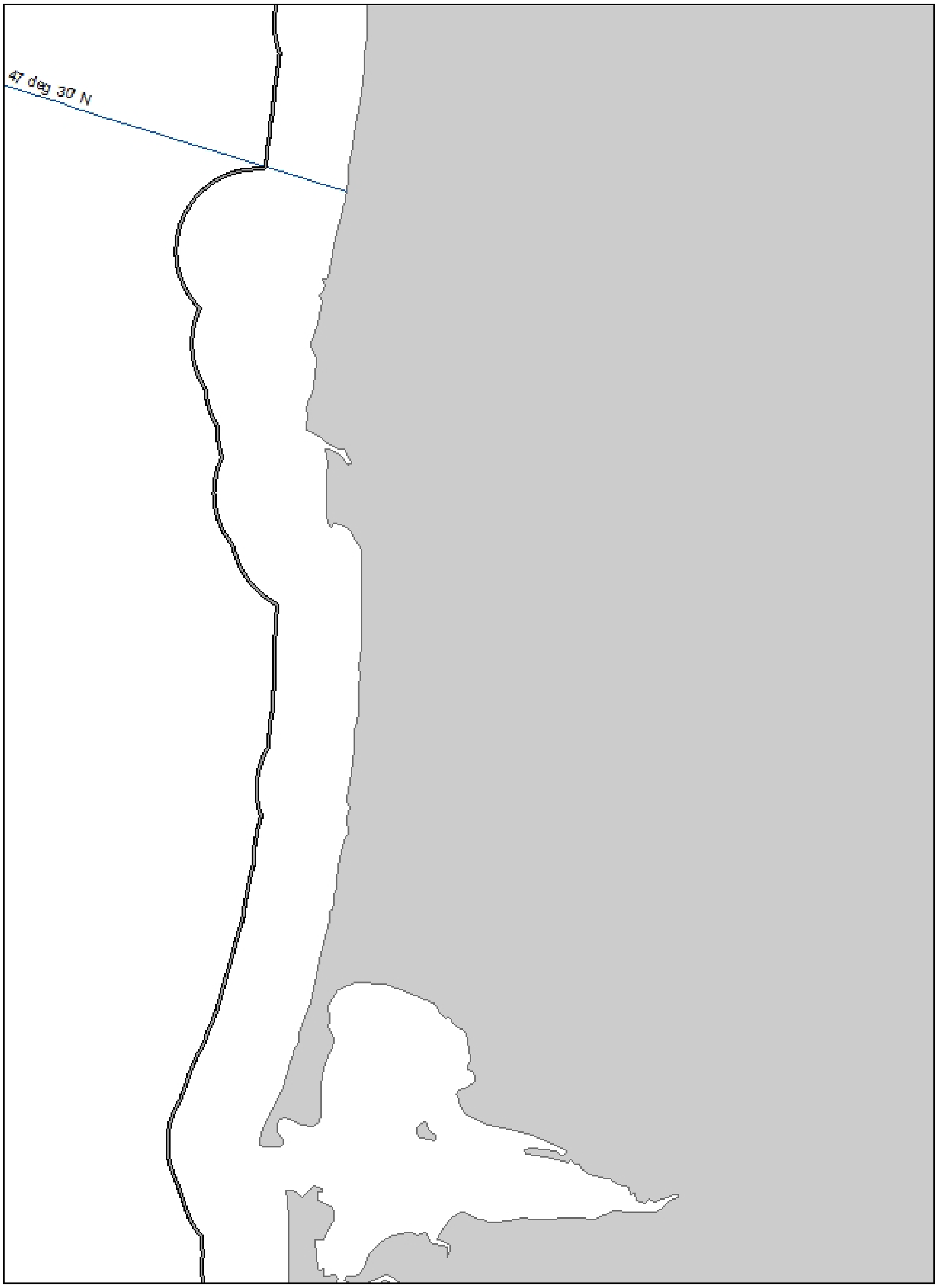

Figure B-21. Detail of Figure B-20, showing differences between the 3 nm line and the shoreline.

Table B-30. Distance estimates using 3 nm state-federal maritime boundary. These differ from what was provided in Agenda Item C.4.b, Washington Department of Fish and Wildlife (WDFW) Report, April 2014.[11]

State	Distance (km)	Percentage of Coastline
Washington	280.01	26.0%
Oregon	530.97	49.3%
Northern California	265.58	24.7%
Total	1,076.56	100%

Table B-31. Source information used for measuring distance of the 3 nm state-federal maritime boundary.

General information	
Software	ArcGIS 10.1
Projected Coordinate System	NAD_1983_2011_UTM_Zone_10N
Geographic Coordinate System	GCS_NAD_1983_2011
Datum	D_NAD_1983_2011
Shapefile information	
Projection of the west coast	U.S. Geological Survey (USGS). 2002. Data Categories: Basemap: State Bounds. Available at: http://coastalmap.marine.usgs.gov/regional/contusa/westcoast/pacificcoast/data.html (5/15/14). Metadata: http://coastalmap.marine.usgs.gov/GISdata/basemaps/boundaries/state_bounds/state_bounds.htm (5/15/14).
Projection of the EEZ	U.S. Geological Survey (USGS). 2013. Data Categories, Boundaries: survey areas, fed/state boundary, U.S. EEZ Boundary. Available at: http://coastalmap.marine.usgs.gov/regional/contusa/westcoast/pacificcoast/data.html (5/15/14). Metadata: http://coastalmap.marine.usgs.gov/GISdata/basemaps/boundaries/eez/NOAA/useez_noaa.htm (5/15/14).
3 nm state boundary	Bureau of Ocean Energy Management. 2002. Submerged Lands Act Boundary. Available at: http://www.marinecadastre.gov/Data/default.aspx (5/19/14).
Latitude lines	Created by GMT analyst, using the following latitude boundaries: 40°10' N., 42° N., and 46°16' N.
Bonilla-Tatoosh line	Created by GMT analyst, using the following coordinates in Washington state regulation at: WAC 220-16-490.

[11] The estimates provided in Table 1 differ from what was provided in the WDFW Report due to the following: 1) the Washington and Northern California proportions were accidentally transposed in the WDFW Report, and 2) the state-federal maritime line (SLA line) used for this GMT analysis utilized a different shapefile source. That is, the U.S. Geological Survey was the source of the SLA line for the WDFW Report and the Bureau of Ocean Energy Management was the source for this GMT analysis.

Appendix 2. Regulatory timeline of regulations affecting management and thus mortality in each state and sector.

Year	Washington [1/]	Oregon		California N. 40°10′ N. Lat.	
	Recreational	**Recreational**	**Commercial**	**Commercial**	**Recreational**
Pre 2004	Depth and Season Restrictions	Depth and Season Restrictions	(2003) Landing caps and 27 fm RCA implemented	(2003) Nearshore permit system implemented	10 fish, Open Year Round No Depth Restriction, Dec 2003 closed
2004	year-round season; 10 rockfish bag limit	year-round season; 40 fm Apr-Sept; 10 marine fish bag limit	Limited entry implemented; 30 fm RCA; Mandatory logbooks; Landing cap increased	30 fm	10 fish RCG, Year Round, Jan - Apr No Depth Restriction, May 1 - Dec 31 30 fm
2005	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year-round season; 40 fm Apr- Sept; 5,8 fish	30 fm	30 fm	30 fm, 10 fish, May 1 - Dec 31
2006	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year-round season, 40 fm Apr- Sept, 6 fish	30 fm Landing cap increased	30 fm Trip limits decreased	30 fm, 10 fish, May 1 - Dec 31
2007	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year-round season, 40 fm Apr- Sept; 6 fish	30 fm Landing cap decreased	30 fm Trip limits increased	30 fm, 10 fish, May 1 - Sep 30
2008	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr-Sept; 5,6 fish	30 fm	30 fm	20 fm, 10 fish, May 1 - Aug 31
2009	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr-Sept; 6,7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Sep 15
2010	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30;	year round, season; 20 and 40 fm Apr-Sept; 7 fish	20 fm South[/2] 30 fm North[/2] Landing cap increased	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Sep 15

Year	Washington [1/]	Oregon		California N. 40°10′ N. Lat.	
	Recreational	**Recreational**	**Commercial**	**Commercial**	**Recreational**
	South Coast, 30 fm March 15-June 15				
2011	year-round season; 10 rockfish bag limit; North Coast, 20 fm June 1 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr- Sept; 7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased & restructured	20 fm, 10 fish, May 15 - Oct 31
2012	year-round season; 10 rockfish bag limit; North Coast, 20 fm June 1 - Sept 30; South Coast 30 fm March 15-June 15	year round season; 30 fm Apr- Sept; 7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Oct 31

[1/] Washington has not had a commercial nearshore fishery since 1995

[2/] The shoreward RCA was 20 fm from the California border to 43° N latitude, and 30 fm from 43° N. latitude to Washington border.

B.6 Non-Trawl: Slope Rockfish Trip Limit Reductions

Analysis of this management measure was not received by the Advanced Briefing Book deadline; it is expected to be delivered as a Supplemental GMT Report.

B.7 Non-Trawl: Lingcod Trip Limit Increases

Need for Action

For 2013-2014 groundfish fisheries, lingcod has been managed, in part, by cumulative bi-monthly trip limits designed to keep catches within the respective ACLs. Trip limits may be adjusted inseason as a result of inseason tracking patterns (higher/lower than projected). This applies to lingcod taken in both the non-nearshore (all three states) and nearshore fisheries (Oregon and California only).

At its April 2014 meeting, the Pacific Fishery Management Council (Council) directed the Groundfish Management Team (GMT) to complete an analysis of various lingcod trip limit and open season options for the west coast commercial non-trawl fixed-gear fishery to estimate economic and biological impacts. Current trip limits and open seasons are given in Table B-32 (No Action = Option 1a). The proposed trip limit and open season configurations (Options 1b and 1c) are summarized in Table B-33, with all trip limits reported in lb per vessel.

Initial analyses were provided to the Council at the April meeting for trip limit options during the open season (Agenda Item C.4.b, REVISED GMT Report, April 2014; pages 39-52 and below in XXX) and options for lingcod retention during the currently closed periods (Agenda Item C.4.b, REVISED GMT

Report, April 2014; pages 52-63 and below in XXX). This document combines results of those previous, separate analyses. Additional details can be found in that April 2014 GMT statement.

Table B-32. No Action Option (Option 1a) for the limited entry and open access non-trawl fixed-gear trip limits (in lb) in effect in 2014 that apply to both north and south of 40°10' N. latitude.

Fleet	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec[a]
Limited entry	closed	closed	800	800	800	400/closed
Open access	closed	closed	400/month			400/closed

[a]The lingcod commercial fishery is closed from December 1st of a given year through April 30th of the subsequent year (five months total). Therefore, the Nov/Dec trip limit applies only to November.

A critical point in the analysis of lingcod trip limits is how proposed increases in the coastwide trip limit structure may affect the mortality of overfished species (OFS) – primarily the OFS rockfish species, in both the non-nearshore and nearshore fisheries. The approach to these proposed trip limit increases does assume that OFS mortality will not be affected in the non-nearshore fishery because any lingcod catch is mostly incidental to the targeting of sablefish; fishing behavior will likely not change because the main target will continue to be sablefish, the much more lucrative fishery. Therefore, it is assumed that any increase in lingcod mortality (landings) will only affect OFS mortality in the Oregon and California nearshore fisheries (Washington has not had a commercial nearshore fishery since 1995).

Additionally, it is prudent to point out that there is probably little to no chance of increased China rockfish impacts under Alternative 1b and 2a (below). Opening the closed season for lingcod retention will not cause increase catch of any rockfish species (OFS or China), because the proposed increases are equal to or less than average encounter rates of lingcod during the closed season (based on WCGOP bycatch rates during December-April). Increasing the lingcod trip limit during the open season showed some increase in OFS for the 50% increase. On the other hand, the increase in canary rockfish was significant when lingcod was increased by 100%. It is expected that other nearshore rockfish mortality to also increase under that scenario (2b).

Table B-33. Lingcod commercial coastwide trip limits (reported in lb per vessel) comparing the No Action Option (Option 1a) to options that increase the bi-monthly trip limit to 1,200 lb and 1,600 lb for the limited entry sector and increases to 600 lb per month and 800 lb per month for the open access sector (Options 1b, and 1c). Also presented are proposed trip limits that establish trip limits for periods 1 and 2 and December, with period 2 closed south of 40°10' N. latitude for both sectors (Options 2a and 2b).

Proposed lingcod trip limits based on the No Action Option (1a) and Options 1b and 1c						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 1a	closed	closed	800	800	800	400 (Nov only)
Option 1b	closed	closed	1,200	1,200	1,200	600 (Nov only)
Option 1c	closed	closed	1,600	1,600	1,600	800 (Nov only)
Open access						
Option 1a	closed	closed	400 lb/month (Dec closed)			
Option 1b	closed	closed	600 lb/month (Dec closed)			
Option 1c	closed	closed	800 lb/month (Dec closed)			

Proposed lingcod trip limits that apply to the area **NORTH** of 40°10' N. latitude with a year-long season structure						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 2a	200 lb/2 months	200 lb/2 months	1,200 lb	1,200 lb	1,200 lb	600 lb for Nov (200 lb for Dec)
Option 2b	200 lb/2 months	200 lb/2 months	1,600 lb	1,600 lb	1,600 lb	800 lb for Nov (200 lb for Dec)
Open access						
Option 2a	100 lb/month	100 lb/month	600 lb/month (100 lb for Dec)			
Option 2b	100 lb/month	100 lb/month	800 lb/month (100 lb for Dec)			

Proposed lingcod trip limits that apply to the area **SOUTH** of 40°10' N. latitude with March/April closed						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 2a	200 lb/2 months	closed	1,200 lb	1,200 lb	1,200 lb	600 lb for Nov (200 lb for Dec)
Option 2b	200 lb/2 months	closed	1,600 lb	1,600 lb	1,600 lb	800 lb for Nov (200 lb for Dec)
Open access						
Option 2a	100 lb/month	closed	600 lb/month (100 lb for Dec)			
Option 2b	100 lb/month	closed	800 lb/month (100 lb for Dec)			

Background

Lingcod was declared overfished in 1999. In 2005, the stock was designated as rebuilt and a coastwide trip limit structure was established that has essentially stayed the same since. Lingcod trip limits have not been modified since 2005 for the limited entry (LE) sector and since 2007 for the open access sector (OA). Since 2007, no inseason adjustments have been made due to fishing mortality concerns for lingcod. At least one industry request was made for an inseason trip limit increase but was not supported by the GMT (Agenda Item E.2.b, Supplemental GMT Report 2, April 2008). This was because the GMT was concerned that any increase in lingcod trip limits and subsequent targeting could have resulted in increased bycatch of canary and yelloweye rockfish. Regarding the OA sector, the GMT expressed concerns that since the number of participants in that fishery was unlimited (as is still the case), any increase in lingcod trip limits could have led to a rapid expansion in the fishery, without any corresponding accountability measures for bycatch of overfished species. And finally, since the trip limits at that time weren't being attained in either the LE or OA fisheries, the GMT did not support an increase.

Since 2008, the coastwide commercial non-trawl fixed-gear catch of lingcod averaged 82.9 mt (Figure B-22) with the majority of landings made by the OA sector. In 2011 and 2012, total mortality by the non-trawl fixed-gear fleet was 3.0 percent and 3.5 percent, respectively, of the non-trawl allocation. For the 2015-2016 biennial management cycle, the Council is considering increases in lingcod trip limits for both the LE and OA non-trawl fixed-gear sectors to provide more fishing opportunity to the fishing communities in the three states. Additionally, a request was made by industry to explore the possibility of allowing the fleet to land modest amounts during those periods, or months, that are currently closed. This analysis estimates the potential harvest mortality under the various trip limit scenarios and open seasons to assist the Council in its decision for a Preferred Alternative. It also provides estimated mortality

amounts for overfished species that are taken in the nearshore commercial fisheries for Oregon and California when lingcod are also taken (Washington does not have a commercial nearshore fishery).

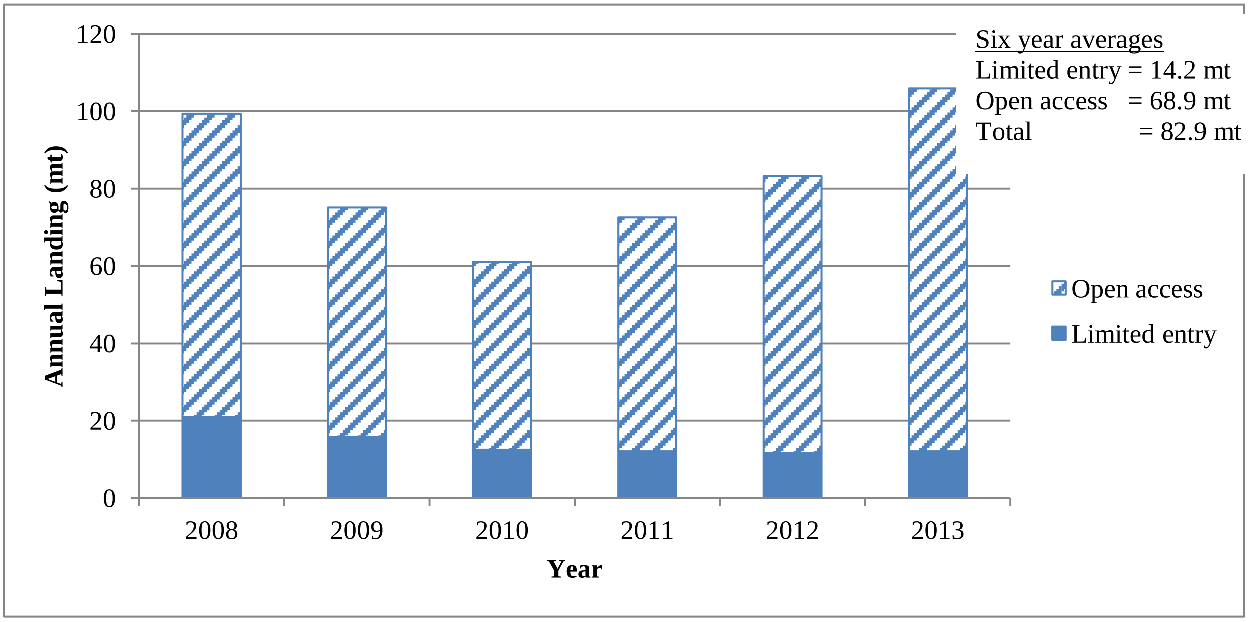

Figure B-22. Coastwide landings of lingcod by the commercial non-trawl fixed-gear fleet for both the limited entry and open access sectors from 2008 to 2013. The 2013 data are preliminary (data source: PacFIN vdrfd).

Methods

A catch-based fleet capacity trip limit model was used, and based on the years from 2008 to 2012. Commercial landings data from PacFIN's vdrfd table were extracted on April 22, 2014 for analysis. Filters were applied to only include: 1) landings made by non-IFQ, shorebased vessels (this applied to 2011 and 2012), 2) hook-and-line or trap gear, 3) Dahl sectors 5 to 10, 12, and 15[12], 4) for the nearshore bycatch model, only those Oregon and California lingcod landings that also showed nearshore species landings, and 5) port of landing north and south of 40°10' N. latitude to identify management area. The model uses a method that establishes a proportion for each participating vessel per period whereby that vessel's actual harvest mortality, as reported from the commercial dealer receipts, is compared to the theoretical maximum that that vessel could have taken. This proportion percentage is then applied to the proposed trip limit for each vessel for each period of allowable fishing. After completing this for all vessels for all periods, the estimated harvest for the fleet is summed for a final annual estimate which is then compared to the annual ACL and/or the non-trawl allocation portion of the ACL.

In addition to the above routine, a portion of the estimated landings under the various trip limit scenarios was identified as those made in conjunction with landings of nearshore species (above). These estimated lingcod landings then inputted into the GMT's nearshore bycatch model to provide estimates of the mortality of overfished species.

More details on methods can be found in Agenda Item C.4.b, REVISED GMT Report, April 2014 (pages 39-52).

[12] Dahl sectors are: 5 nearshore (limited entry), 6 nearshore (open access), 7 non-nearshore (limited entry), 8 non-nearshore (open access), 9 non-nearshore non-sablefish (limited entry), 10 non-nearshore non-sablefish (open access), 12 incidental open access, and 15 commercial non-groundfish.

Results

Lingcod mortality estimates are provided in Table B-34 and Table B-35 for the combined sector options under the different P* values for 2015 and 2016. A final LE and OA sector summary is presented in Table B-36, and lastly overfished species mortality estimates are provided in Table B-37. More detail regarding these estimates is provided below. Also, a comprehensive discussion about trip limits for periods 1 and 2 and December is included in Agenda Item C.4.b, REVISED GMT Report, April 2014, pages 52-63).

Table B-34. Lingcod coastwide commercial mortality estimates using the status quo season structure (closed during periods 1, 2 and December coastwide) comparing No Action (Option 1a) to Options 1b and 1c. The limited entry bimonthly trip limits are shown, along with open access monthly trip limits in parentheses.

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.45						
	Proposed Bimonthly and Monthly Trip Limits (lb)	Estimated Take (mt)	2015		2016	
			Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 1a	800 (400)	88.9	1,950.7	4.6%	1,857.8	4.8%
Option 1b	1,200 (600)	122.3	1,950.7	6.3%	1,857.8	6.6%
Option 1c	1,600 (800)	155.1	1,950.7	8.0%	1,857.8	8.3%

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.25						
	Proposed Bimonthly and monthly Trip Limits (lb)	Estimated Take (mt)	2015		2016	
			Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 1a	800 (400)	88.9	1,444.1	6.2%	1,375.4	6.5%
Option 1b	1,200 (600)	122.3	1,444.1	8.5%	1,375.4	8.9%
Option 1c	1,600 (800)	155.1	1,444.1	10.7%	1,375.4	11.3%

Note: For the limited entry sector, the November trip limits are 400 lb under Option 1a, 600 lb under Option 1b, and 800 lb under Option 1c. The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a, Supplemental REVISED Attachment 2:, April 2014.

Table B-35. Lingcod coastwide commercial mortality estimates under Options 2a and 2b. Season structure modifications for each sector are shown in Table B-33.

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.45					
		2015		2016	
Option	Estimated Take (mt)	Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 2a	151.7	1,950.7	7.8%	1,857.8	8.2%
Option 2b	197.0	1,950.7	10.1%	1,857.8	10.6%

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.25					
		2015		2016	
Option	Estimated Take (mt)	Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 2a	151.7	1,444.1	10.5%	1,375.4	11.0%
Option 2b	197.0	1,444.1	13.6%	1,375.4	14.3%

Notes: South of 40°10' N. latitude the fishery will continue to be closed.
The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a Supplement REVISED Attachment 2, April 2014.

Table B-36. Summary of overall coastwide commercial lingcod mortality estimates for the limited entry and open access sectors for Options 1a, 1b, 1c, 2a, and 2b.

	Trip Limits		Mortality Estimates		
Option	Limited Entry (bi-monthly)	Open Access (monthly)	Limited Entry	Open Access	Total
1a (No Action)	800	400	16.9	72.0	88.9
1b	1,200	600	24.7	97.6	122.3
1c	1,600	800	31.8	123.3	155.1
2a	1,200	600	27.4	124.3	151.7
2b	1,600	800	35.9	161.1	197.0

Note: These trip limit amounts in this table refer to the bi-monthly limited entry sector, whereas the OA sector trip limits are set on a per month basis at one-half the limited entry amount. Refer to Table B-33 for the detailed summary of the actual trip limit amounts.

Table B-37. Overfished species mortality estimates (mt) under the No Action Option (1a), Option 1b, and Option 1c (season structure maintained with periods 1 and 2 and December closed), and under the 2a and 2b options that reflect the season structure modification (i.e., open January – December). These values were calculated by using the five-year commercial averages (2008-2012) of the nearshore species inserted into the nearshore bycatch model.

	Estimated mortality under options with the current season structure in place		
	Option 1a – 800 lb	Option 1b – 1,200 lb	Option 1c – 1,600 lb
Bocaccio	0.4	0.4	0.4
Canary rockfish	6.5	6.6	6.7
Cowcod	0.0	0.0	0.0
Darkblotched rockfish	0.2	0.2	0.2
Yelloweye rockfish	1.1	1.2	1.3

	Estimated mortality under options with an expanded season structure	
	Option 2a – 1,200 lb	Option 2b – 1,600 lb
Bocaccio	0.5	0.5
Canary rockfish	7.0	7.4
Cowcod	0.0	0.0
Darkblotched rockfish	0.2	0.2
Yelloweye rockfish	1.2	1.3

Comparison of Options (Options 1a, 1b, and 1c)

Under Options 1a, 1b and 1c, the coastwide bi-monthly trip limit structure would be maintained whereby commercial retention of lingcod is permitted during periods 3 (May/June), 4 (July/August), 5 (September/October) and November. Retention of lingcod would not be allowed during period 1 (January/February), period 2 (March/April) and in December. Under these three options, trip limit adjustments are considered only for the management area north of 40°10' N. latitude. South of 40°10' N. latitude, the status quo trip limits and season structure would remain in effect for all three options.

No Action (Option 1a)

For 2014, the lingcod commercial bi-monthly non-trawl fixed-gear trip limit for the LE sector is 800 lb per period with 400 lb for November. Fishing would continue to be closed during periods 1 and 2 and December. For the OA sector, trip limits are set at 400 lb per month. Again, periods 1 and 2 and December are closed. These amounts apply on a per vessel basis and apply to all three states. Under the No Action Option (Option 1a), the expected harvest mortality, for both the P* = 0.45 and P* = 0.25 approach, would be less than 10 percent of the non-trawl allocation (Table B-34). The total combined LE and OA mortality would be 88.9 mt.

Fishing Activity Under Option 1a

Under the No Action Option, fishing activity is not expected to change. The number of vessels that will fish would be expected to be about the same as have participated in the fishery over the last few years (Table B-38). In addition, fishing effort per vessel and fishing area are expected to be similar under Option 1a.

Table B-38. Number of vessels in the non-nearshore and nearshore fisheries that made lingcod landings (regardless of the amount) for the three states from 2008 to 2012. Includes both LE and OA vessels.

State	2008	2009	2010	2011	2012	5-Year Avg.
Washington	44	32	37	31	41	37
Oregon	228	219	196	200	202	209
California	251	222	206	223	264	233

Biological Impacts Under Option 1a

With no expected increase in mortality, there are no anticipated biological impacts.

Projected Overfished Species Mortality Under Option 1a

A critical consideration in the lingcod fishery are those catches (landings) that are made in conjunction with nearshore species. These nearshore fishery landings are those that are applied to the nearshore bycatch model as a component necessary for the estimation of overfished species (OFS) mortality. With no expected increase in the take of lingcod and no expected change in fishing behavior under this option, it is also expected that no increase in OFS mortality will be experienced.

Stock Status

Currently, the coastwide lingcod stock is considered healthy. As of the last stock assessment, the point estimate for the depletion of the spawning output (= spawning biomass) at the start of 2009 was 61.9 percent for north of 40°10' N. latitude , 73.7 percent south of 40°10' N. latitude, and 67.0 percent coast wide (Hamel et al. 2009).

Socioeconomic Impacts Under Option 1a

None are expected.

Option 1b

Option 1b maintains the closures during periods 1 and 2 and December. This option also increases the current LE sector trip limit from 800 lb per two months to 1,200 lb per two months and increases the November trip limit from 400 lb to 600 lb. The OA sector trip limit would increase from 400 lb per month to 600 lb per month. The original management measure consideration for this option was to analyze trip limit increases only for the fishery north of 40°10' N. latitude. Trip limit amounts south of 40°10' N. latitude are to be left as is (i.e., remain status quo). Mortality would be expected to increase from 88.9 mt. Under No Action Option 1a to 122.3 mt (37.6 percent increase) under Option 1b, with the majority of this increase coming from the OA sector. Here too, the expected landings mortality would be less than 10 percent of the non-trawl allocation amount at both the P* = 0.45 and P* = 0.25 levels.

Fishing Activity Under Option 1b

With larger trip limits (from 800 lb to 1,200 lb per period for the LE sector and from 400 lb to 600 lb per month for the OA sector) it is reasonable to expect an increase in overall mortality. Table B-36 shows mortality will increase from 88.9 mt (No Action) to 122.3 mt under Option 1b. Despite this expected increase, the total annual mortality will still be substantially less than the non-trawl allocation amount. It is speculated that this modest increase would not generate a surge in fishing activity.

Biological Impacts Under Option 1b

Because the stock is considered very healthy, the 37.6 percent increase (33.4 mt) will have a relatively minor effect on the stock's status. A total mortality of 122.3 mt represents < 10 percent of the non-trawl fixed gear allocation. Projected mortality would not jeopardize the stock's status nor cause the fishery to exceed the non-trawl allocation portion of the annual ACL.

Projected Overfished Species Mortality Under Option 1b

Two overfished species are of major concern: canary and yelloweye rockfish. These two species have been (and will continue to be) the most constraining component of the lingcod fishery and largest concern when considering lingcod trip limit increases. Under this option, both species will experience an approximate 0.1 mt increase from the No Action Option. As per the Preferred Alternative, canary rockfish has a directed nearshore allocation of 6.7 mt (2015) and 6.9 mt (2016) and yelloweye rockfish has a directed nearshore allocation of 1.2 mt (2015) and 1.3 mt (2016). The projected mortality under this option (6.6 mt for canary and 1.2 mt for yelloweye) are equal to or less than the Preferred Alternative nearshore allocations.

Stock Status

Similar to the No Action Option 1a, the stock is expected to remain healthy with no adverse effects from this modest increase in harvest mortality.

Socioeconomic Impacts Under Option 1b

Under this option, the projected increase in total annual landings for both the non-nearshore and nearshore fisheries would be approximately 75,200 lb (34.1 mt). Using the most recent commercial landings data from 2013 as a benchmark, the average coastwide price is $2.50 per pound. Applied to the projected increase of 75,200 lb, the fishery could earn an additional $188,000 compared to the No Action status quo amount – all else being equal.

Option 1c

Option 1c maintains the closures during periods 1 and 2 and December. This option also increases the current LE sector trip limit from 800 lb per two months to 1,600 lb per two months and increases the OA sector trip limit from 400 lb per month to 800 lb per month. The original management measure consideration for this option was to analyze trip limit increases only for the fishery north of 40°10' N. latitude. Trip limit amounts south of 40°10' N. latitude are to remain status quo. Mortality would be expected to increase from 88.9 mt under No Action Option 1a to 155.1 mt (a 74.5 percent increase), with the majority of this increase, again coming from the OA sector. Under this option the projected landings mortality would be less than 10 percent of the non-trawl allocation amount at P* = 0.45 but would be just over 10% (for both 2015 and 2016) for P* = 0.25 (Table B-34).

Fishing Activity Under Option 1c

With larger trip limits (from 800 lb to 1,600 lb per period for the LE sector and from 400 lb to 800 lb per month for the OA sector), it is reasonable to expect an increase in overall mortality. It is possible that there may be a change in fishing behavior with more participants participating in the fishery, but presently it is difficult to estimate what that number may be. Table B-36 shows mortality will increase from 88.9 mt (No Action) to 155.1 mt under Option 1c. Despite this expected increase, the total annual mortality will still be substantially less than the non-trawl allocation amount.

Biological Impacts Under Option 1c

Because the stock is considered very healthy, the 74.5 percent increase (66 mt) compared to the No Action Option will have a relatively minor effect on the stock's status. A total mortality of 155.1 mt under this option represents 10.7 percent of the non-trawl allocation for 2015.

Projected Overfished Species Mortality Under Option 1c

As is the case under Option 1b canary and yelloweye rockfish are the two species that have been (and will continue to be) the most constraining component of the lingcod fishery and largest concern when considering lingcod trip limit increases. Under this option, both species will experience an approximate

0.2 mt increase from the No Action option projection. As per the Preferred Alternative, canary rockfish has a directed nearshore allocation of 6.7 mt (2015) and 6.9 mt (2016) and yelloweye rockfish has a directed nearshore allocation of 1.2 mt (2015) and 1.3 mt (2016). The projected mortality of canary under this option is 6.7 mt, which is equal to the Preferred Alternative nearshore allocation (this morality is 0.2 mt more than the nearshore allocation under than the No Action option estimate of 6.5 mt). For yelloweye, projected mortality under this option is 1.3 mt, which exceeds the Preferred Alternative nearshore allocation for 2015 by 0.1 and equals the Preferred Alternative nearshore allocation for 2016. A mortality of 1.3 mt exceeds the mortality under No Action estimated impact by 0.2 mt.

Stock Status

Similar to the No Action Option 1a, the stock is expected to remain healthy with no adverse effects from this increase in harvest mortality.

Socioeconomic Impacts Under Option 1c

Under this option, the projected increase compared to the No Action Option in total annual coastwide landings would be approximately 146,000 lb (66 mt). Applying the $2.50 per pound value described above provides an estimate that the fishery could earn an additional $365,000 compared to the No Action status quo amount – all else being equal.

Options Overview (Options 2a and 2b)

Under Options 2a and 2b, the coastwide trip limit structure would be modified to accommodate modest trip limits for periods 1 and 2 and December for both the LE and OA sectors (Table B-32). Under these two options, the take of lingcod would be allowed during all periods and months during the year, but only for the management area north of 40°10' N. latitude. South of 40°10' N. latitude, retention of lingcod would continue to be prohibited for both sectors during March and April. Trip limits would also be increased from May-November under these options relative to No Action (Option 1). See Table B-33 for trip limit details.

Option 2a

The intent of Option 2a is to allow retention and landings of lingcod that would otherwise be discarded during the closed season, in addition to increasing trip limits during the currently open season to increase attainment of the non-trawl allocation. Under this option north of 40°10' N. latitude, the LE sector would have a 200 pound trip limit per two months for periods 1 and 2 and 200 lb for December. This sector would also have a 1,200 pound trip limit for periods 3 through 5 and 600 lb in November. For the OA sector, the monthly trip limit would be 100 lb during periods 1 and 2 and 100 lb in December. Additionally, this sector would have a 600 pound monthly trip limit for periods 3 through 5 and November.

Under this option south of 40°10' N. latitude, March and April would continue to be closed to the retention of lingcod. This is proposed because the additional opportunity to fish for lingcod south of 40°10′ N. latitude in period 2, when rockfish is closed, presents the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. Aside from these considerations, the same trip limit amounts would apply for both sectors as is proposed for north of 40°10' N. latitude. See Table B-33 for a summary of trip limit details.

Fishing Activity Under Option 2a

With larger trip limits compared to the No Action Option it is reasonable to expect a modest increase in overall annual lingcod mortality. Compared to the projection for the No Action Option (88.9 mt), the projected mortality would be 151.7 mt, an increase of 62.8 mt (70.6 percent). Despite this projected increase, the total annual mortality will still be substantially less than the non-trawl allocation amounts

(Table B-35). For 2015 and 2016, with a P* = 0.45, the projected percent of the non-trawl allocation would be 7.8 percent and 8.2 percent, respectively. Under a P* = 0.25 scenario, the projected percent of the non-trawl allocation for 2015 and 2016 would be 10.5 percent and 11.0 percent, respectively.

Biological Impacts Under Option 2a

Because the stock is considered very healthy, the 62.8 mt increase will have a relatively minor effect on the stock's status. Lingcod mortality is expected to increase, though encounter rates are not, as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (with an estimated 7 percent mortality). For example, the increased trip limit during the open season is not expected to change fishing behavior (i.e., fishing effort or fishing area). Likewise, allowing retention during December-April at the amounts shown in Table B-33 is not expected to cause increased fishing effort or change in fishing locations (see Agenda Item C.4.b, REVISED GMT Report, April 2014; pages 52-63). Hence, there would be no expected increase in lingcod encounter rates under this option relative to the No Action Option.

Projected Overfished Species Mortality Under Option 2a

With the combination of higher trip limits for the traditional fishing periods coupled with the modest trip limits for the periods that before were closed, projected mortality for canary rockfish is expected to increase. Under the No Action Option 1a, the projected canary rockfish mortality is 6.5 mt (Table B-36), whereas under Option 2a that mortality amount would be 7.0 mt. This projected canary rockfish mortality would exceed the Preferred Alternative nearshore allocation (6.7 mt in 2015 and 6.9 mt in 2016) and the No Action mortality estimate (6.5 mt). Yelloweye rockfish mortality under Option 2a is 1.2 mt, which is the same as shown under Option 1b and equal to the Preferred Alternative nearshore allocation for 2015, but 0.1 mt higher than expected under No Action (1a).

Stock Status

Under Option 2a, no adverse changes to lingcod stock status are expected compared to the No Action Option since lingcod mortality has been far below the non-trawl allocation and is expected to remain so under Option 2a. Estimated lingcod mortality under this option is expected to range between 7.8 percent and 11.0 percent of the non-trawl allocation (Table B-35). Given This level of increase in mortality is far below levels that would result in overfishing and are not expected to adversely affect stock status.

Socioeconomic Impacts Under Option 2a

Allowing fishery participants to retain incidentally encountered lingcod that were previously discarded would increase revenue from current operations targeting other species within incidental lingcod encounters. In 2013, the average price per pound coast wide averaged $2.50 per pound. This amount, applied to the projected increase (approximately 138,500 lb) would result in a coastwide gross estimated ex-vessel increase of approximately $346,000. While low trip limits make it unlikely that fishery participants will choose to target lingcod, such targeting may become worthwhile if the price per pound makes the trip profitable, despite the relatively low trip limits. If trip limits cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely. However, it needs to be pointed out that some vessels do target lingcod on some trips, so any increase would benefit these participants.

Option 2b

The intent of Option 2b is also to allow retention and landings of lingcod that would otherwise be discarded during the closed season, in addition to increasing trip limits during the currently open season. Under this option north of 40°10' N. latitude the LE sector would have a 200 pound trip limit per 2 months periods 1 and 2 and 200 lb for December (the same as for Option 2a). However, this sector would also have a 1,600 pound trip limit for periods 3 through 5 and 800 lb in November. For the OA sector, the monthly trip limit would continue to be100 lb during periods 1 and 2 and 100 lb in December, but the sector would have an 800 pound monthly trip limit for periods 3 through 5 and November. Again, as per Option 2a, south of 40°10' N. latitude, the retention of lingcod would be prohibited during March and April to prevent the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. See Table B-33 for a summary of trip limit details.

Fishing Activity Under Option 2b

With larger trip limits compared to the No Action (Option 1a) and Option 2a, it is reasonable to expect an increase in overall annual lingcod mortality. Compared to the projection for the No Action Option (88.9 mt), the projected mortality would be 197 mt for Option 2b, an increase of 108.1 mt. Despite this projected increase, the total annual mortality will be substantially less than the non-trawl allocation amounts (Table B-35). For 2015 and 2016, with a P* = 0.45, the projected percent of the non-trawl allocation would be 10.1 percent and 10.6 percent, respectively. Under a P* = 0.25 scenario, the projected percent of the non-trawl allocation for 2015 and 2016 would be 13.6 percent and 14.3 percent, respectively. This assumes that no new OA participants would enter the fishery. However, given that this trip limit option would provide a modest increase to potential OA participants, it is reasonable to assume that an increase in the number of participants could occur.

Biological Impacts Under Option 2b

Because the stock is considered healthy, the 108 mt increase compared to the No Action Option will have a relatively minor effect on the stock's status. Lingcod mortality is expected to increase as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (with an estimated 7 percent mortality), as occurs now during the closed season. There may be an increase in lingcod encounter rates under this option relative to the No Action Option, because trip limits during the currently open season would double (Table B-33). The likelihood and impact of this potential increase in effort would be very difficult to quantify. Despite this, however, it is probable that additional sets during a trip may occur to target lingcod (after catching trip limits for other species). This could increase impacts to OFS, as well as China rockfish.

Projected Overfished Species Mortality Under Option 2b

With the combination of higher trip limits for the traditional fishing periods coupled with the modest trip limits for those periods that before were closed, projected mortality for canary is expected to increase. Under Option 1c, the projected canary rockfish mortality is 6.7 mt (Table B-36), whereas under Option 2b that projected mortality amount would increase to 7.4 mt. This projected canary mortality is 0.9 mt higher than shown under No Action (Table B-37) and 0.5 to 0.7 mt higher than the Preferred Alternative allocation. For yelloweye rockfish, the projected mortality under this option will be 1.3 mt, whereas it was 1.2 mt for Option 2a. This projected yelloweye mortality is 0.2 mt higher than shown under No Action, exceeds the Preferred Alternative nearshore allocation for 2015 by 0.1, and equals the Preferred Alternative nearshore allocation for 2016.

Stock Status

Under Option 2b, no changes to lingcod stock status are expected compared to the No Action Option since lingcod mortality has been far below the non-trawl allocation and expected to remain so under Option 2b. Estimated lingcod mortality under this option is expected to range between 10.1 percent and 14.3 percent of the non-trawl allocation (Table B-35). Given the projected increase in mortality that is projected to occur, the level of increase is still expected to be far below levels that would result in overfishing and are not expected to adversely affect stock status.

Socioeconomic Impacts Under Option 2b

Allowing fishery participants to retain more lingcod (some of which were incidentally caught and discarded under status quo) would increase revenue from current operations targeting other species within incidental lingcod encounters. This may also increase revenue by incentivizing increased targeting or change in behavior during the May-November period when trip limits double relative to No Action (Table B-33). In 2013, the average price per pound coast wide averaged $2.50 per pound. This amount, applied to the projected total compared to the No Action Option total would result in a coastwide gross estimated ex-vessel amount of approximately $596,000 more than the No Action Option total. While moderate trip limits make it feasible that fishery participants will choose to target lingcod, such targeting may become more worthwhile if an increase in the overall average price per pound makes the trip profitable. It is speculated that if trip limits cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod could be unlikely.

B.8 Non-Trawl: Allow Lingcod retention in Periods 1, 2, and 6

Need for Action

Lingcod retention is prohibited in Periods 1, 2, and part of 6 for both limited entry and open access fixed gears under the status quo regulations. In recent years, lingcod mortality has been far below the ACL north and south of 42° N. latitude with 25 percent and 13 percent attainment in 2011 and 34 percent and 16 percent in 2012, respectively. Public testimony was received from Mr. Jeff Miles at the September 2013 Council meeting requesting some level of retention during periods 1, 2, and 6. The request was made to land lingcod that are incidentally caught and discarded, with the suggestion that trip limits might be set low enough to prevent changes in fishermen's behavior (i.e., prevent targeting). Higher trip limits than those needed to allow for incidental take may further increase attainment of the non-trawl allocation of the ACL, but bycatch of overfished species while targeting lingcod is a consideration. The proposed change would allow lingcod retention in the restricted access state permitted nearshore fishery in California and Oregon, the open access nearshore fishery in Oregon, and the limited-entry and open access non-nearshore fixed gear fisheries in California, Oregon and Washington.

Background

The prohibition on retention of lingcod during specific periods has been in effect for commercial fixed gear fisheries since the 1990s to improve the conservation of lingcod after being declared overfished. The closure was put in place to minimize impacts on lingcod during their spawning season, which is from December to April (Hamel et al. 2009). Females move in to depths shallower than 50 fm to spawn and males guard nests from predation. Although females do not spend much time in the spawning area, males are concentrated in these shallow waters guarding the eggs during winter and spring months (Love 1996). The season closure for the fixed gear fishery was presumably designed to reduce catch of these males while concentrated during the nest-guarding season to facilitate rebuilding of the stock.

Lingcod was declared rebuilt in 2009, when the status was determined to be 61.9 percent for the northern component and 73.7 percent for the southern component. The coastwide status was 67.0 percent at the beginning of 2009, well above the 40 percent target spawning stock biomass (Hamel *et al.* 2009). As a result, there is no longer a lingcod closed season for individual fishing quota (IFQ fisheries; trawl and fixed gear) or Oregon and California recreational fisheries. The Council is now considering eliminating the spawning season closures in the commercial fixed gear fishery since the lingcod stock has rebuilt and increasing season length may result in higher attainment of the ACL.

Current RCA closures prevent access to much of the lingcod stock, and length restrictions may already as short as they can be while maintaining desirable fillets. Trip limits that are appreciably higher than needed to accommodate bycatch may lead to increase targeting of lingcod, which co-occur with overfished rockfish species. Increasing the season length while maintaining moderate trip limits to allow incidental take may be the most viable means of increasing attainment of the ACL without increasing interactions with overfished species.

Lingcod predate on rockfish both as juveniles and adults. Rockfish and lingcod co-occur on rocky reef habitat and lingcod are currently discarded by participants in the fishery that encounter them while fishing for rockfish during the closed period for lingcod. While mortality on discarded lingcod is relatively low (~7 percent) reflecting hooking and handling mortality since they do not suffer from barotrauma, rockfish discarded by those targeting lingcod exhibit mortalities ranging from 30 – 54 percent in depths less than 30 fm and 100 percent mortality in depths greater than 30 fm. The main concern, therefore, is that targeting of lingcod will result in increased mortality for overfished rockfish species and the potential for the sector allocations to be exceeded.

One important consideration is that period 2 is closed for rockfish retention in the nearshore fishery south of 40°10′ N. latitude. Allowing any retention of lingcod during period 2 in the south may result in increased rockfish bycatch and discard. Maintaining a closure for lingcod during the corresponding months of March and April shoreward of the RCA may be considered under each of the options analyzed to prevent greatly increased rockfish discard mortality in the region in question.

In order to evaluate the potential benefits and impacts from retention by various fixed gear sectors (i.e. nearshore vs. non-nearshore, limited entry vs. open access) under the existing regulations, trip limits were developed to reflect current bycatch rates and to emulate trip limits that are currently allowed during other months. Based on these principals, the following options were analyzed:

Management Options

Option 1: No Action – maintain prohibition on retention of lingcod in the commercial fixed gear fisheries in periods 1, 2 and 6 (December).

Option 2**:** Allow retention of lingcod in commercial fixed gear fisheries during periods 1, 2 and 6 at incidental-catch levels equivalent to average current encounters during the closed periods of 100 lb. per month in the open access fishery and 200 lb. per two month period in the limited entry fishery (i.e., to allow the retention of discarded bycatch).

Option 3**:** Allow retention of lingcod in commercial fixed gear fisheries during periods 1, 2 and 6 with trip limits of 400 lb per month in the open access fishery and 800 lb per two month period in the limited entry fishery (i.e., equivalent to the trip limits during current open months).

Data

Catch and effort for lingcod were estimated for the closed season (December – April) and the open season (May – November). Estimates were calculated and evaluated for the nearshore fixed gear commercial fishery and the non-nearshore fixed gear commercial fishery. Data from WCGOP from 2002-2011 provided lingcod catch (discard and retained) by trip. PacFIN data (2007-2012) provided the average number of trips per vessel per month, average number of vessels fishing per month, and recent landings by the fleet. Lingcod catch per trip (from WCGOP) was then expanded to estimate average lingcod catch per vessel per month (PacFIN data) used in deriving trip limits reflecting incidental catch levels.

Only WCGOP data from the nearshore fixed gear fishery were used to provide maximum bycatch-rate estimates during the current closed period. Encounters with lingcod seaward of the RCA during winter months (the current closed period) are infrequent relative to encounters by the nearshore fixed gear fishery (i.e., many of the larger lingcod are shallow during the spawning season). As such, allowing retention in the non-nearshore fishery that is far higher than their incidental encounter rates during December –April would likely not result in a substantial increase in lingcod targeting. Densities of lingcod seaward of the RCA are low during the December-April period and increased effort for lingcod (i.e., targeting) may not make economic sense for that fishery. For example, the average lingcod catch during the closed periods for the nearshore fishery is 35 lb per trip, whereas the average lingcod catch for the non-nearshore fishery is 7.2 lb per trip during the same periods (WCGOP data). Note that lingcod catch (discard + retained) during the open periods (May – November) are 39 lb per trip for nearshore fixed gear and 43.2 lb per trip for the non-nearshore fishery. The higher encounter rate during the open season makes sense, since this is during the non-spawning season and many larger adults migrate back to deeper waters.

Comparison of Options

Option 1: No Action
Under the No Action Option, retention of lingcod by the fixed gear fishery is prohibited in periods 1, 2 and 6 with the exception of November when a 400 lb. per month trip limit is allowed in both the limited entry and open access fisheries.

Fishing Activity in Commercial Fixed Gear Fisheries under Option 1

The nearshore fixed gear fishery in California and Oregon are subject to state-limited entry permits, while Washington does not allow a commercial fishery in the nearshore. The non-nearshore fixed gear fishery is prosecuted in all three states. Both nearshore and non-nearshore fishery trip limits are divided at 40°10′ N. latitude. The limited entry and open access (Federal) fixed gear trip limits in each period or month are provided in Table B-39.

It is important to point out that the nearshore rockfish fishery south of 40°10′ N. latitude is currently closed in period 2 (March and April), whereas the nearshore rockfish fishery is open year round to the north. The non-nearshore fishery operates year round and primarily targets sablefish. In the nearshore fishery, an average of 3.3 trips per month was taken during the closed season by a monthly average of 82 vessels during 2007-2012. During the open season, an average of 4.2 trips per month and 168 vessels per month took place during the open season. The higher effort during the open season coincides with months of relatively fair weather, allowing greater fishing opportunities.

Table B-39. Commercial fixed gear trip limit regulations for lingcod north and south of 40°10′ N. latitude by sector with closed periods (in gray) under Option 1.

Sector	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec	
LE North	Closed		800 lb./ 2 months			400 lb.	Closed
LE South	Closed		800 lb./ 2 months			400 lb.	Closed
OA North	Closed		400 lb./ month				Closed
OA South	Closed		400 lb./ month				Closed

Biological Impacts under Option 1

Projected Lingcod Mortality
Under the no action alternative, lingcod mortality in the fixed gear fisheries during periods 1, 2 and 6 are expected to be the same as recent years in the past, assuming trip limits for other co-occurring target species do not change. If the trip limits for other target species during the closed season increase, the number of lingcod and overfished species encountered and discarded may increase. At present a 7

percent discard mortality rate reflecting rod and reel gear is anticipated for released lingcod[13]. The landings of lingcod in the last five years for each sector from Washington, Oregon and California are provided in the Table B-40. An average of 52.5 mt of lingcod mortality from the fixed gear fishery north of 42° N. latitude and 31.4 mt to the south are expected under the no action alternative based on the average mortality in 2011 and 2012 from WCGOP total mortality reports. The non-trawl allocations in 2014 were stratified at of 42° N. latitude and mortality from the non-trawl fishery in 2011 and 2012 were 21 percent and 49 percent of the respective allocations north and south, respectively indicating that the fishery has fallen far short of attainment under the current regulations.

Table B-40. Landings of lingcod in nearshore and non-nearshore fixed gear fisheries in California North and South of 40°10′ N. latitude, Oregon and Washington under status quo regulations (Option 1).

Period	Sector			
	Washington	Oregon	California North of 40°10′ N. latitude	California South of 40°10′ N. latitude
Nearshore LE	NA	2.85	0.47	0.52
Nearshore OA	NA	25.70	4.41	15.32
Non-Nearshore LE	3.26	5.10	1.60	0.62
Non-Nearshore OA	2.03	12.85	1.94	3.19

Projected Overfished Species Mortality

In 2011 and 2012 an average of 1.6 mt of yelloweye rockfish, 1.6 mt of canary rockfish, 0 mt of cowcod and 2.8 mt of bocaccio mortality were estimated to have occurred in the fixed gear fishery in pursuit of all targets both in the nearshore and non-nearshore. These estimates reflect the expected mortality under the no action alternative. However, for comparison of alternatives, we provide the no-action projected impacts by using the GMT Overfished Species Nearshore Model. These projected impacts, using 5-year average landed catches from PacFIN (2008-2012) as model inputs, are shown in Table B-41. The projected impacts under Option 1 (No Action) using the Nearshore Model for the Oregon and California nearshore fisheries north and south of 40°10' N latitude are provided in Table B-41. Note that the projected impacts are different than the average mortality shown by WCGOP. The inter-annual variability for overfished species impacts is high, and the projection model estimates long-term average impacts.

Table B-41. Projected mortality for OFS (in mt) from the nearshore bycatch projection model using the lingcod mortality from year round fishing projected from the 5-year average landings of lingcod and targeted nearshore species as inputs. California north and south reflects the management line separating them at 40°10' N latitude.

Species	Oregon	CA North	CA South	Total
Bocaccio	0.00	0.00	0.46	0.46
Canary rockfish	0.93	0.53	5.59	7.05
Cowcod	0.00	0.00	0.00	0.00
Darkblotched	0.12	0.00	0.07	0.18
Yelloweye rockfish	0.82	0.22	0.12	1.16

Stock Status

[13] http://www.pcouncil.org/groundfish/current-season-management/past-management-cycles/2009-2010-final-environmental-impact-statement/, pg. 307.

Lingcod
Though once overfished, the lingcod stock was deemed rebuilt after the most recent assessment in 2009 and are now considered healthy (>40 percent of historical biomass). The coastwide stock status was estimated to be 67 percent of historical spawning stock biomass, with the stock south of 42° N. latitude at 61.9 percent and north of 42° N. latitude at 73.7 percent. Current harvest is far below the non-trawl allocation and will not adversely affect the stock status.

Overfished Species
Under Option 1, the mortality of overfished species is projected to remain the same as recent years, which is expected to be below the sector specific fixed gear allocations. Thus the stock status of overfished species and rebuilding plans would be unaffected.

Socioeconomic Impacts under Option 1

Under the no action alternative, lingcod caught as bycatch during the closed months of the fishing season are discarded and revenues from landing them is forgone by participants in the fishery. In addition, no targeted fishery for lingcod is permitted during the closed months preventing effort from being exerted to increase attainment of the ACL, resulting in forgone revenue from directed effort. Thus fishery participants and coastal communities will continue to forgo potential revenue from converting lingcod discards to landings.

Option 2
Option 2 would allow retention of lingcod in fixed gear fishery during periods 1, 2 and 6 at incidental levels equivalent to the average encounter rates observed during the closed periods in recent years (WCGOP, 2002-2011) and expanded by recent fishing effort (PacFIN, 2008-2012). The trip limits would be 100 lb. per month for the open access fishery and 200 lb. per two month period in the limited entry fishery (Table B-42).

Change in Fishing Activity Compared to Option 1

The average estimates of discarded lingcod during the closed months in each sector from WCGOP provided the basis for the trip limits under Option 2 provided in Table B-42. The intent of Option 2 is to allow retention and landings of lingcod that would otherwise be discarded during the closed season. The encounter rates in the nearshore fishery were much higher than the non-nearshore fishery during the closed period (35 lb per trip versus 7 lb per trip, respectively) since lingcod move onshore during the winter and spring months for spawning. Thus estimates from the nearshore fishery were used as the basis for discard rates to better accommodate incidental take and convert more discards to landings. An attempt was made to adjust trip limits to account for discarding due to length restrictions during the open season, but discarding may also be due to overages against the trip limits in open months, which were confounding. Given the average lb of lingcod encountered with and without accounting for discarding of 80 and 117 lb. per month, respectively, we provide a bracketed value for trip limits of 100 lb. per month for the open access fishery and 200 lb. per two month period for the limited entry fishery (Table B-43).

Since the average encounters per month across all nearshore fishery participants were used as the basis for trip limits, many vessels encountered more lingcod than the average (Figure B-23). Thus many vessels would still incidentally encounter more lingcod than the trip limits would allow them to retain, which would still be discarded under Option 2. As seen in Figure B-23, with a trip limit of 100 lb per month, 69.5 percent of the trips would not exceed the trip limit, but 30.5 percent of trips would continue to discard some of the encountered lingcod. Trends in the percent of trips with a given amount of catch per month were examined for both longline and vertical hook and line gear. While those fishing with longline gear encountered nearly 10 lb. per month more than vertical hook-and-line gear, the difference was not great enough to justify the added complexity of trip limits for each gear type. Thus the values for all nearshore participants combined were used to derive trip limits irrespective of gear type.

The landing restrictions under Option 2 are not expected to result in additional mortality of other target stocks or overfished rockfish species. While fisheries are expected to be prosecuted in a similar fashion to Option 1, the additional opportunity for lingcod south of 40°10′ N. latitude in period 2 when rockfish is closed presents the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. While this is a possibility, the landing restrictions may be low enough that participants in the fishery may not opt to target lingcod during the closed season for rockfish in period 2 as the revenue generated from lingcod alone may not be sufficient to be profitable on its own. Thus, the landing restrictions are expected to be sufficiently low to prevent an appreciable increase in overfished species mortality, even if trip limits are attained.

Table B-42. Average lingcod discard rates from WCGOP, fishing effort from PacFIN, and projected lingcod catch for open and closed seasons. The average number of trips per vessel per month, combined with the average lingcod catch rate, formed the basis for the lingcod trip limits under Option 2 intended to allow retention of incidental catch.

<table>
<tr><th>Fishery and Period</th><th>Metrics</th><th>Values</th></tr>
<tr><td rowspan="5">Nearshore fishery (Dec-April; “closed”)</td><td>Average Lingcod Catch per Trip (All Discarded; lb)</td><td>35.0 lb</td></tr>
<tr><td>Average Number of Trips/Vessel/Month</td><td>3.3</td></tr>
<tr><td>Average Number of Vessels Making Landings / Month</td><td>82</td></tr>
<tr><td>Average Expected Lingcod Catch/Vessel/Month =(35 lb) x (3.3 trips/vessel/month) [a]</td><td>117 lb / month, or 234 lb / 2 mos</td></tr>
<tr><td>Average Expected Landings / Vessel / Month, assuming 32% discard rate = (68%) x (117 lb)[b]</td><td>80 lb / month or 160 lb / 2 mos</td></tr>
</table>

Table B-43. Proposed commercial fixed gear trip limits for north and south of 40°10′ N. latitude by sector, under Option 2.

<table>
<tr><th>Sector</th><th>Jan - Feb</th><th>Mar - Apr</th><th>May - Jun</th><th>Jul - Aug</th><th>Sep - Oct</th><th colspan="2">Nov - Dec</th></tr>
<tr><td>LE North</td><td colspan="2">200 lb./2 months</td><td colspan="3">800 lb./ 2 months</td><td>400 lb.</td><td>100 lb.</td></tr>
<tr><td>LE South</td><td colspan="2">200 lb./2 months</td><td colspan="3">800 lb./ 2 months</td><td>400 lb.</td><td>100 lb.</td></tr>
<tr><td>OA North</td><td colspan="2">100 lb./ month</td><td colspan="4">400 lb./ month</td><td>100 lb.</td></tr>
<tr><td>OA South</td><td colspan="2">100 lb./ month</td><td colspan="4">400 lb./ month</td><td>100 lb.</td></tr>
</table>

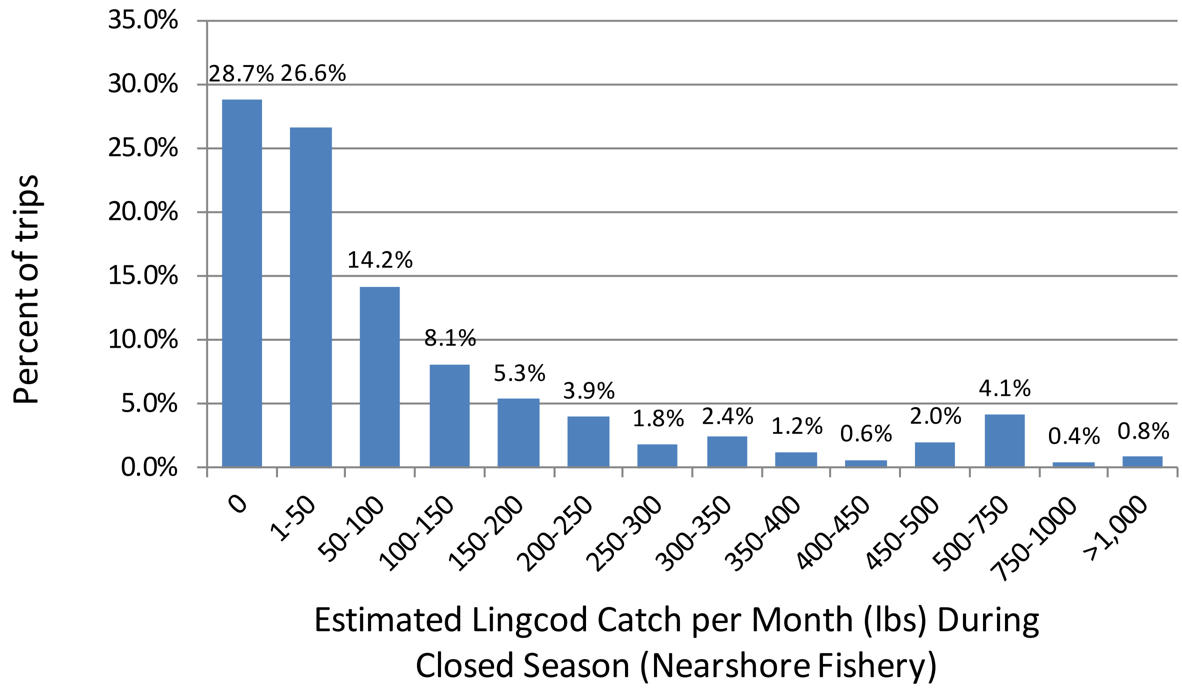

Figure B-23. Projected catch of lingcod per month during the closed season by individual vessels (percent) in the nearshore fixed gear fishery.

Biological Impacts Compared to Option 1

Lingcod Mortality

Lingcod mortality is expected to increase, though encounter rates are not, as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (at 7 percent mortality). There would be no expected increase in lingcod encounter rates under this option relative to Option 1. Increased targeting during the closed period is not expected under Option 2, because trip limits were set to reflect incidental catch rates. The projected mortality of lingcod under this alternative is provided in Table B-44.

Table B-44. Projected landings of lingcod in nearshore and non-nearshore fixed gear fisheries in California North and South of 40°10′ N. latitude, Oregon and Washington under Option 2.

Period	Sector			
	Washington	Oregon	California South of 40°10′ N. latitude	California North of 40°10′ N. latitude
Nearshore LE	NA	3.49	0.55	1.70
Nearshore OA	NA	29.94	5.02	17.34
Non-Nearshore LE	3.67	5.91	1.70	0.70
Non-Nearshore OA	2.0	14.59	2.13	3.44

Overfished Species Mortality

Under Option 2, no additional mortality of overfished species is anticipated since trip limits are set low enough to only accommodate conversion of already encountered but discarded lingcod to landings while targeting other species. Only the nearshore fishery south of 40°10′ N. latitude would be expected to incur additional mortality in period 2 if trip limits of lingcod were targeted, since rockfish is closed during this period. Given that trip limits are set low enough that targeting of lingcod alone is unlikely to be profitable, overfished species mortality is expected to be similar to that under Option 1. If the open access fishery increases effort in nearshore waters to target lingcod, there may be a minor increase in rockfish bycatch including overfished species.

Data Uncertainty Compared to Option 1
Though the trip limits are set to allow retention of lingcod encountered as bycatch, it may encourage some additional effort from the open access fishery, presenting some uncertainty in the lingcod and overfished species mortality. If selective gear is employed, any increase in open access effort may be exerted with minimal unintended consequences in the form of overfished species bycatch. If period 2 remains closed south of 40°10′ N. latitude, there will be less uncertainty in mortality as any additional effort targeting lingcod during the rockfish closure would result in additional bycatch of rockfish relative to Option 1. Though opening lingcod retention for open access during period 2 south of Point Conception could result in increased uncertainty in lingcod and overfished species impacts relative to Option 1, it is expected that trip limits may be low enough to prevent lingcod targeting; therefore, rockfish mortality is expected to be similar to Option 1.

Stock Status

Lingcod
Under Option 2**,** no changes to lingcod stock status are expected compared to the no action alternative since lingcod mortality has been far below the non-trawl allocation and expected to remain so under Option 2. Given the projected increase in impacts, the level of increase is expected to be far below levels that would result in overfishing and are not expected to adversely affect stock status.

Overfished Species
Under Option 2**,** no changes to the stock status or rebuilding progress of overfished species are expected since mortality is projected to remain below the sector specific harvest limits for the nearshore and non-nearshore fisheries.

Socio-economic Impacts compared to Option 1

Allowing fishery participants to retain incidentally encountered lingcod that were previously discarded would increase revenue from current operations targeting other species within incidental lingcod encounters. In 2013, the average price per pound coast wide ranged from $0.36 to $3.62 per lb. depending on the month, state and sector providing $36 to $362 per month of potential revenue from lingcod assuming the trip-limit can be attained. While the low trip limits make it unlikely that fishery participants will choose to target lingcod, such targeting may become worthwhile if the price per pound makes the trip profitable, despite the relatively low trip limits. If the trip-limit cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely.

Option 3
Option 3 would allow retention of lingcod in fixed gear fishery during periods 1, 2 and 6 with trip limits of 400 lb per month in the open access fishery and 800 lb per two month period in the limited entry fisheries.

Change in Fishing Activity Compared to Option 1

The intent of Option 3 is to allow trip limits for lingcod that are the same as the status quo in months currently open to fishing in both the open access and limited entry fisheries during periods 1, 2 and 6 (Table B-45). If effort is the same as the months currently open to fishing at the current trip limits, landings are expected to be lower than those observed in the open months as the trip limits would be the same, but effort is lower during the winter and early spring due to weather. The fishing effort for lingcod would be expected to increase during periods 1, 2 and 6 relative to the no action alternative. The magnitude of the increase in mortality depends on changes in fishing behavior of the limited entry fishery and the number of participants in the open access fishery which is difficult to predict.

Approximately eight percent of trips fishing for nearshore rockfish species during the closed months encountered more lingcod than can be retained under the 400 lb. per month open access trip limits and one percent encountered more than the 800 lb. per two month limited entry trip limits during open months (Figure B-23). It should be noted that even at the trip limit levels of 400 lb. per month for open access or 800 lb. per two months in the limited entry fishery, some participants would still be discarding lingcod even if the current trip limits during the open season were employed during the closed season (Figure B-23). Thus the trip limits under Option 3 will continue to limit landings for some trips and reduce lingcod mortality relative to an unregulated fishery.

The effort in the limited entry fishery is capped by the number of permit holders, thus the 800 lb. per two month trip-limit may increase targeting/harvest relative to other options, but the number of participants is fixed, limiting the magnitude of potential increase relative to the open access fishery. Both open access and limited entry non-nearshore fisheries primarily target sablefish, and the magnitude of the revenue generated by allowing retention of lingcod in this fishery is not expected to cause increased targeting of lingcod because the revenue they would generate is far lower than from sablefish landings. In addition, lingcod encounters are less common in the non-nearshore fishery than in the nearshore fishery during the closed season (see Table B-45), when lingcod move onshore to spawn during the winter and early spring (Love 1996). Lingcod encounters in the nearshore fishery peak during the summer month during the open season. In the nearshore fishery, the increased trip limits are expected to increase revenues and lingcod targeting. It is uncertain whether the increase would be sufficiently high to drive increased participation of latent capacity. Weather is also a factor in that the closed period coincides with a period of more inclement weather, which is expected to limit the amount of additional effort that may be exerted under Option 3.

Table B-45. Proposed commercial fixed gear trip limits for north and south of 40°10′ N. latitude by sector under Option 3.

Sector	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec
LE North	800 lb./ 2 months					
LE South	800 lb./ 2 months					
OA North	400 lb./ month					
OA South	400 lb./ month					

Biological Impacts Compared to Option 1

Lingcod mortality is expected to increase relative to the no action alternative, though it is difficult to determine the extent to which effort will increase. If additional entrants begin fishing in the open access fishery, impacts may increase further than shown here. The low increase in potential revenue makes extreme increases in effort unlikely especially considering that attainment is likely to fall short of the trip limit if targeting lingcod proves difficult. The 800 lb. per two month trip limit on the limited entry fishery may allow additional landings relative to other options, but the number of participants is limited by the number of permit holders.

To project lingcod mortality for the limited entry and open access sectors under Option 3, recent mortality during the open period was expanded to the currently closed periods (i.e., Periods 1, 2 and the second half of 6) using historical proportions of catch by time. The standard fleet capacity trip limit model documented under the analysis of trip limits for 2015-2016 was used to calculate the projected lingcod mortalities for the following fishery sectors per state including limited entry/nearshore open access (Oregon and California only) and Non-nearshore limited entry (all three states) /Non-nearshore open access (in all three states). Using the 1995-1997 period during which lingcod was open to fishing year round, the proportional take per period and/or month was calculated and used to emulate those proportions of catch by time for mortality projections. The projected annual mortalities (mt) were then calculated using the 2008-2012 set of landings as the trip limit base period. The proportions of catch by period and/or month were used to estimate the mortality during the closed months given the recent mortality during the base period. Assuming the trip limit is attained by all participants that landed lingcod during the open season, impacts on lingcod would increase in the nearshore fishery. The resulting lingcod mortalities for the fixed gear fisheries are provided in Table B-46.

Table B-46. Projected landings of lingcod in nearshore and non-nearshore fixed gear fisheries in California North and South of 40°10′ N. latitude, Oregon and Washington under Option 3.

Sector	Washington	Oregon	California	
			North of 40°10' N. Latitude	South of 40°10' N. Latitude
Nearshore LE	NA	3.89	0.71	0.69
Nearshore OA	NA	36.65	6.88	23.55
Non-nearshore LE	4.78	7.27	1.92	0.82
Non-nearshore OA	3.13	19.83	2.72	4.55

Overfished Species Mortality

The nearshore overfished species projection model was applied to calculate the OFS mortalities using five-year averages for Oregon (north of 42° N latitude) and California (between 42° N latitude and 40°10' N latitude and south of 40°10' N latitude). Under Option 3, the higher estimated catch of lingcod was imputed in the model to project the relative increase in overfished species impacts expected with trip limits shown in Table B-46. The result is an estimated percent increase in mortality in the nearshore fishery of 6.9 percent (0.08 mt) for yelloweye rockfish, 6.1 percent (0.43 mt) for canary rockfish, 6.5 percent (0.03 mt) for bocaccio and no increase in cowcod. The resulting overfished species mortality and magnitude of increase relative to status quo (in brackets) in Oregon and regions of California are presented in Table B-47.

There is no model for projecting the mortality of overfished species in the non-nearshore fishery using lingcod mortality. The assumption is made that overfished rockfish mortality will not increase in the non-nearshore fishery because it is unlikely that the trip limit will lead to additional targeting lingcod. Relatively few lingcod are encountered while targeting sablefish, especially during the winter and early spring when lingcod move onshore to spawn. If the open access fishery increases effort in nearshore waters to target lingcod, there may be an unanticipated increase in rockfish bycatch including overfished species, though the moderate trip limits for lingcod are expected to prevent excessive additional effort from the open access fishery. Relative to the contributions from the remainder of the year, the allocation to the fixed gear sectors and the ACL, the projected increase in overfished species mortality in Table B-47 are negligible.

Table B-47. Projected mortality for OFS from the nearshore bycatch projection model using the 5-year averages compared to what the OFS mortality projected increases would be with the addition of increased lingcod mortality amounts for periods 1, 2, and the second half of 6, applying the current trip limit structure (amounts) to the closed periods.

Species	Oregon	California North of 40°10' N latitude	California South of 40°10' N latitude	Total
Bocaccio	0.00 (+0.0)	0.00 (+0.0)	0.49 (+0.03)	0.49 (+0.03)
Canary rockfish	1.00 (+0.07)	0.55 (+0.02)	5.93 (+0.34)	7.48 (+0.43)
Cowcod	0.00	0.00	0.00	0.00
Darkblotched	0.13 (+0.01)	0.00 (+0.0)	0.07 (+0.0)	0.20 (+0.02)
Yelloweye rockfish	0.88 (+0.06)	0.23 (+0.01)	0.12 (+0.0)	1.24 (+0.08)

Data Uncertainty Compared to Option 1
Though the trip limits under Option 3 are set to allow retention of lingcod encountered as bycatch and facilitate attainment of the non-trawl allocation, it may encourage some additional effort from the open access fishery. The open access and limited entry fixed gear fisheries cannot retain rockfish in California waters during period 2 south of 40°10' N latitude, thus discarding of rockfish, including overfished species, may increase under Option 3. If the prohibition on retention of lingcod south of 40°10' N latitude in period 2 is maintained, uncertainty in overfished species bycatch projections and discard mortality of healthy rockfish stocks would be reduced. If selective gear is employed, open access effort may be exerted with less unintended consequences in the form of overfished species bycatch.

Stock Status

Lingcod
Under Option 3**,** no changes to lingcod stock status are expected since lingcod mortality is projected to be far below the non-trawl allocation. Given the projected increase in impacts, the level of increase is expected to be far below levels that would result in overfishing.

Overfished Species
The projected increase overfished species mortality under Option 3 is projected to result in mortality that is still below their respective harvest limits. Thus the stock status and rebuilding plans are not expected to be adversely affected by the regulations under Option 3.

Socio-economic Impacts compared to Option 1

Landing of fish previously discarded as bycatch would increase revenues for participants in the fishery and increase the profitability of existing operations by increasing marginal revenue per trip at no or limited additional cost. For those who choose to target lingcod, the revenue generated from landing lingcod may make a few trips per bi-monthly period worth taking to attain the moderate landings under the trip limit as long as the price per pound and landings make the trip economically viable. In 2013, the average price per pound coast wide ranged from $0.36 to $3.62 per lb. depending on the month, state and sector resulting in $144 to $1448 per month of potential revenue from lingcod assuming the trip-limit can be attained. If the trip-limit cannot be attained or if fuel and other variable costs exceed revenue or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely.

B.9 Non-Trawl: Trip Limit Adjustment for Shortspine Thornyhead N., Bocaccio S., and Shelf Rockfish S.

Need for Action

For 2013-2014 groundfish fisheries, shortspine thornyhead (north of 34°27' N. latitude), bocaccio (south of 34°27' N. latitude) and the minor shelf rockfish complex (south of 34°27' N. latitude), have been managed, in part, by cumulative bi-monthly trip limits, designed to keep catches within the respective ACLs. As a result of inseason tracking patterns (higher/lower than projected), trip limits may be adjusted inseason. For shortspine thornyheads, bocaccio, and the shelf rockfish complex, trip limit increases were implemented on August 13, 2013 as per the GMT's June 2013 Inseason Adjustment statement (http://www.pcouncil.org/wp-content/uploads/F9b_SUP_GMT_JUN2013BB.pdf). These trip limit options are in addition to those increases seen in 2013. The fishery sectors considered in the following analyses are the non-trawl fixed-gear fisheries.

The trip limit models used for these species/sectors are catch-based fleet capacity models, whereby the proportional take of the theoretical maximum (for the selected base years and species) that could have been made by each participating vessel is used to estimate take for various trip limit amounts per vessel per period (bi-monthly or monthly); the sum of which represents the estimated annual catch or mortality. When possible, the final estimated mortality was adjusted by also adding the estimates of discard mortality for the respective fishery sectors. One assumption built into this model is that vessels participation does not vary significantly from the base years used in calculations. However, with the open access fishery (OA), that assumption may be in jeopardy if high enough trip limits prompt individuals to jump into what they perceive as a developing lucrative fishery. Another assumption is that any vessel that landed at least 80 percent of its theoretical maximum period amount would probably take 100 percent of an increased period amount. This 20 percent buffer amount compensates for a form of within-fleet latent capacity. Additionally, estimated discard mortality amounts were calculated using the West Coast Groundfish Observer Program (WCGOP) Groundfish Mortality Reports for 2011 and 2012 and factored into the final projected estimates.

2015-2016 Management Considerations

For the 2015-2016 biennial management cycle, trip limit options for the above fishery sectors are analyzed relative to the No Action Option (based on the 2014 amounts) and two additional options, based on a P* of 0.45 and P* of 0.25, which establish fishery harvest guideline amounts for the non-trawl fixed-gear sectors. Estimated mortality is provided that also incorporates discard mortality using estimated amounts derived from WCGOP Groundfish Mortality Reports. Trip limits under any option could be adjusted inseason as needed to attain, but not exceed, a given catch limit (non-trawl allocation portion of the annual ACL).

Generally speaking, bocaccio and shelf rockfish south of 34°27' N latitude have been underutilized during recent years relative to non-trawl sector allocations, whereas shortspine thornyhead utilization north of 34°27' N latitude has been much higher (Table B-48) .

Table B-48. Comparison of estimated mortality (mt) and the non-trawl allocations (including the recreational sector) from 2011 through 2013 for the following non-trawl, fixed-gear fisheries: shortspine thornyheads (SSTH) – north of 34°27' N latitude, bocaccio – south of 34°27' N latitude, and the minor shelf rockfish complex – south of 34°27' N latitude (Note: Limited entry (LE) and open access sectors are combined and 2013 data are preliminary).

	2011			2012			2013		
	Non-trawl	Est. mort.	% of non-trawl	Non-trawl	Est. mort.	% of non-trawl	Non-trawl	Est. mort.	% of non-trawl
SSTH	76	72.9	95.4%	76	63.2	83.2%	74	59.3	80.1%
Bocaccio	58.6	2.3	3.9%	58.6	3.3	5.6%	73.2	2.3	3.1%
Shelf RF	626.9	19.9	3.2%	626.9	23.1	3.7%	586.5	16.2	2.8%

Table B-49. Expected mortality (mt) under No Action and under the Preliminary Preferred Alternative for the non-trawl sector for 2015-2016 for the following non-trawl, fixed-gear fisheries: shortspine thornyheads (SSTH) – north of 34°27' N latitude, bocaccio – south of 40° 10' N latitude, and the minor shelf rockfish complex – south of 40°10' N latitude (Note: Limited entry (LE) and open access sectors are combined and 2013 data are preliminary)

Species or Complex	No Action	Preliminary Preferred (P*=0.45)		Preliminary Preferred (P* = 0.25)	
		2015	2016	2015	2016
SSTH	77.3	84.3	83.3	61.4	60.8
Bocaccio	4.5	258.8	268.7	258.8	268.7
Shelf RF	387	1,383.2	1,384.0	659.7	659.7

B.9.1 Shortspine Thornyhead North of 34°27' North Latitude Management Measures

For 2013-14 west coast groundfish fisheries, shortspine thornyhead have been managed to sector specific harvest guidelines (95 percent trawl and 5% percent non-trawl). Because the recreational sector does not utilize this species, all analyses and totals represent only the commercial fishery. The HG for the non-trawl fixed gear fishery is expected to increase from 73.3 mt (in 2014) to 84.3 mt in 2015 and 83.3 mt in 2016 (Table B-49). The most recent assessment of shortspine thornyhead (Taylor 2013), indicates the stock is healthy with an estimated spawning stock biomass of 74.2 percent of its initial, unfished biomass. As a result, the Council requested analysis of higher trip limits for the LE sector north of 34°27' N. latitude. The 2014 commercial management measures for shortspine thornyhead are described in Table B-50.

Table B-50. Shortspine thornyhead management measures north of 34 °27' N latitude for the 2014 commercial fishery.

Fishery	
Commercial	Sorting requirement for all commercial landings
Limited Entry Trawl	Managed under IFQ
Limited Entry Fixed Gear	Bi-monthly limit management Current trip limits north of 34°27' N latitude are: Periods 1 -3: “2,000 lb/ 2 months” Periods 4 -6: “2,500 lb/ 2 months” Bi-monthly trip limits can be adjusted through routine in-season action
Open Access Fixed Gear	“CLOSED”

2015-2016 Management Considerations
For the 2011-2013 non-trawl sector (which is allocated 5 percent of the annual take north of 34°27' N latitude) catches were between 80 percent and approximately 90 percent of the allocation (Table B-48). The shortspine thornyhead non-trawl fixed-gear fishery north of 34°27' N latitude is restricted to the LE entry sector. The open access sector is not allowed to retain shortspine thornyhead, where the discard mortality is relatively small (e.g., 0.78 mt during 2012 WCGOP Groundfish Mortality Report). During the 2011-2012 management cycle, 116 LE vessels (85 percent of the LE fleet) landed less than 20 percent of the theoretical maximum amount they could have landed under the trip limits that were in place at the time.

Management Options

Option 1 – No Action: Maintain current shortspine thornyhead trip limits for the limited entry sector north of 34°27' N latitude. Under Option 1, the 2014 trip limits (Table B-51) would remain in place for the LE sector, and the OA sector would remain closed.

Option 2a – Increase trip limits for the limited entry sector north of 34°27' N latitude: Under Option 2a, increased bi-monthly trip limits north of 34°27' N latitude were investigated to determine what the projected morality would be compared to the No Action Option (Table B-51).

Option 2b: Further trip limits for the limited entry sector north of 34°27' N latitude: Under Option 2b moderate trip increases, compared to Option 2a, are explored (Table B-51)..

Biological Impacts Under Option 1

Projected Mortality
Under No Action, projected mortality for shortspine thornyhead north of 34°27' N latitude is 77.3 mt for the LE fixed-gear sector (with no open access fishery allowed). At this level of harvest, the projected mortality represents 92 percent of the 2015 HG (84.3 mt) and 93 percent of the 2016 HG (83.3 mt) at a P* value of 0.45 (Table B-49). At a P* value of 0.25 this exceeds the 2015 HG (61.4 mt) by 26 percent and exceeds the 2015 HG (60.8 mt) by 27 percent. This mortality is expected to be within the HG at the current level of vessel participation only at a P* value of 0.45. This assumes that the vast majority of vessels will continue to take less than 20 percent of their theoretical maximum allowable amount.

Stock Status
The shortspine thornyhead stock was determined to be healthy in the last stock assessment (Taylor 2013) and projections under status-quo catches showed little change in stock status.

Overfished Species Mortality

Overfished species (OFS) are encountered by non-nearshore fixed gear fisheries, which also catch shortspine thornyhead. For example in 2013, non-nearshore fixed gear fishery mortality for OFS was bocaccio rockfish South 40°10' N. latitude (2.62 mt), canary rockfish (0.12 mt), darkblotched rockfish (9.04 mt), Pacific ocean perch (0.41 mt), yelloweye rockfish (0.34 mt), and petrale sole (0.83 mt). It is expected that similar catches may be observed under Option 1 (No Action) during 2015 and 2016.

The non-nearshore fishery primarily targets sablefish. Other species, such as shortspine thornyhead, are incidentally caught (not targeted) and retained. In addition, many of the OFS (e.g., canary and yelloweye rockfish primarily live at shallower depths than shortspine thornyhead, and therefore largely do not co-occur.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish

Other species are encountered by non-nearshore fixed gear fisheries, which also catch shortspine thornyhead. For example, rougheye rockfish was taken by the non-nearshore fixed gear fisheries (when shortspine thornyheads were also landed) as follows: 29.7 mt in 2011, 26.2 mt in 2012, and 19.4 mt in 2013. Shortraker rockfish was also taken as follows: 2.5 mt in 2011, 4.53 mt in 2012, and 0.16 mt in 2013. Lastly, blackspotted rockfish was taken as follows: 0.25 mt in 2011, 4.53 mt in 2012, and 0.16 mt in 2013. However, increases in shortspine thornyhead trip limits are not expected to have any additional impact on the mortality of these species because shortspine thornyhead are incidentally caught while fixed gear fishermen are targeting other higher-valued species. For example, slope rockfish and shortspine thornyhead catch is primarily incidental for fishermen targeting sablefish. Fishing effort and fishing behavior (i.e., selection of fishing locations) are not expected to change due to shortspine thornyhead trip limit increases. Therefore, mortality of these three species of rockfish is not expected to change.

Options 2a and 2b – Increase trip limits for the limited entry sector north of 34°27' N latitude

Under Option 2, increased bi-monthly trip limits north of 34°27' N latitude were investigated to determine what the projected morality would be compared to the No Action Option.

Individual vessel landings reported in PacFIN (table vdrfd) from 2011-2012 for the LE sector were used to analyze catch limits by the fleet. The years 2011 and 2012 were ultimately chosen as the basis for this model because they are the most representative of current and future fishing behavior for the three states. Even though the vast majority of vessels take less than 20 percent of their theoretical maximum annual amount, a small increase in the bi-monthly trip limits could cause the fishery to reach or exceed the HG (non-trawl allocation portion of the annual ACL).

Limited Entry Bi-monthly Trip Limit Options

The LE entry trip limit options for the shortspine thornyhead non-trawl fixed gear fishery north of 34°27' N latitude are shown in Table B-51. Option 2a provides for an increase from 2,000 lb to 2,250 lb per bi-monthly period for periods 1 - 3, and does not change the trip limit for periods 4-6, which remain at No Action level of 2,500 lb per bi-monthly period. Option 2b provides for an increase from 2000 lb to 2,500 lb per bi-monthly period for periods 1-3, resulting in 2,500 lb per bi-monthly period for the entire year (Option 2b).

Table B-51. Comparison of projected landings of shortspine thornyhead in the LE non-trawl fixed-gear sector north of 34°27' N. latitude under No Action (Option 1) and increases for periods 1-3 only (Option 2a) and setting the trip limits to 2,500 lb per period for all six periods (Option 2b).

	Limited Entry Shortspine Thornyhead North 34°27' N. Latitude at a **P* of 0.45**					
	Bi-monthly Trip Limits	Projected	HG (mt)		% of HG	
Options	(in lb)	landings (mt)	2015	2016	2015	2016
Option 1	2,000 for periods 1-3 and 2,500 for periods 4-5	77.3	84.3	83.3	91.7 %	92.8%
Option 2a	2,250 for periods 1-3 and 2,500 for periods 4-5	80.3	84.3	83.3	95.3 %	96.4%
Option 2b	2,500 for all six periods	83.4	84.3	83.3	98.9 %	100.1%

	Limited Entry Shortspine Thornyhead North 34°27' N. Latitude at a **P* of 0.25**					
	Bi-monthly Trip Limits	Projected	HG (mt)		% of HG	
Options	(in lb)	landings (mt)	2015	2016	2015	2016
Option 1	2,000 for periods 1-3 and 2,500 for periods 4-5	77.3	61.4	60.8	126%	127%
Option 2a	2,250 for periods 1-3 and 2,500 for periods 4-5	80.3	61.4	60.8	131%	132%
Option 2b	2,500 for all six periods	83.4	61.4	60.8	136%	137%

Biological Impacts Under Options 2a and 2b

Projected Mortality
Under Option 2a and Option 2b, the projected mortality of shortspine thornyhead north of 34°27' N latitude would result in the fishery nearly reaching its HG (Option 2a) and exceeding it (Option 2b) under a P*=0.45 approach (Table B-49). Expected catches under these options are expected to exceed the HG using a P*=0.25 approach.

Stock status
While the stock is considered healthy, no negative consequences would probably result from trip limit increases shown in Table B-51. The IFQ mortality since 2011 ranged from 50 to 60 percent of its allocation. That, coupled with the non-trawl fixed-gear allocation of 5 percent indicates that the projected mortality would not likely jeopardize the stock's health.

Overfished Species Mortality
Details shown in Option 1 also apply to Options 2a and 2b. In addition, increases in shortspine thornyhead trip limits are not expected to have any additional impact on overfished species mortality, because shortspine thornyhead are incidentally caught while fixed gear fishermen are targeting other higher-valued species (i.e., sablefish). Fishing effort and fishing behavior (i.e., selection of fishing locations) are not expected to change due to shortspine thornyhead trip limit increases. Therefore, overfished species impacts are not expected to change.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
As was pointed out for Option 1, an increase in shortspine thornyhead trip limits are not expected to have any additional impact on the mortality of these species. If increases in catch of slope rockfish were to occur following increases to shortspine thornyhead trip limits, it is expected that such increases would be minimal because shortspine thornyheads are not the primary target species.

Impact to Industry

Higher trip limits for shortspine thornyhead could increase access to healthy stocks, resulting in increased ex-vessel value, although the amount is difficult to quantify. Changes as a result of this action may not have a large effect on the stock per se; the possibility of exceeding harvest limits could have a negative impact on the fishery, albeit a small impact because the take of shortspine thornyheads in this sector represents a bycatch amount of the sablefish fishery. The latest anecdotal information received from the industry, regarding the 2014 sablefish fishery, indicates that demand may experience an upswing, which could result in an increased mortality of thornyheads.

B.9.2 Bocaccio South of 34°27' North Latitude Management Measures

For 2013-2014 California groundfish fisheries, bocaccio has been managed to sector specific harvest amounts (i.e., trawl, non-trawl, recreational). The HG for non-trawl fixed gear is expected to increase in 2015 and 2016 to 80.1 mt and 83.1 mt respectively (Table B-53). The 2011 update assessment (Field 2013) indicated that a strong 2010 year class is moving through the fishery (particularly south of 34°27' N. latitude) and as such, encounters (and discarding) have increased. This, combined with the information that recent mortality of this stock is far below the non-trawl harvest guideline (Table B-53), prompted the Council to request an analysis of higher trip limits for the LE and OA sectors south of 34°27' N. latitude. The 2014 commercial management measures for bocaccio rockfish are described in Table B-52.

Table B-52. Bocaccio management measures south of 34°27' N. latitude for the 2014 commercial groundfish fisheries.

Fishery	
Commercial	Sorting requirement for all commercial landings
Limited Entry Trawl	Managed under IFQ
Limited Entry Fixed Gear	Bi-monthly limit management. Current limits south of 34°27' N. latitude are: Period 1: “*300 lb/2 months*” Period 2: Closed Period 3: “*300 lb/2 months*” Periods 4-6: *“500 lb/2 months”* Bi-monthly limits can be adjusted through routine in-season action.
Open Access	Bi-monthly limit management. Closed Period 2 Current limits south of 34°27' N. latitude are: Period 1: *“100 lb/2 months”* Period 2: Closed Period 3: *“100 lb/2 months”* Periods 4-6: *“200 lb/2 months”* Bi-monthly limits can be adjusted through routine in-season action.

2015-2016 Management Considerations
Fewer than 10 LE vessels land bocaccio south of 34°27' N. latitude, while the number of OA vessels landing this species is roughly twice as many. Total mortality estimates reported from WCGOP indicate that approximately six percent of the non-trawl fixed gear HG was attained in 2012 (Table B-53). Encounters are expected to increase as the bocaccio population continues to rebuild (i.e. rebuilding paradox). During the 2011-2012 management cycle, 5 LE vessels (83 percent of the six vessels that landed bocaccio) landed less than 20 percent of the theoretical maximum amount of bocaccio they could have landed south of 34°27' N. latitude. In the OA sector, 28 of 39 vessels (72%) that landed bocaccio south of 34°27' N. latitude landed less than 20 percent of their theoretical maximum amount of bocaccio.

Table B-53. Total bocaccio mortality (in mt) in the non-trawl fixed gear sector (LE and OA combined) south of 40°10' N latitude from 2011-2012. (source: WCGOP)

Year	Mortality	HG	% HG
2011	2.3	58.6	4 %
2012	3.3	58.6	6 %

Management Options

Option 1-No Action: Maintain current trip limits for LE and OA sectors south of 34°27' N latitude.
Under Option 1, the 2014 trip limits (Table B-52) would remain in place for both LE and OA sectors.

Option 2a: Increase trip limits for LE and OA sectors south of 34°27' N latitude: Under Option 2a moderate trip increases, compared to Option 1- No Action, are explored (Table B-56).

Option 2b: Further increase trip limits for LE and OA sectors south of 34°27' N latitude: Under Option 2b moderate trip increases, compared to Option 2a, are explored (Table B-56).

Biological Impacts Under Option 1: No Action

Projected Impacts
Under No Action, projected mortality for bocaccio south of 34°27' N latitude is 1.0 mt and 3.5 mt for the LE and OA sectors, respectively (Table B-54). Between 40°10' and 34°27' N. latitude, average landings (2011 and 2012) for both sectors combined were 0.9 mt. The projected landings for the entire area south of 40°10' N. latitude under No Action is therefore 5.4mt (Table B-53), which is well below the HGs for 2015 and 2016 (258.8 mt and 268.7 mt, respectively) for both P*=0.45 and P*=0.25 (Table B-53).

Table B-54. Summary of bocaccio projected landings south of 40°10' N. latitude (by sector) under No action.

Area	Limited Entry	Open Access
40°10' to 34°27' N. lat.	0.9	
South of 34°27' N. lat.	1.0	3.5
Total	5.4	

Stock Status
The bocaccio stock south of 40°10' N. latitude was formally designated as overfished in 1999. The current stock assessment (Field, 2013) indicates an increasing abundance trend and progress towards rebuilding (Field, 2011). Under Option 1, no changes in progress towards rebuilding are expected.

Overfished Species Mortality

Bocaccio mortality has been minimal south of 34°27' N latitude. Annual average landings from 2008 to 2013 for the LE and OA sectors were 0.2 mt and 1.08 mt, respectively (Table B-55). During this five-year period, a total of only six vessels participated in the LE fishery and 52 in the OA fishery where bocaccio was taken. Of the 52 vessels in the OA fishery, only two averaged more than 0.1 mt of bocaccio per year; one at 0.18 mt and the other at 0.13 mt.

Table B-55. Bocaccio landings (mt) by sector and year from 2008 – 2012 for the non-trawl, non-nearshore fixed-gear fisheries south of 34°27' N latitude. Data source: PacFIN.

Sector	Sector description	Year and landings (mt)					Total	5-yr avg.
		2008	2009	2010	2011	2012		
7	Non-nearshore LE			0.00	0.02	0.36	0.39	0.08
8	Non-nearshore OA	0.04		0.00	0.00	0.16	0.21	0.04
9	Non-nearshore non-sablefish LE	0.17	0.05			0.40	0.62	0.12
10	Non-nearshore non-sablefish OA	1.16	0.73	0.66	1.17	1.28	5.01	1.00
12	Incidental OA	0.08	0.02	0.03	0.05	0.02	0.20	0.04
	LE total						1.00	0.20
	OA total						5.42	1.08

Note: Since these are PacFIN amounts (table vdrfd) and not West Coast Groundfish Observer Program estimates, no discard mortality estimates are included.

A range of bocaccio trip limits and calculated projected mortality under three alternatives for both the LE and OA sectors was analyzed (Table B-56). The years 2011 and 2012 were used because they were the most representative of current and future fishing behavior, with the assumption that potential trip limit increases would not significantly change fishing behavior (i.e. the number of vessels increasing per fishery sector).

Table B-56 . Projected mortality for bocaccio under a range of Options for the LE and OA fixed gear fisheries south of 34°27' N latitude.

No Action Option 1							
Sector	Period and trip limit (lb)						Total estimated mortality (mt)
	1	2	3	4	5	6	
LE FG	300	closed	300	500	500	500	1.2
OA FG	100	closed	100	200	200	200	2.0

Option 2a							
Sector	Period and trip limit (lb)						Total estimated mortality (mt)
	1	2	3	4	5	6	
LE FG	750	closed	750	750	750	750	1.7
OA FG	250	closed	250	250	250	250	5.0

Option 2b							
Sector	Period and trip limit (lb)						Total estimated mortality (mt)
	1	2	3	4	5	6	
LE FG	1,000	closed	1,000	1,000	1,000	1,000	2.3
OA FG	500	closed	500	500	500	500	9.9

Currently, projected mortality for bocaccio in the GMT scorecard is informed by two sources of data – the sablefish bycatch projection model for the area between 40°10' N latitude and 36° N latitude and by trip limit models south of 34°27' N latitude. Mortality between 36° N latitude and 34°27' N latitude (i.e., Morro Bay port complex) in not currently accounted.
WCGOP data were examined for the area south of 36° N latitude to estimate mortality of co-occurring overfished species (OFS; canary, darkblotched, and yelloweye rockfish) that may occur as a result of increases to the bocaccio rockfish trip limits in the LE and OA sectors. WCGOP data from 2011 to 2012 revealed that no OFS were encountered on the observed bocaccio trips during this time frame. Given the small sample size (5 vessels) informing the data and location of fishing, it is reasonable to assume that some OFS are encountered as bycatch, albeit in very small and unquantifiable amounts.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Other species are encountered by non-nearshore fixed gear fisheries, which also catch bocaccio. However, this is not the case for rougheye, blackspotted, and shortraker rockfish if we use the 2011 and 2012 mortality amounts as examples. During these years, no recorded landings of these three species of rockfish were made when landings of bocaccio were made. This is due primarily to the fact that these three species are infrequently taken south of 40°10' N. latitude.

<u>Options 2a and 2b: Increase trip limits for LE and OA sectors south of 34°27' N latitude</u>
Under Option 2, increased bi-monthly trip limits south of 34°27' N. latitude were investigated to accommodate increased encounters and minimize discarding as the stock continues to rebuild.

Individual landings reported in PacFIN from 2011-2012 for LE and OA sectors were used to analyze catch limits by the fleet. Although the HG for bocaccio applies to the entire area south of 40°10' N latitude, only modifications to trip limits south of 34°27' N latitude were investigated (i.e., trip limits between 40°10' and 34°27' N. latitude were status quo). For analytical and managerial ease, bi-monthly trip limits are assumed the same for each period. The years 2011 and 2012 were chosen as the basis for this model because they may be representative of current and future fishing behavior. Average landings during this time period for the area between 40°10' and 34°27' N latitude were added to the analytical options to project landings for the entire area south of 40° 10' N latitude.

Limited Entry Bi-Monthly Trip Limit Options

The LE bi-monthly trip limit options for bocaccio south of 34°27' N. latitude range from 750 lb/2 months (Option 2a) to 1,000 lb/2 months (Option 2b; Table B-57). In recent years the majority of vessels have taken less than half of the maximum trip limit during any given period.

Open Access Bi-Monthly Trip Limit Options

The OA bi-monthly trip limits range from 250 lb/2 months (Option 2a) to 500 lb/2 months (Option 2b; Table B-57). Participation in the OA sector has traditionally been more variable than LE, making it difficult to predict catch and fleet behavior; therefore it is possible that landings could be higher than projected.

Projected landings under each option for the LE and OA sectors are provided (Table B-57). These options are not mutually exclusive. , That is, the Council could recommend a different option for each sector.

Table B-57. Comparison of projected landings (mt) of bocaccio in the LE and OA sectors under No Action trip limits (Option 1), and two options with trip limit increases (Options 2a and 2b) to the 2015 non-trawl HG (258.8 mt) and the 2016 non-trawl (268.7 mt). Trip limit increases apply only to the open periods (currently period 2 (March/April) is closed). This applies to a P* of 0.45 and 0.25. Projected landings between 40°10' and 34° 27' N. latitude are based on average landings during 2011-2012.

2015							
	LE S. 34°27' N. lat.		OA S. 34°27' N. lat.		Projected Landings (mt) 40°10' -34°27' N. lat.		
Option	Trip limit (lb.)	Projected Landings (mt)	Trip limit (lb.)	Projected Landings (mt)		Total (mt)	% of Non-trawl Allocation
Option 1	300 for periods 1 and 3 500 for periods 4-6	1.0	100 for periods 1 and 3 and 200 for periods 4-6	3.5	0.9	5.4	2.0%
Option 2a	750 – all open periods	1.7	250 - all open periods	6.2	0.9	8.8	3.4%
Option 2b	1,000 – all open periods	2.2	500 - all open periods	12.4	0.9	15.5	6.0%

2016							
	LE S. 34°27' N. lat.		OA S. 34°27' N. lat.		Projected Landings (mt) 40°10' -34°27' N. lat.		
Option	Trip limit (lb.)	Projected Landings (mt)	Trip limit (lb.)	Projected Landings (mt)		Total (mt)	% of Non-trawl Allocation
Option 1	300 for periods 1 and 3 500 for periods 4-6	1.0	100 for periods 1 and 3and 200 for periods 4-6	3.5	0.9	5.4	1.9%
Option 2a	750 – all open periods	1.7	250 - all open periods	6.2	0.9	8.8	3.3%
Option 2b	1,000 – all open periods	2.2	500 - all open periods	12.4	0.9	15.5	5.8%

Note: Although status quo provides for differential trip limits by period (i.e. lower in Periods 1 and 3, and higher in Periods 4-6), for purposes of this analysis a constant trip limit amount was analyzed for all open periods.

Biological Impacts

Under Option 2a, landings are projected to increase approximately 70 percent (0.7 mt) and 63 percent (3.4 mt) in the LE and OA sectors respectively compared to No Action (Option 1; Table B-57). While under Option 2b projected landings are expected to increase by 120 percent (1.2 mt) in the LE sector and 187 percent (10.1 mt) in the OA sector compared to No Action. Similar to Option 1, mortality for bocaccio south of 40°10' N. latitude is projected to be well below the non-trawl fixed gear HGs (i.e., 3.4% to 6.0% of the non-trawl harvest guideline; Table B-57).

Stock Status

Similar to Option 1, no changes to rebuilding progress are expected.

Overfished Species Mortality
Same as Option 1. In addition, increases in bocaccio limits relative to Option 1 are not expected to have any additional impact on overfished species mortality, because bocaccio are incidentally caught while fixed gear fishermen are targeting other higher-valued species (i.e., sablefish). Fishing effort and fishing behavior (i.e., selection of fishing locations) are not expected to change due to bocaccio trip limit increases. Therefore, overfished species impacts are not expected to change.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Same as No Action Option 1: no impacts expected.

Impacts to Industry

Higher trip limits for bocaccio may convert discards into retained fish, thus increasing landings, resulting in increased ex-vessel value, although the amount is difficult to quantify. Changes as a result of this action may not have a large effect on the sectors as a whole, but could be of importance to some individuals in each sector.

B.9.3 Minor Shelf Rockfish Complex South of 34°27' North Latitude Management Measures

Although the shelf rockfish complex is managed as a single stock south of 40°10´ N. latitude, trip limit options analyzed herein are for the management area south of 34°27' N. latitude. For 2013-14 California groundfish fisheries, the minor shelf rockfish complex south of 40°10´ N. latitude has been managed to sector specific allocations (i.e. trawl, 12.2% and non-trawl, 87.8%). Shelf rockfish are not formally allocated within non-trawl sectors, that is, the non-trawl commercial LE and OA sectors, as well as the recreational sector, share the non-trawl allocation. The non-trawl allocation south of 40°10´ N. latitude is expected to increase substantially from 615 mt in 2014 to 1,383.2 mt in 2015 and 1,384.0 mt in 2016 at a P* = 0.45 (Table B-59). At P* = 0.25, the 2015 and 2016 allocations would be 659.7 mt for both years. Based on an industry request, the Council requested analysis of higher trip limits for LE and OA sectors south of 34°27' N. latitude. The 2014 commercial management measures for shelf rockfish south of 34°27' N. latitude are described in Table B-58.

Table B-58. Shelf rockfish management measures for the 2014 commercial groundfish fisheries, south of 34°27' N. latitude.

Fishery	
Commercial	Sorting requirement for all commercial landings
Limited Entry Trawl	Managed under IFQ
Limited Entry Fixed Gear	Bi-monthly limit management. Current limits south of 34°27' N. latitude are: Period 1: *"3,000 lb/2 months*" Period 2: Closed Period 3: *"3,000 lb/2 months*" Periods 4-6: *"4,000 lb/2 months"* Bi-monthly limits can be adjusted through routine in-season action.
Open Access	Bi-monthly limit management. Current limits south of 34°27' N. latitude are: Period 1: *"750 lb/2 months"* Period 2: Closed Period 3: *"750 lb/2 months"* Periods 4-6: *"1,000 lb/2 months"* Bi-monthly limits can be adjusted through routine in-season action.

2015-2016 Management Considerations

Participation in the fixed gear shelf rockfish fishery south of 34°27' N. latitude is limited, with fewer than 30 vessels operating in the OA sector and six vessels in the LE sector during 2011 and 2012. Total mortality estimates reported from WCGOP indicate that approximately 61 percent of the non-trawl allocation south of 40° 10´ N. latitude was attained in 2012 (Table B-58). If an intersector allocation (i.e. trawl, non-trawl allocations) had been in place in 2009 and 2010, attainment would have been approximately 47 and 31 percent in each year respectively, although the recreational sector accounts for the majority of the total estimated mortality (Table B-59). During the 2011-2012 management cycle, nine LE vessels that made shelf rockfish landings (100 percent of LE vessels making shelf rockfish landings) landed less than 20 percent of the theoretical maximum amount of shelf rockfish they could have landed. In the OA sector, 42 vessels (84 percent) landed less than 20 percent of their theoretical maximum amount. Data indicate that few participants attained greater than half of the allowable limit, averaging approximately 240 lb/2mo and 280 lb/2mo in the LE and OA fleets respectively during 2011 and 2012.

Table B-59. Total Mortality (in mt) in the minor shelf rockfish complex non-trawl fixed gear sector (LE and OA combined) south of 40°10' N. latitude from 2009-2012. (source: WCGOP)

Year	Commercial (non-trawl)	Recreational	Non-Trawl Allocation	% Non-trawl Allocation
2009	8.3	246	615	41%
2010	14.2	212	615	37%
2011	19.9	326	615	53%
2012	23.1	354	615	61%

Management Options

<u>Option 1-No Action: No increase to trip limits for shelf rockfish south of 34°27' N. latitude:</u> Under Option 1, the 2014 trip limits would remain in place for both LE and OA sectors.

Option 2a: Increase trip limits for LE and OA sectors south of 34°27' N. latitude: Under Option 2a, increased, compared to Option 1, were investigated (Table B-61).

Option 2b: Further increase trip limits for LE and OA sectors south of 34°27' N latitude: Under Option 2b moderate trip increases, compared to Option 2a, are explored (Table B-61).

Biological Impacts Under Option 1

Projected Impacts

Under No Action, projected mortality for minor shelf rockfish south of 34°27' N. latitude is 3.9 mt and 14.3 mt for the LE and OA sectors, respectively (Table B-60); between 40° 10' N. and 34° 27' N. latitude, average landings during 2011 and 2012 were 16.1 mt for both sectors combined. Assuming that take in the recreational fishery south of 40° 10' N. latitude is unchanged from 2012 (354 mt; WCGOP Groundfish Mortality Report, 2012); projected mortality of shelf rockfish south of 40° 10' N. latitude is 387 mt. This represents 28 percent of 2015 allocation of 1,383.2 mt under P* of 0.45, and 58.7 percent of the 2015 allocation of 659.7 mt under P* of 0.25. For 2016, this represents 28 percent of the 2016 allocation of 1,384.0 mt under P* of 0.45, and 58.7 percent of the 2016 allocation of 659.7 mt under P* = 0.25.

Table B-60. Summary of commercial minor shelf rockfish landings south of 40° 10' N. latitude (by sector) under No Action.

Area	Limited Entry	Open Access
40° 10' to 34° 27' N. lat.	16.1	
South of 34° 27' N. lat.	3.9	14.3
Total	34.3	

Stock Status

The minor shelf rockfish complex south of 40° 10' N. latitude is comprised mainly of unassessed stocks, with the exception of greenspotted rockfish and greenstriped rockfish. The greenspotted rockfish assessment indicated the stock is in the precautionary zone; greenstriped rockfish was considered healthy. Greenspotted rockfish have shown a substantial increase in biomass since the RCAs were implemented in 2003 (2013-2014 FEIS). Given that shelf rockfish are particularly well protected by the RCAs, the shelf rockfish ACL is expected to increase in 2015-16, and only 31-67 percent of the non-trawl allocation has been caught during recent years (Table B-59), no changes to stock status are expected under No Action.

Overfished Species Mortality

Under the No Action Option, there is no anticipated increase to the mortality of OFS.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish

Other species are encountered by non-nearshore fixed gear fisheries, which also catch minor shelf rockfishes. However, this is not the case for rougheye, blackspotted, and shortraker rockfish if we use the 2011 and 2012 mortality amounts as examples. During these years, no recorded landings of these three species of rockfish were made when landings of minor shelf rockfish were made. This is due primarily to the fact that these three species are infrequently taken south of 40°10' N. latitude.

Options 2a and b: Increase trip limits for LE and OA sectors south of 34° 27' N. latitude

Under Option 2, increased bi-monthly trip limits south of 34° 27' N. latitude were investigated, which may afford greater opportunity under the increased non-trawl allocation.

Individual vessel landings reported in PacFIN from 2011-2012 for LE and OA sectors were used to analyze catch limits by the fleet. Although the allocation for the minor shelf rockfish complex applies to the entire area south of 40° 10' N. latitude, only modifications to trip limits south of 34° 27' N. latitude were investigated (i.e. trip limits between 40° 10' and 34° 27' N. latitude were status quo). For analytical and managerial ease, bi-monthly limits are assumed the same in each period. The years 2011 and 2012 were ultimately chosen as the basis for this model because they may be representative of current and future fishing behavior. Average commercial landings between 40° 10' and 34° 27' N. latitude during this time period and the 2012 recreational total mortality reported by WCGOP for the area south of 40° 10' N. latitude were added to the analytical options to project mortality for the entire area south of 40° 10' N. latitude.

Limited Entry Bi-Monthly Trip Limit Options

The LE bi-monthly trip limit options for minor shelf rockfish complex south of 34° 27' N. latitude are shown in Table B-61. These options range from 4,000 lb/2 months (Option 2a) to 5,000 lb/2 months (Option 2b). In recent years the majority of vessels have taken less than half of the maximum trip limit during any given period. The proposed trip limit increases apply only to the existing open periods.

Open Access Bi-Monthly Trip Limit Options

The OA bi-monthly trip limit options for minor shelf rockfish complex south of 34° 27' N. latitude are shown in Table B-61. These options range from 1,500 lb/2 months (Option 2a) to 2,500 lb/2 months (Option 2b). Although no effort shift occurred during previous inseason actions, participation in the OA sector has traditionally been more unpredictable than LE, making it difficult to predict catch and fleet behavior; therefore it is possible that projected landings (Table B-61) could be higher than expected if the trip limit is increased sufficiently enough to encourage entry into the fishery by new participants.

Projected landings under each Option for the LE and OA sectors are provided (Table B-61). These Options are not mutually exclusive, that is, the Council could recommend a different option for each sector.

Table B-61. Comparison of minor shelf rockfish projected landings south of 40o 10′ N. latitude in the LE and OA sectors under No Action (Option 1), and two options with trip limit increases (Options 2a and 2b) to the 2015 and 2016 HGs under P*=0.45 (1,282.2 mt and 1,383.0 mt respectively) and the 2015 and 2016 HGs under P*=0.25 (659.7 mt). . Projected landings between 40° 10' and 34° 27' N. latitude are based on average landings during 2011-2012. (Note: recreational catch were derived from the 2012 WCGOP Groundfish Mortality Report.)

	P*=0.45 (2015 allocation = 1,382.2 mt and 2016 allocation = 1,384.0 mt)								
	Limited Entry S. 34° 27' N. lat.		Open Access S. 34° 27' N. lat.		Projected Landings 40° 10' -34° 27' N. lat	Projected Recreational Catch	Total	% of Non-trawl Allocation	
Option	Trip limit	Projected Landings	Trip limit	Projected Landings				2015	2016
Opt. 1	3,000	3.9	750	14.3	16.1	354	387	28%	28%
Opt. 2a	4,000	4.3	1,500	24.0	16.1	354	399	29%	29%
Opt. 2b	5,000	5.4	2,500	39.9	16.4	354	416	30%	20%

	P*=0.25 (2015 and 2016 allocations = 659.7 mt)							
	Limited Entry S. 34° 27' N. lat.		Open Access S. 34° 27' N. lat.		Projected Landings 40° 10' -34° 27' N. lat	Projected Recreational Catch	Total	% of Non-trawl Allocations
Option	Trip limit	Projected Landings	Trip limit	Projected Landings				
Opt. 1	3,000	3.9	750	14.3	16.1	354	387	58.7%
Opt. 2a	4,000	4.3	1,500	24.0	16.1	354	399	60.5%
Opt. 2b	5,000	5.4	2,500	39.9	16.4	354	416	63.1%

Biological Impacts

Projected Mortality

Under Option 2a, landings are projected to increase approximately 10 percent (0.4 mt) and 68 percent (9.7 mt) in the LE and OA sectors respectively compared to No Action (Option 1; Table B-61). Under Option 2b projected landings are expected to increase by 38 percent (1.5 mt) in the LE sector and 179 percent (25.6 mt) in the OA sector compared to No Action. Similar to Option 1, mortality of shelf rockfish south of 40° 10' N. latitude is projected to be well below the non-trawl allocation (Table B-61).

Stock Status

Similar to Option 1, no changes to stock status are expected as a result of this action. The increase in projected landings will keep mortality well within the non-trawl allocation (Table B-61) and no changes to the current RCAs structure have been proposed (i.e. the RCA protections afforded under option 1 will remain in place).

Overfished Species Mortality

There may be a small increase in the bycatch of OFS, but at present, no quantifiable method has been explored to determine how much this may be. Any increase in trip limit is expected to increase fishing effort for shelf rockfish species. Likewise, increased catch of overfished species would likely occur. The amount of the increase is uncertain and cannot be estimated at this time. This could be an issue that would affect more the OA sector since this fishery is open-ended compared to the LE sector. It is difficult to estimate how many new participants that could enter the fishery as a result of increased trip limits, and thus the extent of increased OFS mortality.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Same as Option 1.

Impacts to Industry

Higher trip limits could increase harvest given the sizeable increase in the non-trawl allocation; although difficult to quantify, increased ex-vessel value could be expected as a result. Given the relative size of the fleet, changes as a result of this action may not have a large effect on the sectors as a whole, but could be of importance to some individuals in each sector.

B.10 Non-Trawl: Coastwide Sablefish Trip Limits

Need for Action

This section discusses projected landings and associated cumulative landing limits ("trip limits") for the four fixed gear sablefish, daily trip limit (DTL) fisheries. They include limited entry (LE) and open access (OA) fisheries, north and south of 36° North latitude. Hereafter, they will be referred to as follows: LE North, LE South, OA North, and OA South. The two northern fixed gear sablefish DTL fisheries account for approximately 13.5 percent of the northern sablefish ACL, while the southern ones account for approximately 58 percent of the southern ACL (during 2015, under the Preferred Alternative).

Proposed trip limits for 2015 and 2016 in these fisheries were produced GMT landing forecast models (described briefly below, and in detail in the 2011-2012 Groundfish Harvest Specifications Environmental Impact Statement; EIS).

While the tables show trip limits in this section as simply bimonthly, weekly, or daily, it is worth noting that the language in regulation applies each limit in a specific way when there is a mix of limits for the different time periods, within one fishery. This is the case for the two open access sablefish DTL fisheries. For example, the limits in regulation under No Action for the OA North fishery read as follows: "300 lb. per day or one landing per week of up to 800 lb., not to exceed 1,600 lb. per two months".

Analytical description

The purposes of this analysis are to produce and compare trip limits and predicted landings between the No Action Alternative and the other alternatives, for the four fixed gear, sablefish DTL fisheries. The ACLs, regional allocations, harvest guidelines and fishery landed shares vary among the alternatives.

Proposed trip limits under the alternatives for 2015 and 2016 were produced with the objective of keeping projected catch within the proposed management targets, which resulted from different values of the sablefish P-star (P*) and corresponding ACL, harvest guidelines, and shares for the areas north and south of 36° N. latitude. Forecasted landings under the action alternatives were intentionally constrained to between 90 and 95 percent of the landings share for each fishery, in order to produce trip limits which are likely to result in high attainment of the harvest guideline, while maintaining a sufficiently precautionary remainder; one that is appropriate for the uncertainty associated with use of the forecast models, and the accuracy of the estimated landings data used as model inputs. This strategy has been used over the past several years in inseason management, in the 2013-14 Groundfish Harvest Specifications EIS, and most recently in establishing trip limits for 2014, at the November, 2013 meeting of the Pacific Fishery Management Council (PFMC). These annual trip limit schedules can be adjusted through the inseason process as early as the preceding November meeting of the PFMC, as well as throughout the year, in order to account for updated data, or changes in science or policy.

Model description

The catch projection models used in this analysis are multiple linear regression models that relate trip limits and other predictor variables to bimonthly or monthly landings, separately for each fishery. They are also used for inseason management. Detailed descriptions of the models can be found in Appendix A. of the 2011-2012 harvest specifications EIS. Models were originally produced by members of the GMT, Oregon Department of Fish and Wildlife (ODFW), National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center (SWFSC) and Northwest Fisheries Science Center (NWFSC) in 2006 (limited entry) and 2009 (open access). Changes in model specification are made as needed over time, to increase accuracy of projections where possible. Changes since the 2013-14 harvest specifications include: Limited entry models were translated from SAS to R. In the LE North model, sablefish ex-vessel price (adjusted for inflation) was added as a predictor, separate regressions were carried out for each bimonthly period, and landings were predicted similarly to the open access models, where predicted landings equals predicted number of vessels participating, times the average landed catch per bimonthly period. The Producer Price Index from the U.S. Bureau of Labor Statistics for "fresh and frozen seafood" was used to deflate the time series of ex-vessel prices in the LE North model. New landings data through 2012 were added to all four models. The time range of data included in each model varies between from 2004-2012, to 2007-2012, depending on its information content for making projections. Accuracy of prediction varies among the four models. Of the four, the best fit of predicted to actual, bimonthly landings is produced by the LE North model, with an R^2 value of 0.956. Under the most recent data, the worst fit between predicted and actual landings comes from the LE South model, with an R^2 value of 0.528. We are still able to manage the LE South DTL fishery to a high level of attainment through inseason management and close tracking of data throughout the year, in spite of the relatively low model fit seen under the current data.

Model input data

Landings and catch data were acquired from PacFIN using the query "slct_ves_sabl_arid_DTL_tab_no_EFP.sql". This query pulls vessel-daily landings data from tables that separate fixed gear, sablefish DTL landings from sablefish primary landings, on a vessel-daily basis, using software and an algorithm and developed by PacFIN and NWR staff in 2010 and 2011. For the LE North fishery, the software tracks landings accumulation by vessel, against their sablefish endorsed tier permits. If the vessel has active sablefish endorsed primary tier permits attached, the season is open, and there is room on the attached permits, landings are counted as primary. When either the tier permits on the vessel are exhausted, or the season ends, landings are then counted as DTL. The algorithm in the software adheres to the specific federal regulations concerning primary and DTL landings in 50 CFR 660.232.

Accounting for discards and discard mortality

Harvest guidelines applicable the sablefish DTL fisheries were reduced in order to account for discard mortality, which resulted in landed shares for use in projection modeling to predict landings, and determine necessary trip limits. A harvest guideline is defined as numerical management harvest objective which is not a quota. These are either cited in regulation or calculated from other higher level numerical management objectives appearing in regulation.

The applicable harvest guideline was multiplied by 16.6 percent (discard rate estimate), and by 20 percent (discard mortality rate estimate). Then that product (estimated dead discarded sablefish) was subtracted from the harvest guideline, resulting in a "landed share", which projected landings should be beneath, in order to keep total catch within the harvest guideline. The estimated discard rate used by GMT was taken from the report "Estimated Discard and Catch of Groundfish Species in the 2012 US West Coast Fisheries", by the West Coast Groundfish Observer Program, of the NWFSC. The discard mortality rate estimate was taken from information in Davis (2001, LTtp://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.2001.tb00495.x/abstract), Shirrippa and Colbert (2005, LTtp://www.pcouncil.org/wp-content/uploads/Sable05_complete.pdf), and Shirrippa (2007, LTtp://www.pcouncil.org/wp-content/uploads/Sable07v3_0.pdf). Shirrippa (2005) used experimental data and sea surface temperature to predict varying release mortality by gear. The GMT considered that Davis (2001) demonstrated high sensitivity to temperature and deck time, along with high variability of predicted discard mortality in Shirrippa (2005) informed by sea surface temperature data, and adopted an estimate of 20 percent. This value was also adopted by Taylor 2011 in the current sablefish stock assessment.

Values for landed shares among the alternatives

Landed share values for each of the DTL fisheries are shown by year, fishery and alternative below in Table B-62 and Figure B-24.

Table B-62. Landed shares for each of the fixed gear sablefish, DTL fisheries, used for making projections, under each of the alternatives.

	LE N	OA N	LE S	OA S
No Action 2014	214	319	483	393
Preferred Alternative 2015	236	388	531	432
Preferred Alternative 2016	258	425	581	472
Alt. 1 2015	247	406	555	451
Alt. 1 2016	269	443	606	492
Alt. 2 2015	202	333	455	370
Alt. 2 2016	223	367	503	409

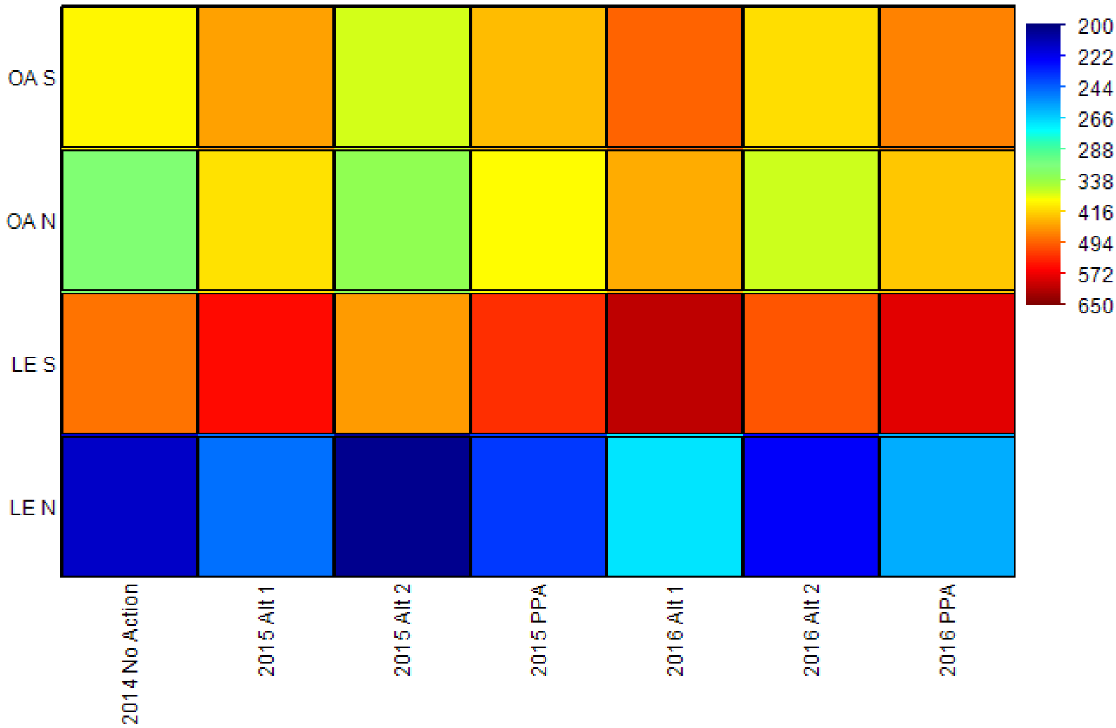

Figure B-24. Heatmap showing variation in potential landed shares used for making projections, for each of the fixed gear sablefish DTL fisheries, under each of the alternatives.

B.10.1 No Action Alternative

Area restrictions

Under No Action, the following RCA boundaries for use of fixed gear, from 2014 regulations, would remain in place for 2015 and 2016 (Table B-63, from Table 2 North, and South, to Part 660, Subpart E, Codified Federal Regulations).

Table B-63. Rockfish Conservation Area (RCA) boundaries for fixed gear, under the No Action Alternative.

Area	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
North of 46° 16'	shoreline - 100 fm line					
42° - 46° 16’	30 fm line - 100 fm line					
40° 10’ - 42°	20 fm depth contour - 100 fm					
34° 27’ - 40° 10’	30 fm - 150 fm line					
South of 34° 27’ (w/islands)	60 fm line – 150 fm line (also applies around islands)					

Trip limits and projected impacts under No Action

The No Action trip limit structures for 2014 in each fishery are presented in Table B-64. The No Action Alternative resulted in projected attainments ranging between 71 and 99 percent, using the best available data, and 2014 trip limits set in the November, 2013 council meeting (Table B-65). The aim throughout all the alternatives was to enable harvest of a high proportion of the landed share, yet accommodate uncertainty. The GMT and the Council considered, while constructing and adopting them, respectively, the uncertainty in the landings data (in terms of correctly separating sablefish DTL fishery landings from those of the sablefish primary fishery, and IFQ landings) along with uncertainty associated with making model-based projections.

These trip limits can be adjusted as needed inseason, to influence higher or lower catch as the year progresses. We strove to produce trip limits with a predictable and temporally uniform structure, which was appreciated by the GAP in their statement at the November 2011 council meeting, and subsequent meetings.

Table B-64. Trip limits for sablefish DTL fisheries under the No Action Alternative (2014).

Fleet	Area	Bimonthly limit	Weekly limit	Daily limit
LE	**N**	2,850	950	NA
OA	**N**	1,600	800	300
LE	**S**	NA	2,000	NA
OA	**S**	3,200	1,600	300

Projected attainment values for the four sablefish DTL fisheries under the No Action Alternative are within the range generally recommended by the Council, of between 90 and 95 percent, with the exception of the OA North fishery, which has a projected attainment of 99 percent, and the OA South fishery, which has been maintained at a lower level in recent years, partially to allow some buffer for the LE South fishery (Table B-65). The reason for the higher than usual projected attainment in the OA North fishery under Alternative 1 is that actual landings have been running much lower than projected for the past two years, under recent poor sablefish market conditions.

Table B-65. Model-projected landings under the No Action Alternative, for the fixed-gear, sablefish DTL fisheries. Landed shares and projected impacts are in metric tons (mt) of landed catch.

No Action	LE N	OA N	LE S	OA S	South sum
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Difference	9.6	2.3	45.2	113.3	158.5

B.10.2 Preferred Alternative – Sablefish Trip Limits

Preferred Alternative for 2015

Trip limits and projected impacts under the Preferred Alternative for 2015

The trip limit structures for each fishery in 2015 under Preferred Alternative are presented in Table B-66. Differences between Preferred Alternative and No Action limits also appear in the table. Trip limits are generally higher under Preferred Alternative than for No Action. Higher limits were needed to influence similar attainment, under the higher shares. Differences range from 25 lb per week smaller for the OA South, to 225 lb per two months higher in the LE North fishery.

Table B-66. Trip limits under the Preferred Alternative, No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2015. Limits are in lb of landed catch per time period listed.

		2015 Preferred			No Action			Difference		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	3,075	1,025	NA	2,850	950	NA	225	75	NA
OA	**N**	1,800	900	300	1,600	800	300	200	100	0
LE	**S**	NA	2,100	NA	NA	2,000	NA	NA	100	NA
OA	**S**	3,200	1,575	315	3,200	1,600	300	0	-25	15

Projected landings, attainment and remainder in 2015, under the Preferred Alternative are presented in Table B-67. The same metrics are also presented for the No Action Alternative, and the differences between these two alternatives, in the table.

Attainment rates are very similar between the Preferred Alternative and No Action with the exception of the OA North fishery for reasons explained in No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is consistently higher under the Preferred Alternative than No Action; between 15.4 mt and 58.4 mt higher, due to the higher trip limits, produced to influence similar attainment under the higher landed shares of the Preferred Alternative.

Table B-67. Model-projected landings under the Preferred Alternative, No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2015. Landed shares and projected landings are in metric tons (mt).

2015 Preferred	**LE N**	**OA N**	**LE S**	**OA S**	**South sum**
Projected landings	219.7	358.3	496.3	310.2	806.4
Landed share	236	388	531	432	963.0
Percent attainment	93%	92%	93%	72%	84%
Remainder	16.3	29.7	34.7	121.8	156.6
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	15.4	41.6	58.4	30.5	88.9
Landed share	22.0	69.0	48.0	39.0	87.0
Percent attainment	-2%	-7%	3%	1%	2%
Remainder	6.6	27.4	-10.4	8.5	-1.9

Preferred Alternative for 2016

Trip limits and projected impacts under Preferred Alternative for 2016

The trip limit structures in 2016 under the Preferred Alternative for each fishery are presented in Table B-68. Differences between the Preferred Alternative and No Action limits also appear in the table. Trip limits are generally higher under the Preferred Alternative than for No Action. Higher limits were needed to influence similar attainment under the higher shares. Differences range from 25 lb per week higher for the OA South, to 525 lb per two months higher in the LE North fishery. The daily limit for the OA North fishery remains unchanged under all alternatives.

Table B-68. Trip limits under the Preferred Alternative, No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2016. Limits are in lb of landed catch per time period listed.

		2016 Preferred			**No Action**			**Difference**		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	3,375	1,125	NA	2,850	950	NA	525	175	NA
OA	**N**	2,000	1,000	300	1,600	800	300	400	200	0
LE	**S**	NA	2,175	NA	NA	2,000	NA	NA	175	NA
OA	**S**	3,250	1,625	325	3,200	1,600	300	50	25	25

Projected landings, attainment, and remainder under the Preferred Alternative are presented in Table B-69. The same values for the No Action Alternative are also presented in the table, and the differences between these two alternatives.

Attainment rates are very similar between the Preferred Alternative and No Action with the exception of the OA North fishery, for reasons explained in No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is consistently higher under the Preferred Alternative than No Action; between 36.7 mt and 105.5 mt higher, due to the higher trip limits produced in order to influence the same attainment under the higher landed shares of the Preferred Alternative.

Table B-69. Model-projected landings under the Preferred Alternative, No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2016. Landed shares and projected landings are in metric tons (mt).

2016 Preferred	LE N	OA N	LE S	OA S	South sum
Projected landings	241.0	402.5	543.3	344.2	887.5
Landed share	258	425	581	472	1,053.0
Percent attainment	93%	95%	94%	73%	84%
Difference	17.0	22.5	37.7	127.8	165.5
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	36.7	85.8	105.5	64.5	170.0
Landed share	44.0	106.0	98.0	79.0	177.0
Percent attainment	-2%	-5%	3%	2%	2%
Remainder	7.3	20.2	-7.5	14.5	7.0

B.11 Recreational: Canary Rockfish Sub-Bag Limit in Oregon Fisheries

Need for Action

Although the canary rockfish stock is a category 1 stock, some unresolved problems and uncertainties have been identified in the stock assessment. The current stock abundance is relatively uncertain. In part this is because the only measure of relative abundance does not occur in the primary habitat (rocky reef) of canary, and many other, rockfish. Future stock abundances are also uncertain because the bottom trawl survey primarily catches very large (and old) canary rockfish, which means recruitment events (of young individuals) are difficult to determine or verify. The last full assessment (Stewart 2009) indicated that historical and current relationship between canary rockfish distribution and habitat features should be investigated to provide more precise estimates of abundance from the surveys, and to guide survey augmentations that could better track rebuilding through targeted application of newly developed survey technologies.

Uncertainties of the current and future abundance of the canary rockfish stock could be improved if recreational groundfish fishery data were available. The recreational fishery occurs almost entirely over rocky reef habitats, therefore the recreational fishery catch rates could be used to provide an index of relative abundance (catch per unit effort; CPUE) of canary rockfish from their primary habitat. Additionally, since recreational fishery gears catch smaller and younger canary rockfish than trawls, biological data from the recreational fishery could be used to better detect recruitment events needed to better track rebuilding.

For recreational fishery catch to aid in the data used for future canary rockfish stock assessments, retention of canary rockfish would have to be permitted. Since anglers are currently required to discard all canary rockfish catch, biological samples are currently obtained from infrequent illegal landings. The number of canary rockfish reported to have been discarded by anglers is too uncertain to be used as a CPUE index in an assessment. Allowing retention so dockside creel samplers can verify the species and collect and biological samples could address some of the stock assessment uncertainty.

Determine or verify future canary rockfish abundances (recruitment)
Since there is a large gap in sizes and ages of canary rockfish caught by trawl surveys used in the assessment, it takes at least ten years to verify recruitment signals using NWFSC bottom trawl survey data alone; the SWFSC pre-recruit pelagic trawl survey catches Age-0 fish and the NWFSC bottom trawl survey is selective for 40-50 cm fish (based on peak of length frequency distributions), which roughly corresponds to females Age-10 and older (Wallace and Cope 2011).

Since recreational gears are selective for intermediate size and age fish relative to the trawl surveys (> 30 cm; Figure B-25), recruitment signals from the pre-recruit survey could be verified in as few as three to five years (corresponding ages for 30 cm females) by using biological data from the recreational fishery (instead of ten years for the bottom trawl).

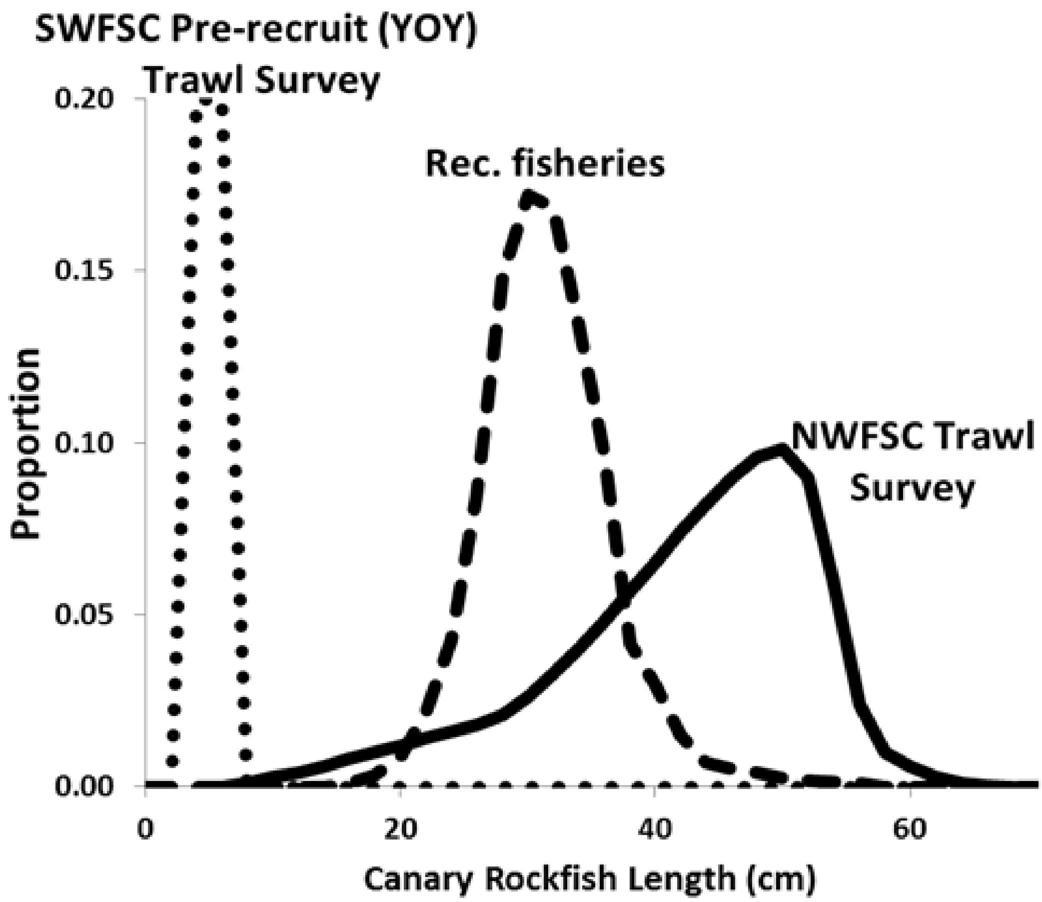

Figure B-25 Canary rockfish length frequency comparison for the trawl surveys and the recreational fisheries. NFWSC curve is an approximation for combined sexes from 2003-2010, from Figure 11 of the Canary rockfish assessment (Wallace and Cope 2011). Recreational data from RecFIN query, 2006-2013; OR, WA, and CA (pooled due to infrequency of (illegal) catches).

Increase accuracy of removals
Allowing retention of canary rockfish in the recreational fisheries could improve the accuracy of canary rockfish removal estimates because catches could then be landed and verified by dockside creel samplers. In contrast, anglers are currently required to discard all canary rockfish encountered, and angler reported

data is consequently needed to determine discard mortality. Potential sources of uncertainty in discard mortality estimates from angler reported data include: (1) misidentification of the species discarded (2) misreporting of the quantity released and (3) misreporting of the factors that affect which discard mortality rate will be applied to their discards (i.e., depth of capture and if a descending device was used).

Allowing retention of canary rockfish may be a cost-effective and, viable solution to improving removal estimates. For example, it would be impractical and unsafe to require small private recreational boats (generally less than 22 feet) to carry observers to monitor discards.

Though canary rockfish has a coastwide OFL and ACL, each state's recreational fishery has its own HG. And each of the West Coast states manages their recreational groundfish fishery independently of each other (e.g. season length, bag limits) to stay within their HG. Therefore analysis of allowing canary rockfish retention was completed on a state by state basis. Under the Preferred Alternative, canary retention was selected only for the Oregon recreational fisheries. As such, the description of the Preferred Alternative is described below whereas the analysis for Washington and Oregon is contained in the Considered but Rejected for Implementation Section, B.20.

Management options

Status Quo**:** Retention of canary rockfish will remain prohibited in the Oregon recreational fisheries.

Option 1**:** One canary rockfish per day, which will be a sub-bag limit of the miscellaneous groundfish daily bag limit of ten (includes rockfish, cabezon, greenlings, elasmobranchs) in the Oregon recreational fisheries.

Option 2**:** Up to ten canary rockfish per day, as part of the federal miscellaneous groundfish daily bag limit, may be reduced under state regulations (currently seven fish) in the Oregon recreational fisheries.

Abundance index of canary rockfish from their primary habitat (rocky reef)off of Oregon
Currently, the only index of relative abundance used in the canary rockfish stock assessment (for adults), the NWFSC bottom trawl survey, occurs in marginal habitat utilized by the species (i.e., sand or flat bottom; Love 2002; Johnson et al. 2003) and does not appear to be detecting a possibly increasing population trend occurring in their primary habitat (i.e., rocky reef). Since 2008 catch frequencies on Oregon recreational groundfish trips, which occurs over rocky reef in all depths, have increased while they have remained stable for trawl survey tows (Figure B-26).

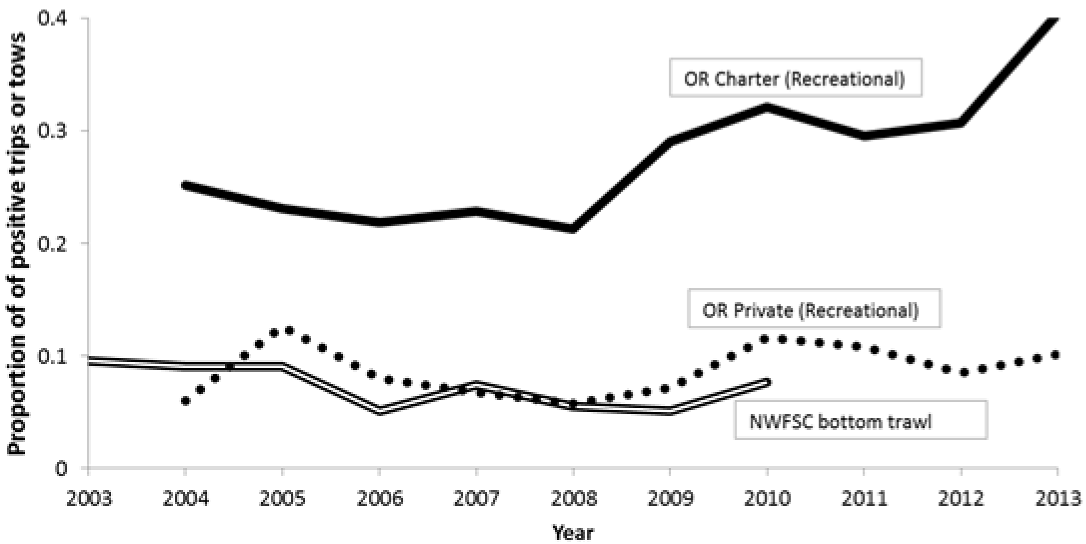

Figure B-26. Comparison of canary rockfish relative abundances from marginal habitat (sand and flat bottom; NWSFC bottom trawl survey) and primary habitat (rocky reef; OR charter and OR recreational groundfish fisheries).

Although the Oregon recreational groundfish fishery provides a measure of relative abundance of canary rockfish in their primary habitat, it has not been used as an index in assessments because it is based on uncertain data (David Sampson, Oregon State University, personal communication). If this uncertainty were resolved by allowing retention of canary rockfish (catches would be landed and verified by creel samplers), then a recreational index of abundance could potentially be incorporated into the canary rockfish assessment, in a similar fashion as used in the black rockfish assessment (logistic regression; Sampson 2007).

There would be minimal to no additional costs to management to develop a recreational CPUE index of abundance for canary rockfish, as the marine recreational creel survey already obtains the necessary data (assuming retention was allowed) for catch and effort accounting. Further, a recreational canary rockfish index of abundance would be robust due to high sample sizes (~9,000-10,000 recreational groundfish interviews per year), year-round coverage, and fine spatial data (i.e., by depth and reef quadrant). Given this wide-scale temporal and fine spatial coverage, it may be possible to apply a post-hoc survey design to the data (e.g., randomly selecting 100 samples from each reef area by a time period).

In order for a recreational canary rockfish catch per unit effort (CPUE) index to be indicative of population trends (and therefore useful to the assessment), fishing behavior would have to be relatively standardized (e.g., would be difficult to determine population trends if some targeted canary rockfish while others did not). By limiting the canary rockfish to one per angler per day, there would less incentive for anglers to target them, and a relatively standardized fishing behavior would be expected (harvests would be from incidental catches). Additionally, post-hoc methods could be used to standardize fishing behavior by limiting catch rate comparison to similar locations (reef block and depth), times, boat types (charter or private), and even by individual vessels (sample data contains unique vessel information; name of boat for charters and registration number for private boats).

No increase to the projected rebuilding time
The Oregon recreational fishery is projected to remain within the most recent canary rockfish HG (11.1 mt in 2014) for all canary rockfish harvest alternatives (Table B-70), and by doing so, no delays to the

projected rebuilding time would occur (assume full attainment of ACLs). The projected difference in mortality between non-retention (3.1 mt; bag limit=0) and a one fish sub-bag limit (8.1 mt) is attributed to the infrequency of canary rockfish catches by recreational anglers. Since 2009, 73 percent (13,536 of 18,703) of canary rockfish caught by recreational anglers has been from trips where the number of anglers outnumbered the canary rockfish catch (Figure B-27). Accordingly, all of those canary rockfish would have been legal to harvest had the bag limit been one. And had they kept their catch, the discarded mortality impacts from released fish would have been greatly reduced (3.0 mt vs. 0.8 mt, respectively), since their discarded dead catch would have been converted to harvested dead catch.

Since most of the catch comes from trips where anglers catch fewer than one canary rockfish per person, an increase in the bag limit from one to seven[14] (8.1 mt vs. 9.5 mt, respectively) is projected to have much less effect on mortality (Table B-70); only 24 percent (4,548 of 18,703) of past canary rockfish catch has been from trips where anglers caught greater than one but less than or equal to seven canary rockfish (Figure B-27). A bag limit of seven would result in the conversion of near all discarded catch to harvested, as 97 percent of canary rockfish caught by recreational anglers have been from those who caught seven of fewer. The only remaining discards would come from the very infrequent large volume catches 'lightning strikes'.

Projections of catch if retention were permitted are based on the assumption that no targeting would have occurred, as anglers did not have incentive to catch them in the past due to the harvest prohibition. While it is unrealistic to assume that no targeting will occur, targeting is expected to be minimal because canary rockfish catches are greater in deep depths (>30 fm; Figure B-28), and to maximize their catch rates, they would have to leave the shallower depths where the catch rates of their primary target species (black rockfish) and others are greatest. Further, the majority of recreational anglers tend to fish seaward of 30 fm (76 percent) when they are permitted to fish all-depths. In short, in order to target canary rockfish, they would be paying more in fuel, driving further, and leaving the most productive shallow depths.

Table B-70. Projected canary rockfish total (grey boxes), discard, and harvest mortality for each harvest option. Projected harvests (# of fish) are shown to demonstrate sample sizes of biological samples that may be attained by allowing retention. (The current bag limit of seven fish in Oregon state regulations was used for this analysis, rather than the ten fish bag limit in federal regulations)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
	Projected (fish)	237	298	714	803	1455	1887	2300	2584	1081	535	124	77	12096	
Bag=0	Discard Mortality	0.07	0.09	0.21	0.17	0.41	0.47	0.53	0.62	0.23	0.16	0.04	0.02	3.0	Total=3.1 mt
	Harvest Mortality	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	
	# Harvested													125	
Bag=1	Discard Mortality	0.02	0.02	0.05	0.04	0.10	0.12	0.13	0.16	0.06	0.04	0.01	0.01	0.8	Total=8.1 mt
	Harvest Mortality	0.14	0.18	0.43	0.48	0.87	1.13	1.38	1.55	0.65	0.32	0.07	0.05	7.3	
	# Harvested	178	224	536	602	1091	1415	1725	1938	811	401	93	58	9072	
Bag=7	Discard Mortality	<0.01	<0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	<0.01	<0.01	0.1	Total=9.5 mt
	Harvest Mortality	0.18	0.23	0.55	0.62	1.13	1.46	1.78	2.00	0.84	0.41	0.10	0.06	9.4	
	# Harvested	229.49	288.56	690.91	776.62	1407.2	1824.7	2223.7	2498.9	1045.5	517.33	119.95	74.509	11697	

[14] The current bag limit specified in Oregon state regulations, in federal regulations the bag limit is ten.

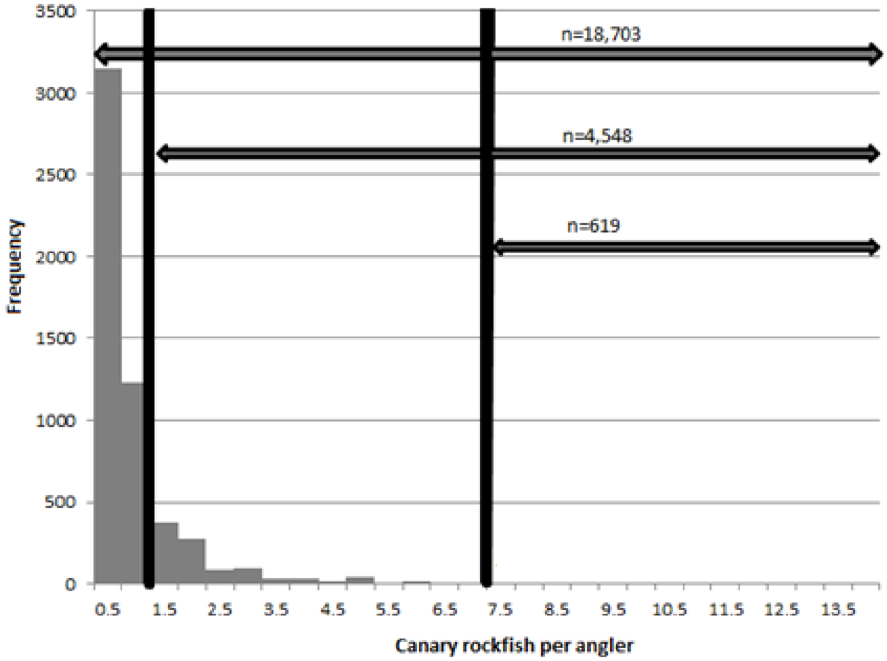

Figure B-27. Canary rockfish catch rate (bars) frequencies for trips that caught one or more and the corresponding quantity of canary rockfish associated with those trips (numbers by arrows), 2009-current.

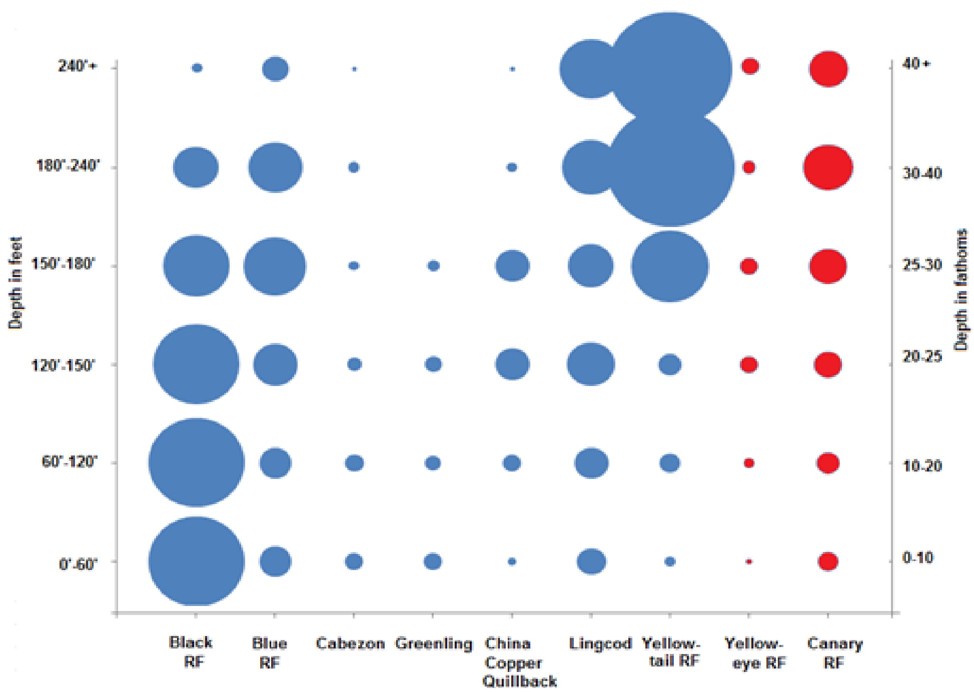

Figure B-28. Relative catch rates by depth of overfished species and harvestable species constituting the bulk of recreational fishery landings.

Projection methods

Canary rockfish mortality was projected for the harvest options via application of a conversion factor (Formula 1) to the output of the canary rockfish mortality model (of the Oregon recreational groundfish model). The conversion factor converted discarded catch of canary rockfish from historic trips to harvested catch up to the boat limit (aggregate of individual bag limits) and any catch in excess of the boat limit remained as discarded (retention was modeled at a boat level because anglers continue to fish and share their catch until the bag limits of all have been caught). For example, if the bag limit was one and seven anglers discard five canary rockfish, then five were converted to harvested (boat limit) and two remained as discarded (excess of boat limit).

Formula 1: Conversation factor applied to the canary rockfish mortality model to project mortality of canary rockfish if harvest (H) were permitted. M=Mortality; H=harvested (1 or 7); CR=Canary rockfish per angler.

$$M_{Baglimit(H)} = \text{Discard } M_{BagLimit=0}\left[\frac{\#Fish_{CR > Baglimit(H)}}{\#Fish_{Baglimit=0}}\right] + \#Fish_{Baglimit=0}\left[\frac{\#Fish_{CR \leq Baglimit(H)}}{\#Fish_{Baglimit=0}}\right]\left[\frac{\text{FishWeight (kg)}}{.001 \text{ (kg to mt)}}\right]$$

Reduces discarded catch due to harvest

Converts discarded catch to harvest catch

Reduce waste of the resource

As previously described in the projected impact section, allowing harvest converts discard mortality (waste) to harvest mortality. Instead of wasting 3.0 mt of canary rockfish by prohibiting retention, this could be reduce to 0.8 mt with a bag limit of one and 0.1 mt with a bag limit of seven (the current bag limit in Oregon state regulations). A sub-bag limit of one fish should prevent most targeting of canary rockfish, while allowing retention of those canary rockfish that are incidentally encountered. A bag limit of up to seven (state regulation) or ten (federal regulation) could change angler behavior, such as targeting areas of canary rockfish. Additionally, allowing retention of incidentally encountered canary rockfish could aid anglers in filling their bag with less time on the water.

Possible reduction of impact to healthy species

The following rationale has been proposed by anglers: canary rockfish are "abundant", and if allowed to keep one, impacts to other harvested groundfish species would be reduced by 14 percent; as anglers could substitute one of the seven fish they are allowed to catch (current bag limit) with a canary rockfish (thereby reducing impacts by $1/7^{th}$ or 14 percent).

This reduction *would only apply to trips in which both a bag limit attainment and catch of canary rockfish occurred*. Since limits only occur in less than 20 percent of trips (19.4 percent; 6,371 of 32,769 trips; Figure B-29) and canary rockfish are only caught during 13 percent of trips that had limited (828 of 6,371), the projected reduction in catch of harvestable species by allowing canary retention is only 0.3 percent (19.4 percent x 13 percent x 14 percent), not the hypothesized 14 percent. In short, the $1/7^{th}$ reduction in catch from allowing canary retention would only apply to the 2.5 percent of trips that limit and have canary rockfish catch.

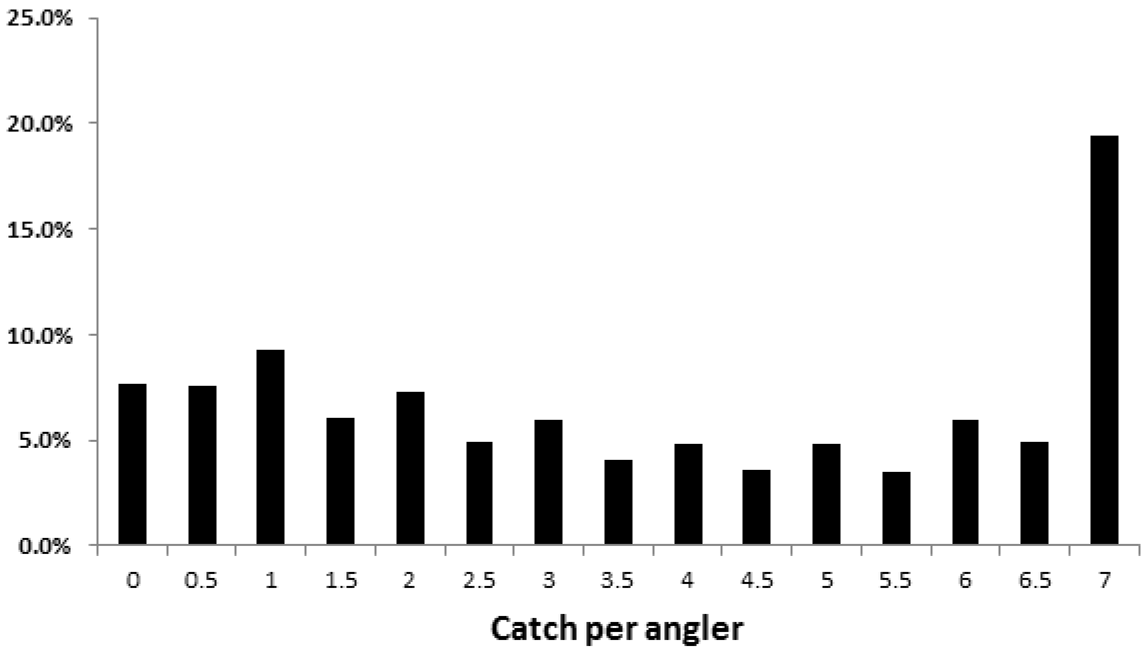

Figure B-29. Percentage of angler trips that caught 0-7 miscellaneous groundfish bag limit. Data is from 32,769 bottomfish trips that occurred from 2009-2013.

Discussion

The potential new recreational fishery data sources could be acquired without additional monetary costs (i.e., dockside creel survey needed to collect the data already exists) or delays to the projected rebuilding times of canary rockfish. No delays to the projected rebuilding times would be expected because the recreational fishery currently only obtains a fraction of the harvest guideline (e.g., 29 percent of the Oregon recreational HG in 2013) and could therefore continue to stay within the harvest guideline even if several thousand canary rockfish were landed (rebuilding analyses assume 100 percent of ACLs harvested).

In summary, allowing retention of canary rockfish in the recreational fishery could be a simple, cost-effective, and impact neutral (to projected rebuilding times) method to increase the understanding of canary rockfish, and therefore provide the Council better information to manage of one the most important groundfish stocks.

B.12 Retain groundfish, lingcod only, or flatfish only during the Pacific halibut fisheries

Need for Action

Recreational Pacific halibut anglers have expressed a desire to change the regulation that prohibits them from harvesting groundfish on “all-depth” days (while in possession of a halibut). Many anglers have stated that they travel 15-30 miles offshore for halibut and fish in waters 100 fm (600 feet) or greater. Going that far, they would like to be able to retain more than just one halibut (e.g. other species incidentally encountered) Additionally, after reeling up a lingcod, or other bottomfish, from those depths they would like to be able to retain them, for their efforts. Anglers participating in the groundfish fishery are allowed to keep halibut incidentally encountered on days when the nearshore halibut fishery is open. The reasoning for the groundfish retention prohibition on "all-depth" days is unclear to anglers because it does not pertain to groundfish that can be harvested, but rather as a means to reduce discard (catch-and-release) mortality of overfished species, specifically yelloweye rockfish.

In order to keep yelloweye rockfish mortality within sector-specific limits, regulations to limit how often recreational anglers fish deep water reefs (>40 fm; 240 feet) are used as the primary management tool; anglers fishing deep reefs more commonly encounter yelloweye rockfish than those fishing shallower reefs, and a higher percentage of those released die due to barotrauma inflicted injuries. The additive effects of high catch rates and high discard mortality rates are too excessive to provide anglers much opportunity to fish deep water reefs, and still keep the groundfish fishery open year round.

Since groundfish anglers target reefs, depth restrictions are used to prevent groundfish anglers from fishing deep reefs during the greatest effort months (April-September). Halibut anglers are permitted to fish beyond the groundfish depth restrictions because this is where the fishery has historically occurred, and because halibut anglers actively avoid reefs (to prevent gear loss and because halibut fishing is better over gravel or sand habitat). The regulation prohibiting retention of groundfish is used to prevent anglers from also targeting groundfish (over the deep reefs) during their halibut trip. Allowing retention of groundfish by halibut anglers on "all-depth" days while intended to allow retention of incidentally encountered groundfish while halibut fishing, could also create a loophole allowing anglers to target groundfish any depth they choose under the guise of 'halibut fishing' on "all-depth" days, and reducing the effectiveness of the groundfish depth restrictions.

If allowed to retain groundfish, some halibut anglers would be expected to (and have told state agency staff that they would) target deep water reefs because they are already in the area and because there is a perception that trophy lingcod (highly desirable to recreational anglers) are more common over deep reefs than shallow water reefs.

Due to somewhat different regulations and fishing behaviors between the Washington and Oregon Pacific halibut fisheries, analysis for each state are separated below.

B.12.1 Washington

Recreational halibut fisheries in Washington are restricted to reduce encounters with overfished species, particularly yelloweye rockfish. Depth restrictions are the primary tool used to reduce encounters with overfished species. Depth by management area become more prohibitive as you move from south to north along the coast due to increasing rocky relief habitat along the northern Washington coast and the increased likelihood of encounters with yelloweye and canary rockfish. While groundfish fisheries are restricted to the nearshore area, recreational halibut fisheries are permitted in the deeper water because this is where the largest concentrations of halibut occur. To reduce encounters with yelloweye and canary rockfish during the recreational halibut fishery, groundfish retention restrictions are in place; these restrictions vary by management area. In the North Coast management area (Neah Bay and La Push), groundfish retention is prohibited seaward of 20 fm from May 1 through September 30 with the exception that lingcod, Pacific cod and sablefish can be retained on days open to recreational halibut fishing. In the south coast (Westport), lingcod retention is allowed seaward of the 30 fm depth restriction, which is in place from March 15 through June 15, on days the recreational halibut fishery is open. In the Columbia River management area (Ilwaco/Chinook), only sablefish and Pacific cod are allowed with halibut on board from May 1 through September 30.

Season length also varies by management area (Table B-71). Recreational halibut seasons in recent years in the North Coast (Neah Bay and La Push) and South Coast (Westport) management areas typically last fewer than 10 days; the halibut season lasted four days in the North Coast and five days in the South Coast in 2013. In contrast, the Columbia River area recreational halibut season has lasted from May through September for the most recent seasons. Even though the North and South Coast management areas include more habitat typically associated with yelloweye and canary rockfish, the short season length limits the opportunity for encounters with overfished species during the recreational halibut fishery.

Table B-71. Recreational halibut season length (days) by management area.

	2009	2010	2011	2012	2013
North Coast (Neah Bay / La Push)	6	7	8	7	4
South Coast (Westport)	11	7	7	5	5
Columbia River	37	48	40	60	66

Management Measures by Area

Recent changes to groundfish retention management measures associated with the recreational halibut fisheries in the North and South Coast management areas may provide insight when considering groundfish retention during the recreational halibut fishery in areas such as the Columbia River where it is currently prohibited (with exception of Pacific cod and sablefish).

South Coast (Westport)

In 2010, changes to the Pacific Fishery Management Council's Pacific Halibut Catch Sharing Plan were implemented that allowed lingcod retention in the area seaward of the 30 fm depth restriction on days open to the recreational halibut fishery. Prior to 2010, only Pacific cod and sablefish could be retained seaward of 30 fm from May 1 through June 15 (reflecting the time period that the primary halibut fishery would likely be open). An additional management measure change that permitted rockfish retention seaward of the 30 fm depth restriction was analyzed in the 2011-2012 Harvest Specification and Management Measures Environmental Impact Statement and implemented in 2011. Table B-72 summarizes the most common groundfish encountered (retained and released groundfish) on recreational halibut trips in the South Coast (Westport) management area from 2006 through 2013. Black rockfish and lingcod make up the bulk of groundfish encountered during recreational halibut trips in the South Coast region.

Table B-72. Groundfish encounters (retained + released) per 100 recreational halibut angler trips in the South Coast management area.

Species	2006	2007	2008	2009	2010	2011	2012	2013
Black RF	273	134	100	157	95	73	84	151
Lingcod	35	23	59	43	73	135	119	82
Spiny dogfish	2	23	6	11	28	4	3	3
Yellowtail RF	6	4	6	6	15	13	8	2
Misc.	3	3	5	6	5	6	2	2
Quillback RF	5	3	6	3	0	1	2	1
Flatfish	1	1	1	1	6	2	1	4
Canary RF	0	0	4	1	1	2	3	2
Yelloweye RF	0	0	2	2	1	1	2	3
Bocaccio	0	0	3	0	0	1	0	0

Average groundfish encounters during the four years prior (2006-2009) to the management change allowing lingcod retention on halibut trips is compared groundfish encounters during the four years after (2010-2013) (Table B-73). Allowing lingcod retention seaward of the 30 fm depth restriction on days open to the recreational halibut fishery increased the number of lingcod retained as expected but following the management change, encounters with yelloweye and canary rockfish doubled on average.

Table B-73. Groundfish encounters (retained + released) per 100 recreational halibut angler trips in the South Coast management area.

Species	Avg. 2006-2010	Avg. 2010-2013
Black RF	166	101
Lingcod	40	102
Spiny dogfish	11	10
Yellowtail RF	6	9
Misc.	4	4
Quillback RF	4	1
Flatfish	1	3
Canary RF	1	2
Yelloweye RF	1	2
Bocaccio	1	0

North Coast (Neah Bay and La Push)

In 2013, groundfish regulations were changed through inseason action to address increased yelloweye rockfish encounters in the North Coast management area. The change revised the time period that groundfish retention seaward of 20 fm is prohibited from June 1 through September 30 to May 1 through September 30. In addition, because encounters with yelloweye rockfish primarily increased in the recreational halibut fishery, groundfish retention during the recreational halibut fishery was changed from allowing all groundfish seaward of 20 fm on days open to halibut fishing to limiting groundfish retention to lingcod, sablefish and Pacific cod on days open to the recreational halibut fishery.

Similar to the South Coast management area, black rockfish and lingcod are the most common groundfish encountered on recreational halibut trips. Changes in 2013 to revise the length of time the depth closure is in place and limit the amount of groundfish that can be retained on halibut trips did reduce encounters with yelloweye rockfish compared to the average per angler encounter rate between 2009 and 2012 (Table B-74). In addition to somewhat lower encounter rates of yelloweye rockfish after the management change, in 2013 61 percent of the yelloweye rockfish were encountered in waters deeper than 20 fm compared to 83 percent in 2012, reducing the total morality of yelloweye on recreational halibut trips.

Table B-74. Groundfish encounters (retained + released) per 100 halibut angler trips in the North Coast management area.

Species	2009	2010	2011	2012	Avg. 09-12	2013
Lingcod	123	139	166	149	*144*	131
Black RF	134	124	122	138	*130*	149
Yelloweye RF	9	9	9	14	*10*	9
Yellowtail RF	7	9	9	8	*8*	3
China RF	5	6	6	8	*6*	8
Bocaccio	8	3	7	7	*6*	6
Cabezon	5	6	6	8	*6*	5
Kelp greenling	4	10	3	5	*6*	7
Quillback RF	3	6	5	5	*5*	2
Canary RF	3	3	4	6	*4*	5
Spiny dogfish	4	3	3	3	*3*	2
Flatfish	3	3	2	2	*3*	1
Blue RF	1	7	3	1	*3*	1
Copper RF	2	1	2	3	*2*	2
Misc.	2	3	2	2	*2*	2
Vermillion RF	1	1	1	2	*1*	1
Pacific cod	0	1	3	2	*1*	1

Columbia River

Management measures associated with groundfish retention on recreational halibut trips in the Columbia River area have remained unchanged since 2005 with only Pacific cod and sablefish allowed when a halibut is on board from May 1 through September 30. There are no depth restrictions associated with the recreational groundfish fishery in this area as there are in the North Coast and South Coast management areas. In 2012, a lingcod restriction was implemented to reduce encounters with yelloweye rockfish associated with anglers targeting lingcod in deep water in the Columbia River area.

The species composition of groundfish encountered on recreational halibut trips in the Columbia River area is different than what is reported in the North Coast and South Coast management areas with Spiny dogfish and flatfish comprising a large proportion of the groundfish encountered (Table B-75). Overfished species encounters on recreational halibut trips are lower in the Columbia River area than in the North Coast and South Coast management area (Table B-76).

Recently, anglers have expressed interest in revising regulations to allow lingcod retention during the recreational halibut fishery in this area.

Table B-75. Groundfish encounters (retained + released) per 100 halibut angler trips in the Columbia River management area.

Species	2009	2010	2011	2012	2013
Spiny dogfish	25.45	50.13	11.66	20.64	11.91
Flatfish	20.49	14.89	2.60	8.21	8.98
Lingcod	4.90	8.04	9.10	17.97	11.40
Misc.	2.83	5.87	8.53	13.05	10.27
Black RF	0.19	2.69	0.69	3.62	12.52
Yellowtail RF	1.70	2.91	9.52	3.53	0.31
Gen RF	1.81	5.98	0.63	2.14	0.00
Bocaccio	0.00	0.17	0.69	0.17	0.16
Cabezon	0.37	0.00	0.00	1.15	0.00
Canary RF	0.37	3.23	0.47	1.46	0.78
Gen cod	2.43	1.52	0.62	0.89	0.00
Pacific cod	0.72	0.17	1.62	1.27	0.00
Yelloweye RF	0.33	0.70	0.46	0.99	0.31
Vermillion RF	0.00	0.56	0.00	0.44	0.63
Kelp greenling	0.66	0.00	0.00	0.18	0.31
Quillback RF	0.00	0.00	0.00	0.77	0.00

Table B-76. Overfished species encounters (retained + released) per 100 halibut angler trips by management area (average 2009-2013).

	Yelloweye	Canary
North Coast	10	4
South Coast	2	2
Columbia River	0.56	1.26

Summary

In Washington, due to the regional variability in encounters with all groundfish species, including overfished species and regional differences in the length of the recreational halibut season, consideration for allowing groundfish retention during recreational halibut fishing should be evaluated on a management area basis.

Encounters with yelloweye and canary rockfish on recreational halibut trips is lower in the Columbia River management area than in other areas and expanding the groundfish species allowed on halibut trips might be a viable alternative for the recreational halibut fishery that occurs in this area along the Washington coast. However, this management area extends to Cape Falcon, Oregon and so it is important to consider groundfish encounters in the Oregon recreational halibut fishery which may be different from the Washington recreational fishery. In addition, each state has separate harvest guidelines for yelloweye and canary rockfish and allowing retention of these overfished species would have to be evaluated to include trade-offs to other fishing opportunities in other management regions in both sates depending on each states projected attainment of their state specific harvest guidelines.

It is difficult to project whether or not anglers would spend more time fishing in deepwater areas targeting groundfish such as lingcod where encounters with overfished species is higher if retention were allowed on recreational halibut trips. But, analysis of the recent changes to management measures in the North Coast and South Coast suggest that encounters with overfished species is likely to increase.

B.12.2 Oregon

Although many halibut anglers would be expected to target groundfish is allowed to do so (and some have told ODFW staff that they would), the actual percentage that would is unknown. Therefore, additional yelloweye rockfish impacts by allowing retention of groundfish were projected across a wide range of percentages (of halibut anglers that would also target groundfish; Figure B-30). If none of the halibut anglers targeted groundfish, no additional yelloweye rockfish impacts would be expected to occur from the halibut fishery; however, the impacts could be substantial if a greater percentage of targeting occurs. For example, yelloweye rockfish mortality from the Oregon halibut fishery would be expected to increase to 1.4 mt (from 0.8 mt) if as few as 20 percent of anglers targeted groundfish during halibut trips. If this percentage increases to 75 percent, then yelloweye rockfish impacts from the halibut fishery alone are expected to exceed the 2013 harvest guideline level (similar to the HG for 2015 and 2016) for all Oregon recreational fisheries.

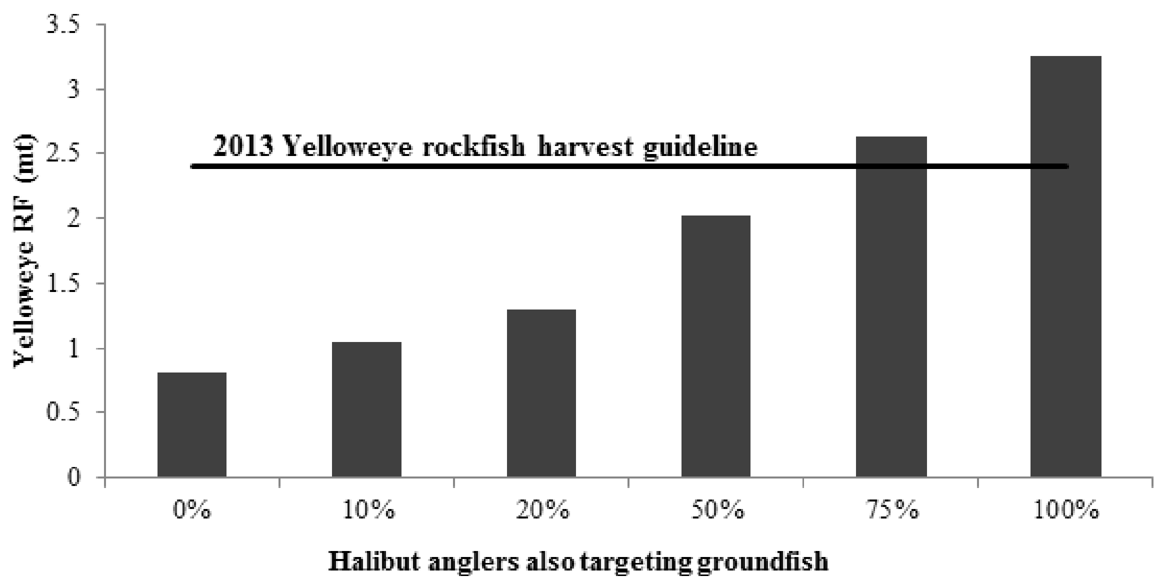

Figure B-30. Projected mortality of yelloweye rockfish from the Oregon recreational halibut fishery if halibut anglers were allowed to retain groundfish during halibut trips for various degrees of targeting of groundfish by halibut anglers. Since the percentage of anglers that would target groundfish during their halibut trip is unknown, mortality is shown for a wide range of targeting. The horizontal black line represents the 2013 harvest guideline for all Oregon recreational fisheries.

Since there is currently little room for any additional yelloweye rockfish mortality, sacrifices would likely have to be made to the recreational groundfish fishery, in the form of more restrictive regulations, in order to allow retention of groundfish by halibut anglers. While further regulations would come at great costs to groundfish anglers (e.g., shorter seasons, lesser bag limits, more restrictive depths), the benefits to halibut anglers are expected to be minimal. Allowing halibut anglers to retain incidental groundfish catches does not provide much benefit because these catches are infrequent (based on angler reports to ORBS to be 0.3 fish per halibut trip) and primarily consist of species that are overfished or non-desired (e.g., sharks, skates, and arrowtooth flounder; Figure B-31). Although anglers would be pleased if allowed to retain desirable species, such as lingcod or petrale sole, their trip satisfaction is much more dependent on whether or not they catch a halibut, their primary target. Further, allowing retention of groundfish would not increase halibut effort (the best measure of value of recreational fisheries) because the fishery is already at full capacity (quotas always caught).

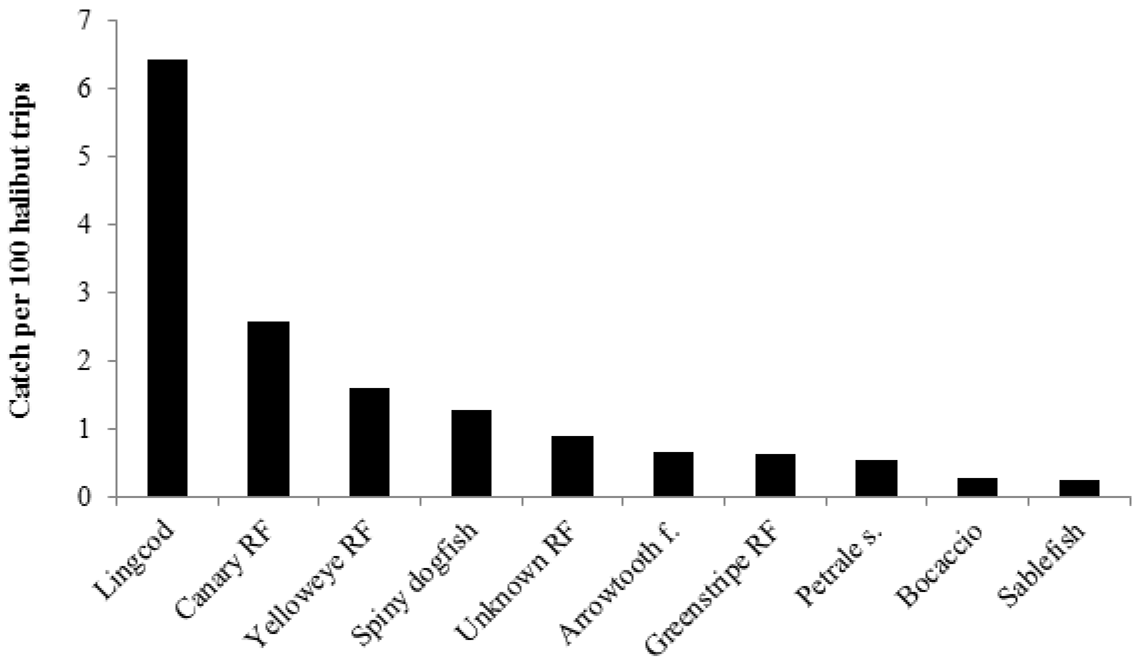

Figure B-31. Catch rates of the top ten most commonly encountered groundfish species by recreational halibut anglers in Oregon.

A modification to allow halibut anglers to harvest groundfish species that are not associated with reef habitat (i.e. other flatfish species), and thereby extending the current rule which allows sablefish and Pacific cod has also been requested. Lingcod and rockfish would remain prohibited as they are primarily associated with reef habitat. This modification could reduce the risk (incentive for anglers to target deep reefs) and may provide some additional harvest opportunities and increase angler satisfaction.

Adoption of the any change to these regulations would also have to be implemented via the Pacific Halibut Catch Share Plan, wherein the regulatory language for incidental groundfish retention for halibut fisheries is housed.

Management Options

No action: No groundfish except for sablefish and Pacific cod can be retained during all-depth halibut season while in possession of a halibut

Option 1: All groundfish can be retained during all-depth halibut season
Option 2: No groundfish except for sablefish, Pacific cod, and flatfish may be retained during all-depth halibut season while in possession of a halibut --or-- specify the groundfish can be retained except for rockfish and lingcod

Management Measures Considered but Rejected

The Council requested analysis of several new management measures which were rejected for implementation in the 2015-2016 harvest specifications and management measures process. Some of the management measures were forwarded for further consideration and prioritization within the Omnibus Regulation Changes while others were rejected all together. A summary of the analysis conducted to date is contained below.

B.13 Groundfish Closure Areas for Rougheye Rockfish and Spiny Dogfish

Groundfish closure areas (GCAs) are a management measure intended to help reduce catch of non-target species that have been identified as a possible concern. GCAs such as RCAs are currently in place as one tool to keep catches of overfished species below their respective overfishing levels (OFLs) (and annual catch limits; ACLs). For the 2015-16 Pacific Coast groundfish fishery, GCAs for rougheye rockfish and/or spiny dogfish are being considered. The Groundfish Management Team (GMT) was asked to provide analysis to aid the Pacific Fishery Management Council (Council) in deliberations on this matter. This report provides a description of the analysis and some results. Also note that due to the short time frame between the March and April 2014 Council meetings, the full GMT did not have an opportunity to review this report by the April Briefing Book deadline. However, the GMT will have an opportunity to review and provide comments at the April Council meeting. In addition, the GMT did not have time to explore many analyses that may be needed, such as in-depth analysis of inter-annual and intra-annual variation. Guidance from the Council and the Scientific and Statistical Committee (SSC) on analyses that may be beneficial but not shown here is requested. For example, the GMT seeks guidance from the SSC regarding the most appropriate metric to identify concentrations of stocks along the U.S. west coast.

B.13.1 Rougheye rockfish groundfish closure area (GCA)

To aid consideration of groundfish closure area(s) for rougheye rockfish, an analysis was conducted to identify areas where rougheye may be caught in significantly higher proportion than in other areas. For identification of these "hot spots", a cluster analysis of high catch locations was conducted. Observer data collected from the following sectors were used: at-sea whiting, non-nearshore fixed gear, and individual fishing quota (IFQ). Focus was on midwater trawl gear (at-sea whiting and IFQ sectors), fixed gears (non-nearshore fixed gear), and bottom trawl gear (IFQ sector). Data relative to fixed gears used by the IFQ sector were not analyzed in time for this report. More detail about the data and methods, as well as additional figures resulting from different analytical assumptions, are found below. In addition, our analysis up to this point includes exploration of different methods and assumptions for identifying hot spots. The resulting figures may vary in the location and size of these hot spots. This suggests that further exploration may be needed; also, these results should be considered in addition to other information about the behavior of rougheye rockfish and these fishery sectors (e.g., from fisheries scientists, managers, and participants).

At-sea whiting sector

Areas where statistically significant clusters of high bycatch ratios (rougheye rockfish-to-Pacific whiting) and low bycatch ratios are shown in Figure B-32. All data for this sector were located north of 40° 10' N latitude.

Non-nearshore fixed gear sector

Areas where statistically significant clusters of high bycatch ratios (rougheye-to-sablefish) and low bycatch ratios are shown in Figure B-33. The area north of 42° N latitude was the focus of this figure due to the occurrence of hot spots in this area.

Individual fishing quota sector

Areas where statistically significant clusters of high bycatch ratios and low bycatch ratios are shown in Figure B-34 and Figure B-35. For midwater trawl observations, rougheye rockfish-to-Pacific whiting was the bycatch ratio used in the analysis. The area north of 43° N latitude was the focus of Figure B-34 due to the occurrence of hot spots in this area. For bottom trawl observations, rougheye-to-all other groundfish was the bycatch ratio used. This area north of 42° N latitude was the focus of Figure B-35 due to the occurrence of hot spots in this area.

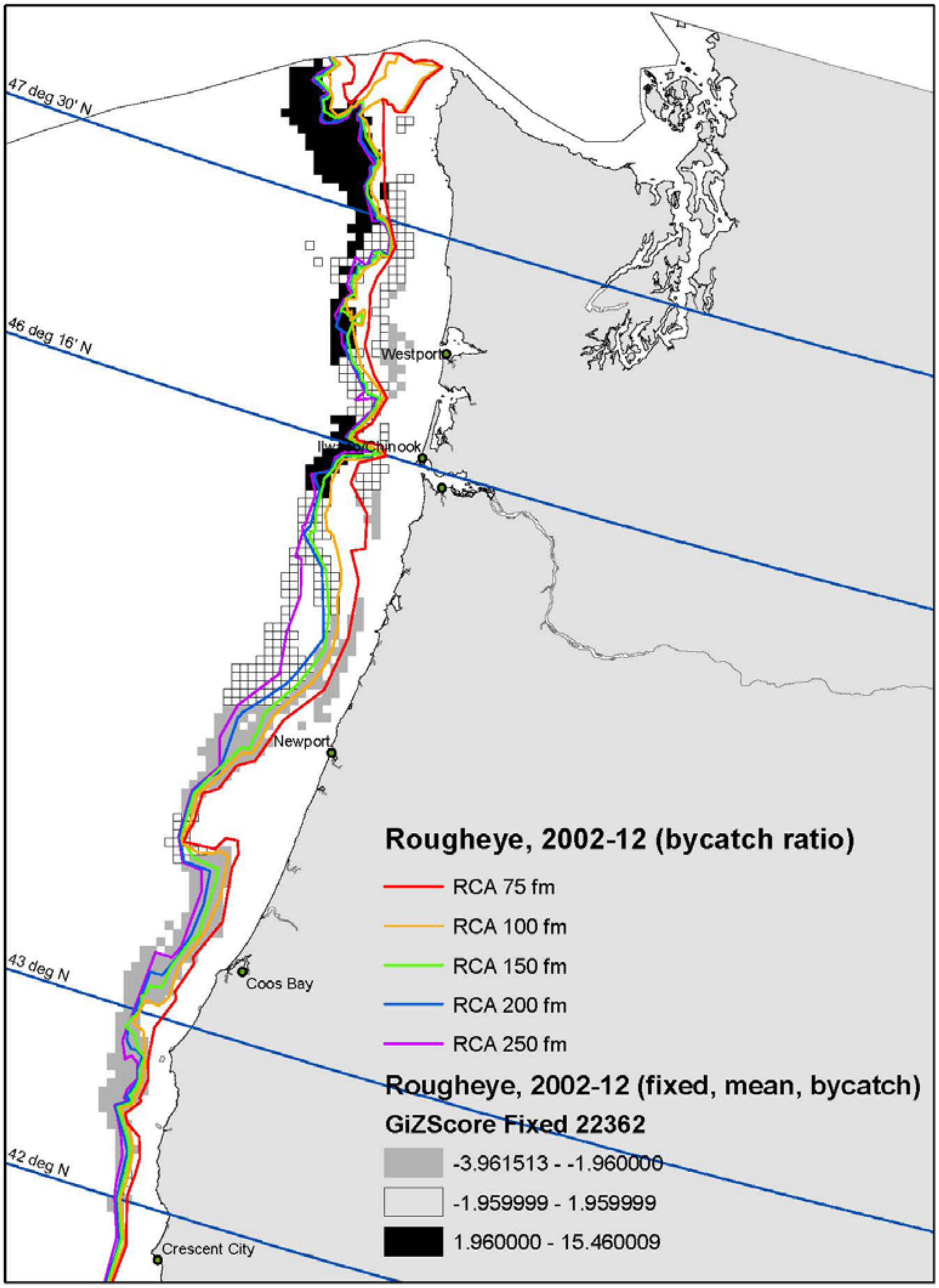

Figure B-32. Hot and cold spots of rougheye rockfish in the at-sea whiting sector, 2002-12.

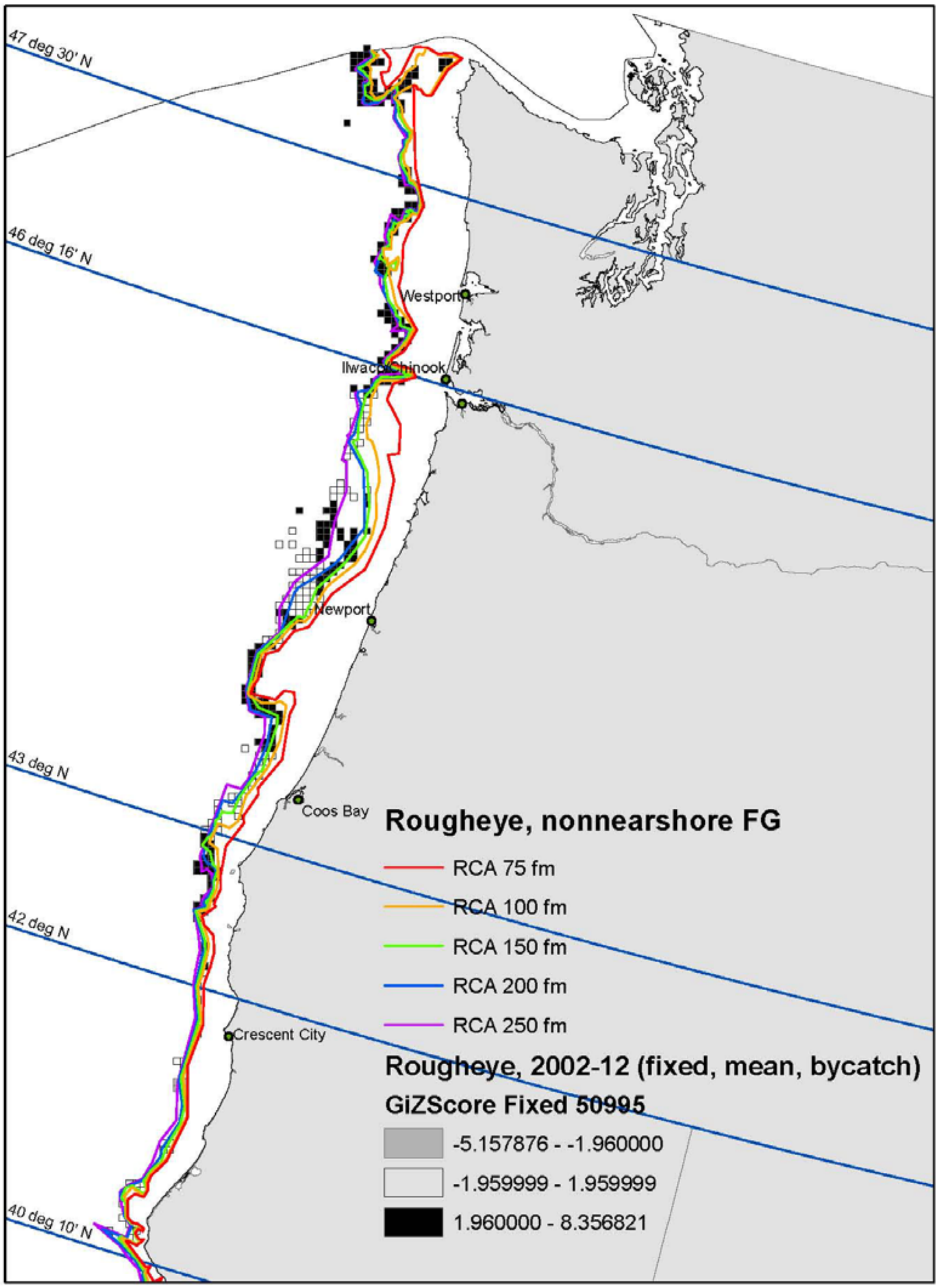

Figure B-33. Hot and cold spots of rougheye rockfish in the non-nearshore fixed gear sector, 2002-12.

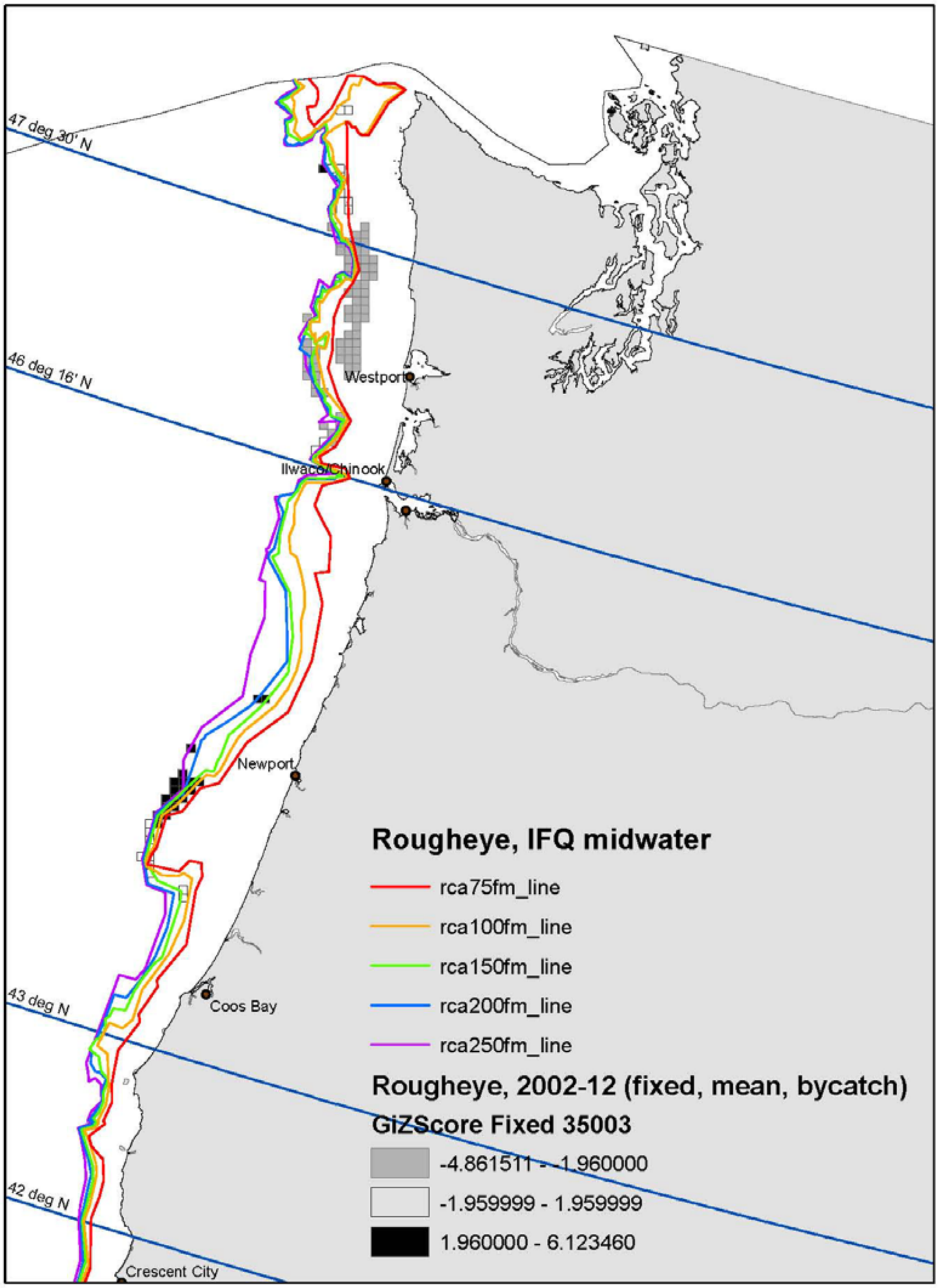

Figure B-34. Hot and cold spots of rougheye rockfish in the IFQ sector, midwater trawl, 2002-11.

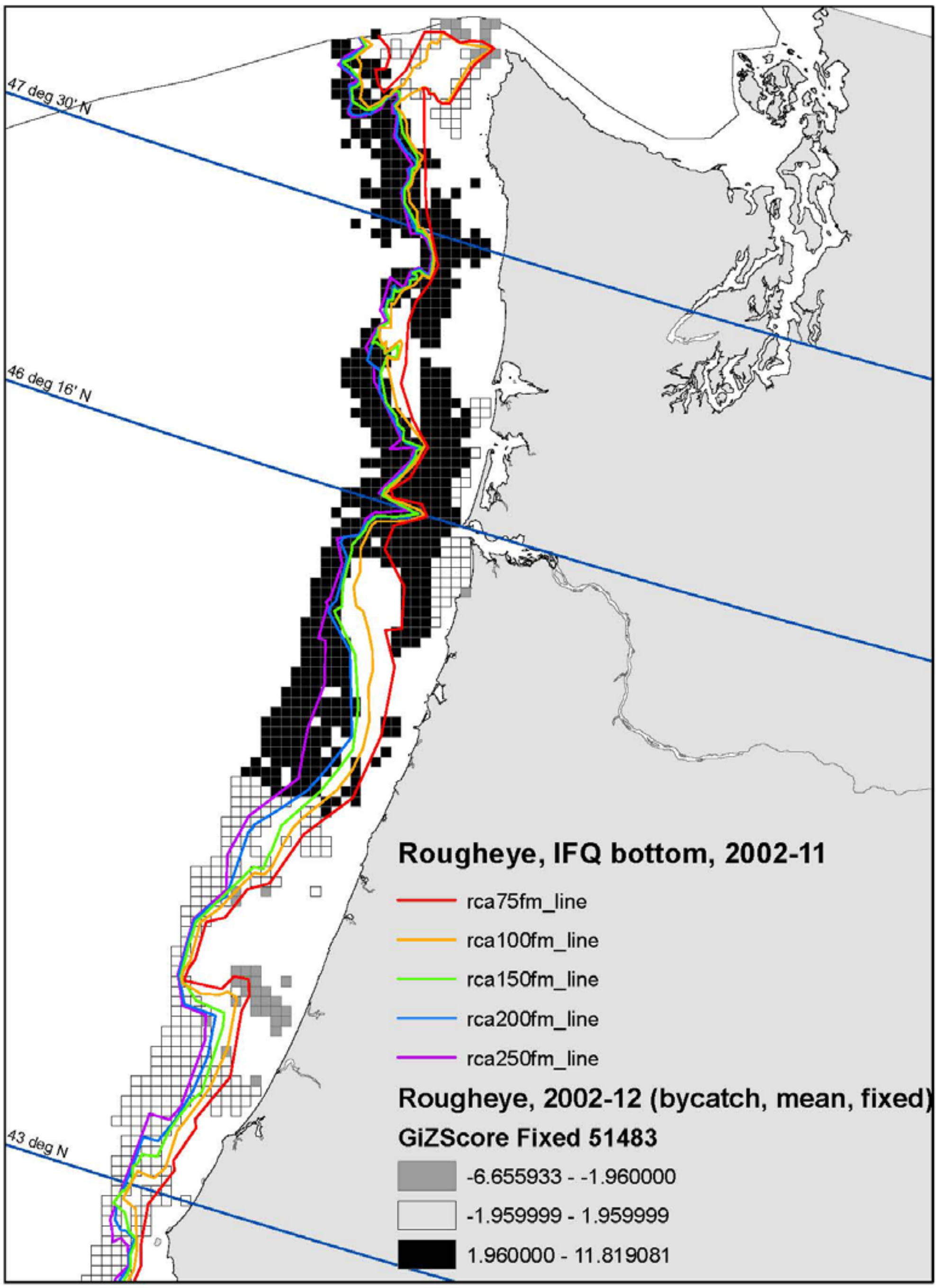

Figure B-35. Hot and cold spots of rougheye rockfish in the IFQ sector, bottom trawl, 2002-11.

B.13.2 Spiny dogfish shark groundfish closure area (GCA)

To aid consideration of groundfish closure area(s) for spiny dogfish shark, an analysis was conducted to identify areas where spiny dogfish may be caught in significantly higher proportion than in other areas. For identification of these "hot spots", the method used to identify hot spots for rougheye rockfish was also used for spiny dogfish. Observer data collected from the following sectors were used: at-sea whiting and catch shares (individual fishing quota or IFQ) sectors. Focus was on midwater trawl gear (at-sea whiting and IFQ sectors), fixed gears (non-nearshore fixed gear sector), and bottom trawl gear (IFQ sector). Data relative to fixed gears used by the IFQ sector were not analyzed in time for this report. More detail about the data and methods used are found in Appendix A. In addition, our analysis up to this point includes exploration of different methods and assumptions for identifying hot spots. The resulting figures may vary in the location and size of these hot spots. This suggests that further exploration may be needed; also, these results should be considered in addition to other information about the behavior of spiny dogfish and these fishery sectors (e.g., from fisheries scientists, managers, and participants).

At-sea whiting sector

Areas where statistically significant clusters of high bycatch ratios (spiny dogfish-to-whiting) and low bycatch ratios are shown in Figure B-36. All data for this sector were located north of 40° 10' N latitude.

Non-nearshore fixed gear sector

Areas where statistically significant clusters of high bycatch ratios (rougheye-to-sablefish) and low bycatch ratios are shown in Figure B-37. The area north of 42° N latitude was the focus of this figure due to the occurrence of hot spots in this area.

Individual fishing quota sector

Areas where statistically significant clusters of high bycatch ratios and low bycatch ratios are shown in Figure B-38 and Figure B-39. For midwater trawl observations, rougheye rockfish-to-Pacific whiting was the bycatch ratio used in the analysis. The area north of 43° N latitude was the focus of Figure B-38 due to the occurrence of hot spots in this area. For bottom trawl observations, rougheye-to-all other groundfish was the bycatch ratio used. This area north of 42° N latitude was the focus of Figure B-39 due to the occurrence of hot spots in this area.

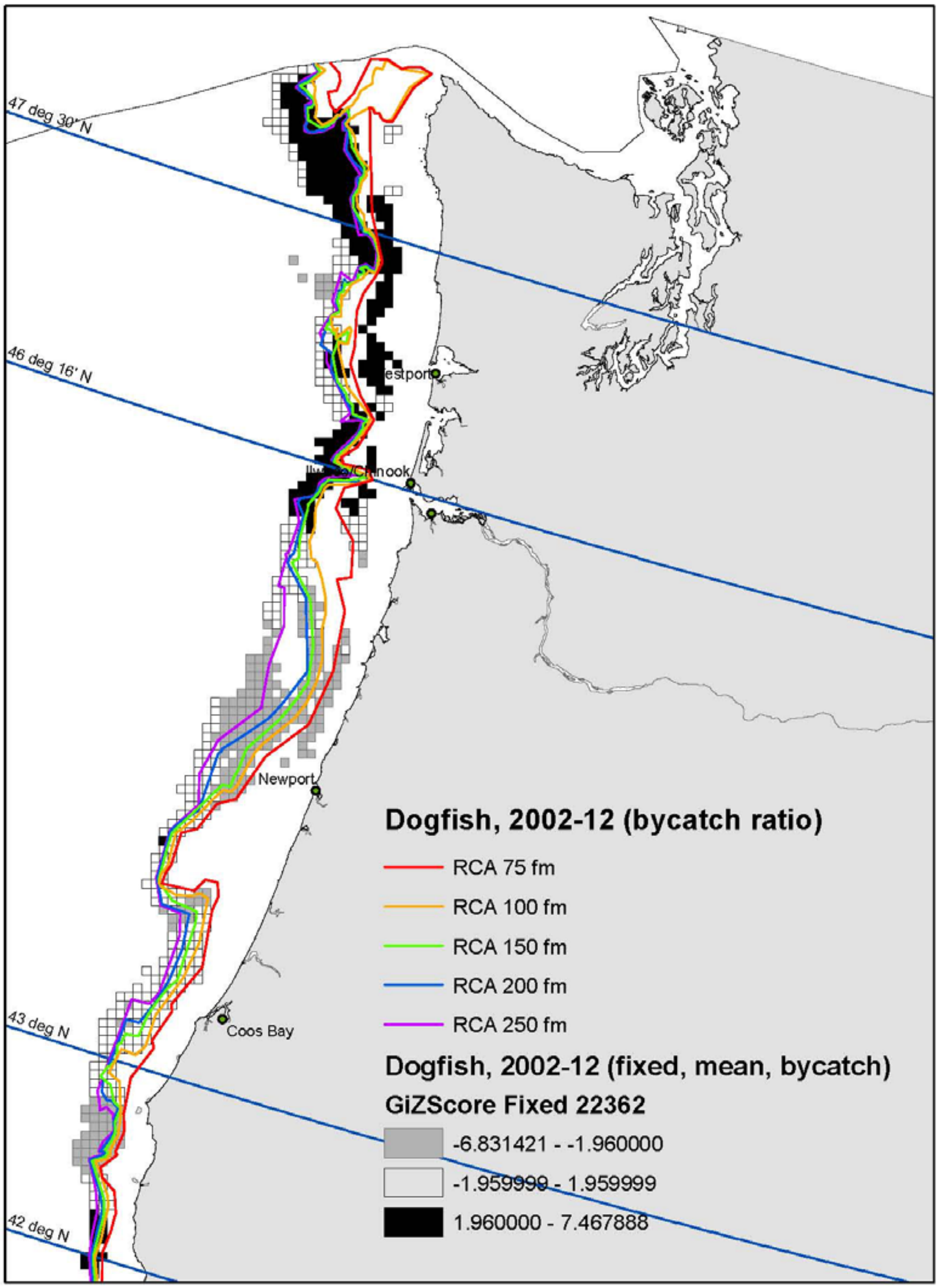

Figure B-36. Hot and cold spots of spiny dogfish in the at-sea whiting sector, 2002-12.

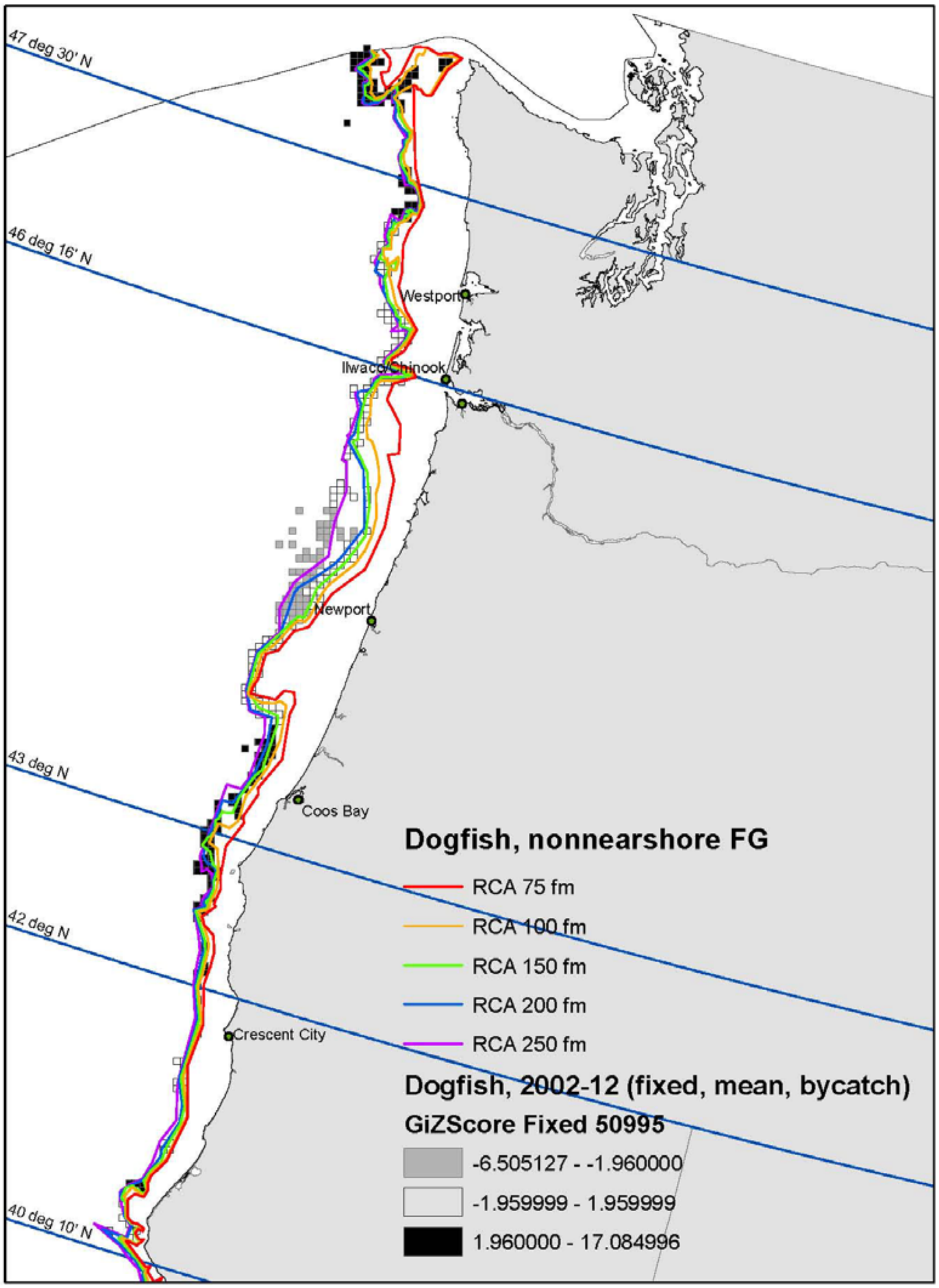

Figure B-37. Hot and cold spots of spiny dogfish in the non-nearshore fixed gear sector, 2002-12.

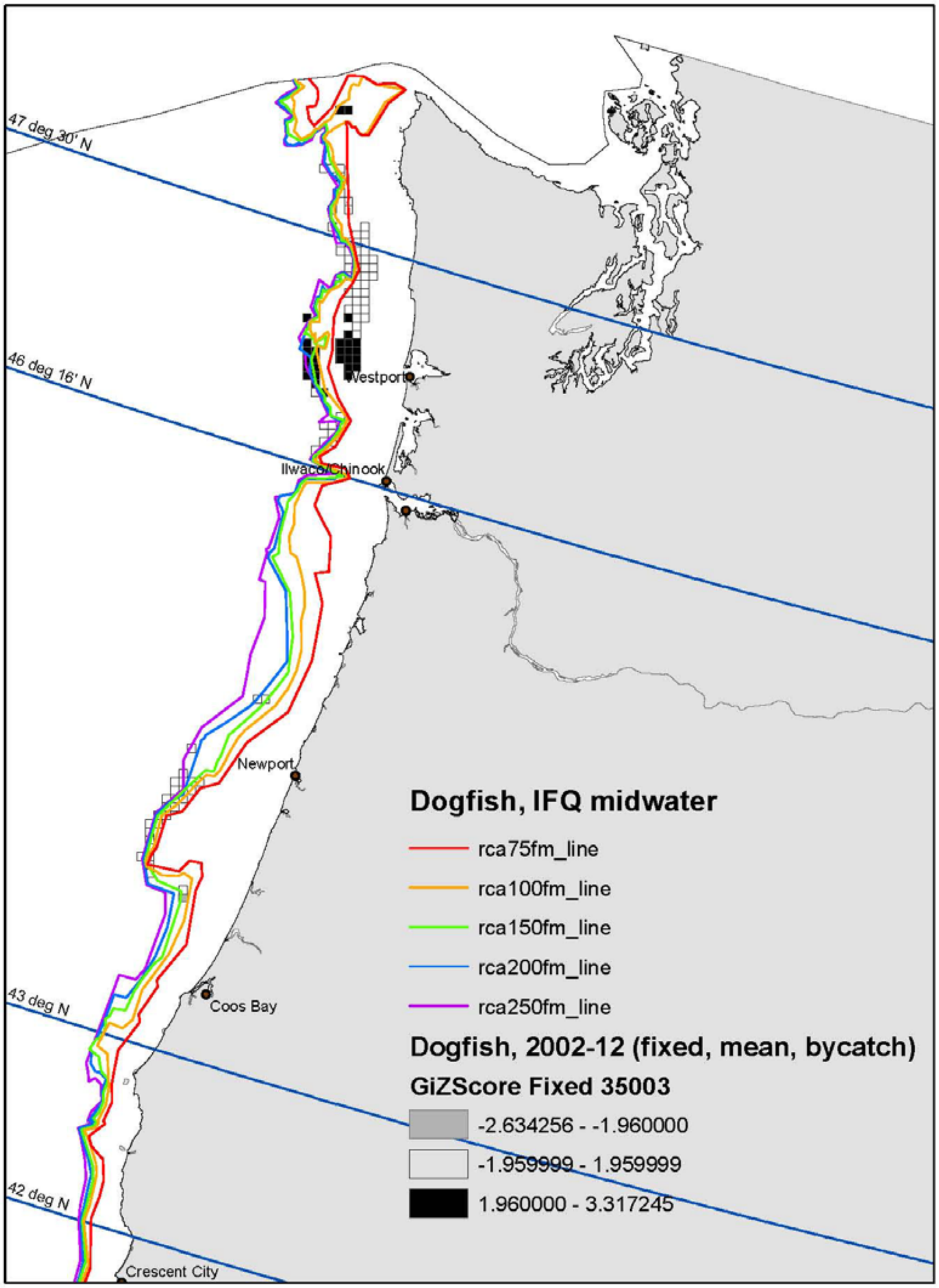

Figure B-38. Hot and cold spots of spiny dogfish in the IFQ sector, midwater trawl, 2002-11.

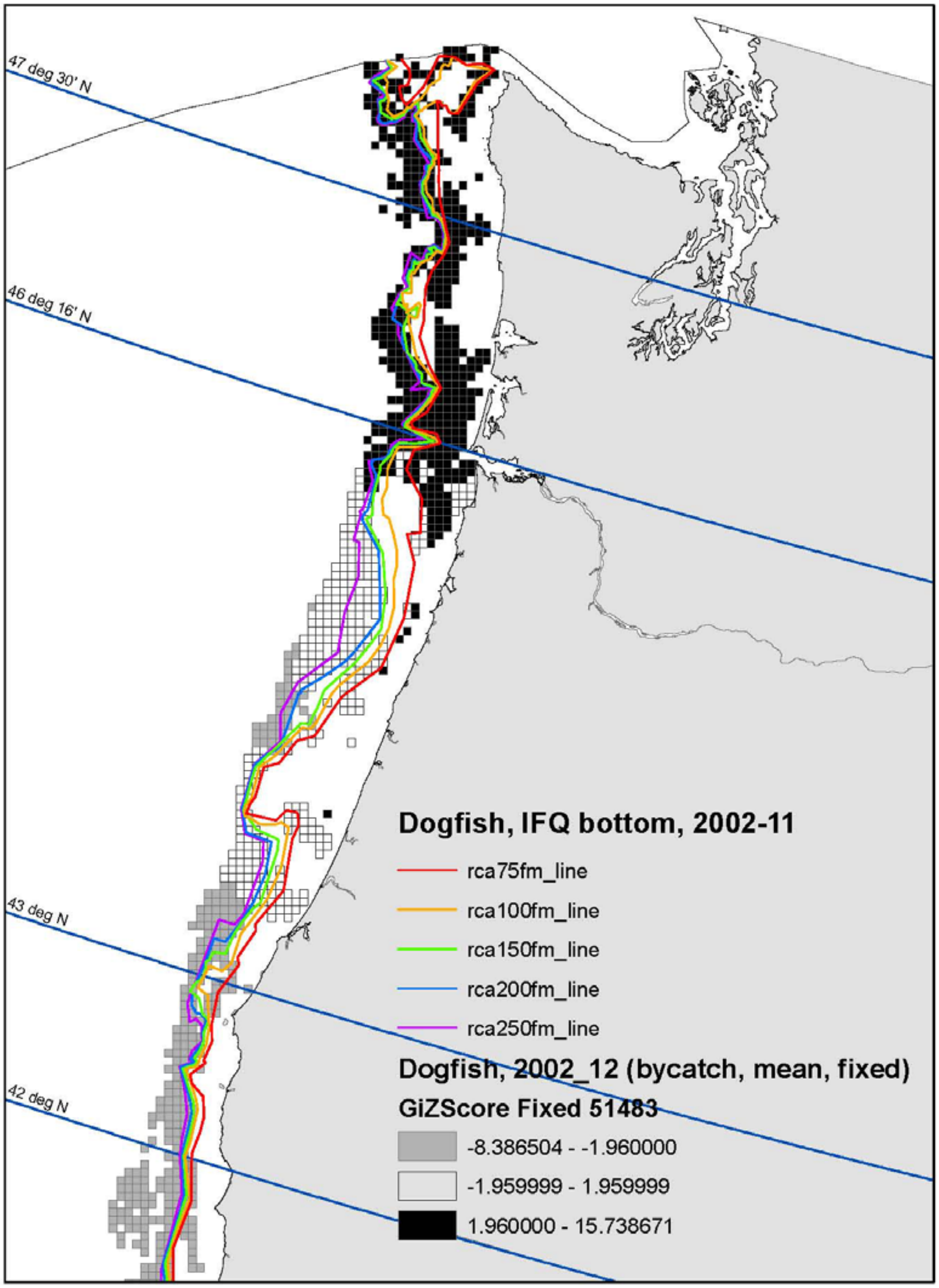

Figure B-39. Hot and cold spots of spiny dogfish in the IFQ sector, bottom trawl, 2002-11.

Description of hot and cold spot analysis: data and methods

Three datasets were made available for this analysis: a West Coast Groundfish Observer Program (WCGOP) dataset used as the input for the Fixed Gear Projection Model used by the GMT (non-nearshore fixed gear sector, 2002-12); a WCGOP dataset that provided information about the IFQ sector (2002-11); and a North Pacific Observer Program (NORPAC) dataset provided by the Pacific States Marine Fisheries Commission (PSMFC) specifically for this analysis (at-sea whiting sector, 1980-2012; 2002-12 were used for this analysis). Though the data were available, the IFQ sector using fixed gear was not analyzed for this report due to time limitations.

The available data were also subject to the following filter. For the IFQ sector using midwater trawl, only those hauls associated with a "Pacific whiting trip" were included in this analysis. A Pacific whiting trip was defined as a trip whose landings (lb) comprised of at least 50 percent Pacific whiting. Additionally, some observations in the datasets were identified as either rougheye or shortraker rockfish ("UDW1" in the WCGOP datasets and "XXXX" in the NORPAC dataset). These observations were combined with the rougheye observations.

For the spatial analysis, each haul and associated catch were attributed to a point location. This location was defined as either the midpoint of each haul or set (for the NORPAC observations) or the average latitude and longitude coordinates of each haul (for the WCGOP observations).

Bycatch ratios (rougheye-to-target species or spiny dogfish-to-target species) were associated with each of these locations. Pacific whiting was defined as the target species for the at-sea whiting sector and IFQ sector using midwater trawl. Sablefish was defined as the target species for the non-nearshore fixed gear sector. For the IFQ sector using bottom trawl, all groundfish excluding rougheye and spiny dogfish were combined and defined as the target for this sector. The natural log of these bycatch ratios and their locations were used as the inputs for this spatial analysis. Hauls that caught the target species but did not catch either rougheye rockfish or spiny dogfish were assigned a bycatch ratio equal to one-half of the minimum bycatch ratio (0.5 * min bycatch ratio) for that bycatch species and sector. This was done to avoid invalid values when taking the natural log (i.e., ln(0) does not result in a valid value). Table B-77 shows the number of observations (hauls) available for this analysis and the number of hauls where no bycatch was reported.

Table B-77. Number of observations (hauls) in this analysis with no bycatch.

Sector	Years with bycatch obs.	Bycatch/Target ratio	Total # of hauls	Hauls with no bycatch	Hauls with no bycatch, %
At-sea whiting	2002-2012	Rougheye/Whiting	21,854	16,960	78%
		Dogfish/Whiting	21,854	10,227	47%
Non-nearshore fixed gear	2002-2012	Rougheye/Sablefish	11,542	8,940	77%
		Dogfish/Sablefish	11,542	7,366	64%
ITQ fixed gear*	2010-11	Rougheye/Sablefish	2,138	1,660	78%
		Dogfish/Sablefish	2,138	1,825	85%
ITQ midwater	2002-2011	Rougheye/Whiting	1,728	1,340	78%
		Dogfish/Whiting	1,728	352	20%
ITQ bottom	2002-2011	Rougheye/All groundfish	37,071	30,311	82%
		Dogfish/All groundfish	37,071	20,411	55%

*This sector was not included in time for this report but will be made available if requested.

A geographic information system software (ArcGIS 10.1) was then used to depict these points and values graphically. First, the west coast exclusive economic zone (EEZ) was divided into 5 km by 5 km grids. For each fishery sector, each haul location and corresponding attributes (e.g., bycatch ratio) were plotted with these grids. Only grids that contained haul locations were selected for further consideration. This grid size was considered to be an appropriate size for adhering to confidential data protocols (i.e., at least three distinct vessels were present within each grid that is depicted in each figure) in the final step of this analysis.

These grids and associated bycatch ratios were then used as inputs for the identification of hot spots. That is, the grid value was aggregated as the mean of the bycatch ratios within that grid. The Hot Spot Analysis (Getis-Ord Gi*) tool, part of the Spatial Analyst extension in ArcGIS, was used. The Getis-Ord Gi* statistic estimates the relationship between grids and identifies clusters of grids with high or low values. Z-scores and p-values are estimated for each grid and used to evaluate statistical significance.

The last step in the hot spot analysis evaluated and showed only those grids where at least three distinct vessels were present in each grid, to adhere to confidential data protocols. The resulting output (figure) shows only these grids and highlights where statistically significant clusters of high bycatch ratios are present (grids with z-scores of 1.96 or higher) and statistically significant clusters of low bycatch ratios are present (grids with z-scores of -1.96 or lower). That is, the pattern of bycatch ratios across these highlighted grids, relative to their neighbors, has a high probability (95 percent confidence level) of occurring due to non-random spatial processes. All other grids (z-scores between 1.96 and -1.96) indicate that the bycatch ratios within them are likely due to random spatial processes.

The relationship between grids can be conceptualized in different ways. For this report, figures that resulted from applying a fixed distance threshold were shown. That is, each grid and its attributes (e.g., bycatch ratio) were evaluated relative to all grids within a threshold distance. Grids outside of this threshold distance were not evaluated. Additional figures not shown in this report were generated using a different spatial conceptualization, an inverse distance threshold. This method also evaluates each grid and its attributes relative to all grids within a threshold distance. However, grids outside of this threshold are evaluated to have some degree of influence (weight) on the grid of interest. Figure B-40 is an example of a result when using this method for identifying hot and cold spots of rougheye rockfish in the at-sea whiting sector. Note that the pattern of hot spots is different than what is shown using a fixed distance method Figure B-32); further evaluation is needed to better understand what is driving these differences in results.

In addition to exploring different spatial conceptualizations, we evaluated outputs resulting from the exclusion of hauls with no bycatch. As mentioned above, the number of hauls where this was the case is shown in Table B-77. Figure B-37 shows an example of a result of this evaluation, a hot spot off of southern California. This evaluation also identified hot spots off of Oregon and Washington but these are not shown in this figure.

Finally, we offer the following considerations. Figure B-32 through Figure B-39 are the result of this data processing and analysis process, and should be considered within this context. Further exploration of the data and methods to identify hot spots could include, but are not limited to, the following: 1) identify hot spots using inter-annual and intra-annual time frames; 2) further evaluate the sensitivity of the results to spatial relationships between observations (e.g., inverse distance); 3) evaluate different distance thresholds between observations (i.e., other than the minimum distance to ensure that each grid has at least one neighbor); 4) evaluate dogfish catch only (rather than the dogfish-to-sablefish bycatch ratio) due to some targeting of spiny dogfish in the fixed gear sectors; and 5) evaluate an alternative target (i.e., denominator for the bycatch ratio) for the IFQ sector such as only Dover sole, thornyheads, and sablefish combined, some other species (e.g., lingcod), or species group (e.g., slope rockfish).

Note that the decision to use catch ratios or simply catch as the metric will result in different conclusions. The GMT seeks guidance regarding the metric that is most applicable to the question being answered. For example, an alternative to using a denominator that represents the catch of target species is to simply overlay the significant clusters for the catch of bycatch species against the relative densities of target species catch (e.g., Figure B-42). This demonstrates that conclusions may be much different depending on the metric selected; Figure B-42 shows that highest catches of rougheye rockfish is off northern Washington, whereas Figure B-32 demonstrates that the highest catch ratios (rougheye catch divided by whiting catch) may occur off central Washington, central Oregon, and southern Oregon).

For the IFQ sector using fixed gear that was not included in this report, the following subsequent analyses could be conducted: combine these observations with the non-nearshore fixed gear sector; evaluate this sector independently, noting that only two years of data are currently available to the GMT; and/or assume that the behavior of this sector is similar to the non-nearshore fixed gear sector and no further evaluation is necessary.

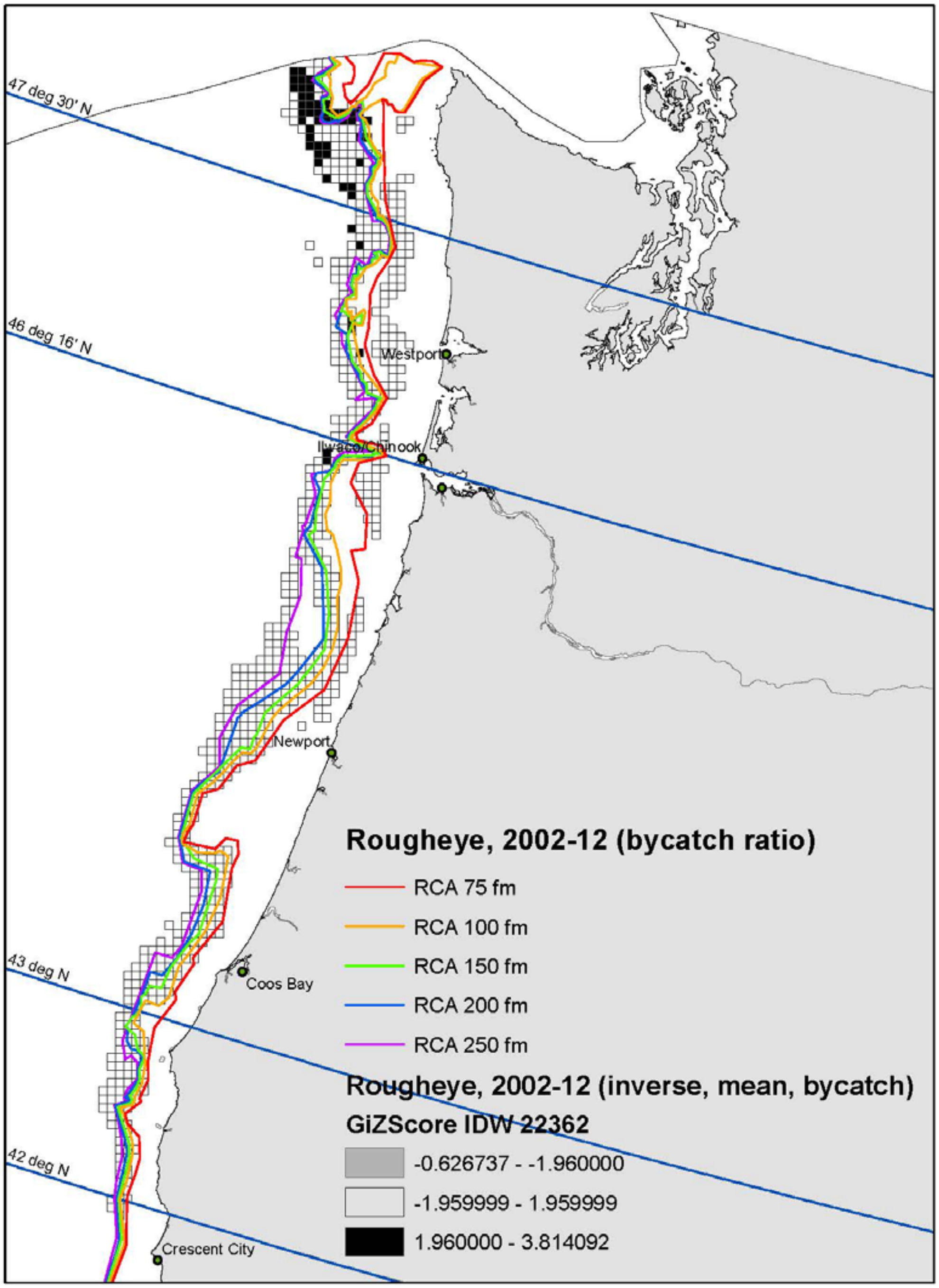

Figure B-40. Hot and colds spots of rougheye in the at-sea whiting sector, using the inverse distance method.

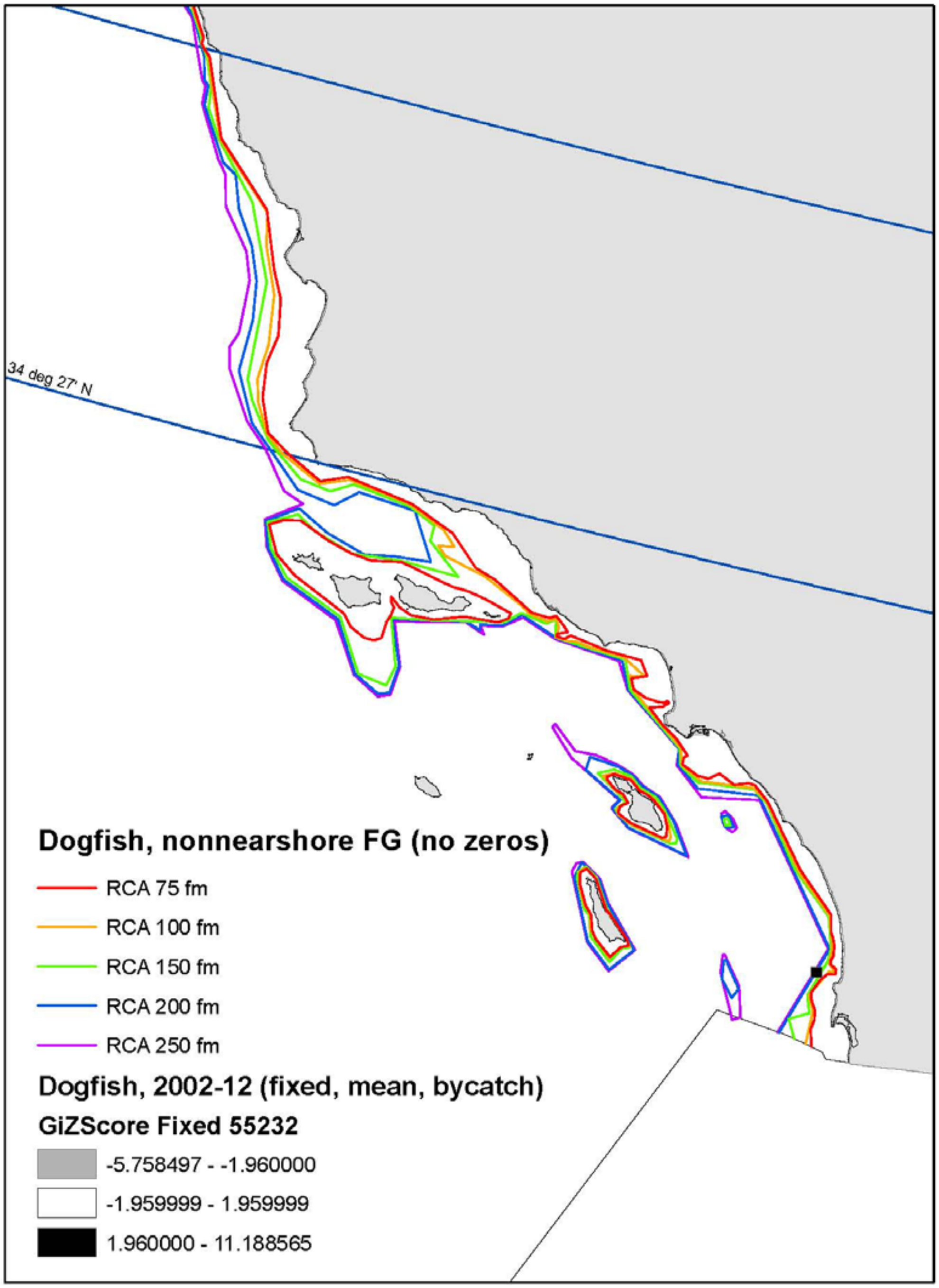

Figure B-41. Hot and colds spots of spiny dogfish in the non-nearshore fixed gear sector, using the fixed distance method and excluding hauls with zero bycatch; southern California only.

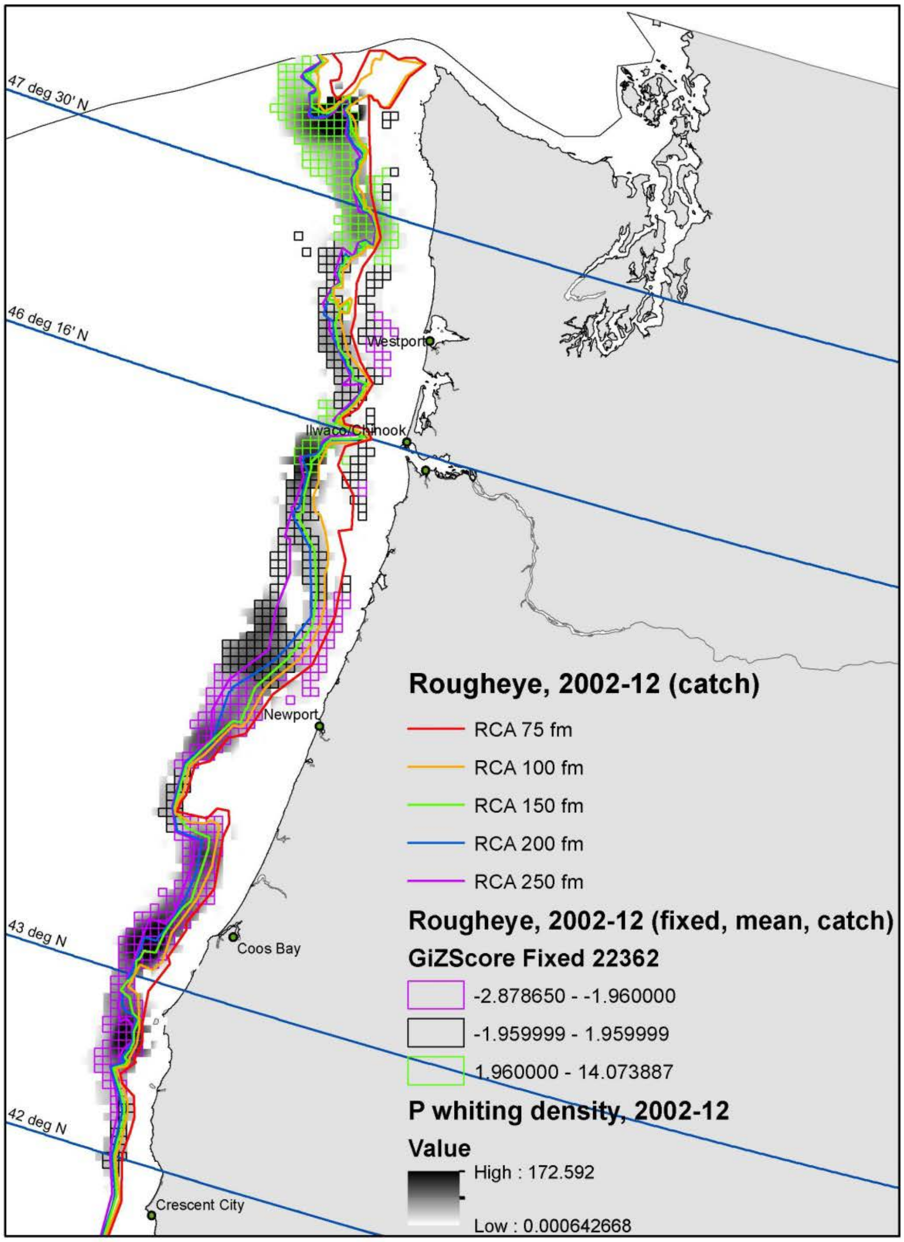

Figure B-42. Catch of rougheye rockfish north of 40° 10´ N latitude by the non-Tribal at-sea whiting sector. Data were acquired from NORPAC (2002-2012). Areas where high levels of catch are clustered are shown by the green-shaded boxes (i.e., north of 47° 30´ N latitude; z-scores greater than or equal to 1.96), moderate catches are shown by the empty boxes, and areas of low catches are shown by the solid purple boxes (z-scores less than or equal to -1.96). Density plots of Pacific whiting catch are shown in the background (i.e., darkest = highest catch of target species).

B.14 Two-Year Trawl and Non-Trawl Allocation of Petrale Sole

In November 2013, the Council requested data to inform a two-year trawl and non-trawl allocation of petrale sole. Under the current action alternatives, the non-trawl sector is allocated 35 mt and the remaining amount is allocated to the trawl sector (2,544 mt). The Council expressed interest in an approach that would allocate 15 mt to the non-trawl sector and the remainder to the trawl sector (2,564 mt). Historical mortality by sector can be found in Table B-78. In recent years, both the trawl allocation and the ACL for petrale sole have been greater than 95 percent attained. As such, it may be logical to assume that an increased allocation of petrale sole to the trawl sector would be utilized. Recent year catches by the non-trawl sector have been less than 2 mt, therefore a 15 mt allocation could be sufficient.

Table B-78. Historical Mortality of Petrale Sole, by sector, from 2002-2012.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Set-Aside Total	**172.6**	**270.0**	**207.8**	**32.9**	**28.3**	**47.7**	**45.7**	**70.8**	**32.0**	**127.3**	**72.0**
California Halibut	0.2	0.4	3.4	1.0	1.6	0.4	0.2	0.1	0.1	0.1	0.4
Incidental	145.5	179.9	118.3	0.4	0.3	0.1	0.0	1.1	0.2	0.4	0.8
Pink Shrimp	6.2	5.7	2.3	1.9	0.0	2.3	1.5	0.3	1.2	1.8	1.1
Tribal Shoreside	20.6	83.9	83.8	29.7	26.4	45.0	44.0	69.4	30.5	125.1	69.7
Non-Trawl Total	**1.1**	**0.7**	**1.6**	**0.8**	**1.3**	**1.5**	**1.5**	**0.8**	**0.9**	**1.4**	**1.7**
Nearshore Fixed Gear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-nearshore Fixed Gear	0.9	0.5	1.2	0.4	0.7	0.5	0.9	0.2	0.4	0.7	0.8
WA Rec											
OR Rec	0	0.1	0.3	0.4	0.6	1	0.5	0.6	0.4	0.6	0.7
CA Rec	0.2	0.1	0.1	0	0	0	0.1	0	0.1	0.1	0.2
Trawl Total	**1,749.0**	**1,694.2**	**1,790.7**	**2,741.9**	**2,662.8**	**2,275.0**	**2,154.8**	**1,884.7**	**885.7**	**810.4**	**1,032.6**
LE Trawl Permit - Fixed Gear										0.1	0.4
LE Trawl Permit - Trawl Gear	1,748.5	1,694.2	1,790.0	2,741.9	2,662.8	2,275.0	2,154.8	1,884.7	885.6	810.3	1,032.2
Non-Tribal At-Sea Hake		0.0				0.0					
Shoreside Hake	0.4	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Grand Total	**1,922.4**	**1,964.7**	**1,999.7**	**2,775.3**	**2,691.7**	**2,323.2**	**2,201.4**	**1,955.7**	**918.1**	**938.4**	**1,105.4**

B.15 Trawl: At-Sea Set-Asides for Spiny Dogfish Shark

Introduction

The Council requested that 163 mt to 725 mt be analyzed as a range of potential set aside levels of Spiny Dogfish be analyzed for the at sea whiting sectors ("At Sea" sectors). Here we use a basic Monte Carlo simulation approach to evaluate that range in the context of annual Spiny Dogfish bycatch as a whole.

The goal of the simulations is to provide a look at patterns of total annual dogfish mortality under the No Action scenario; and, then to describe how those patterns might be affected if an At Sea set aside were established at a particular level. This second goal also allows for an evaluation of how often catch in the At Sea sectors might reach the various set aside levels and thereby require action by the Council, by the sector participants, or both to avoid an overage of the set aside. In addition to the 163 mt and 725 mt amounts requested by the Council, we look at intermediate values of 300 mt and 500 mt as At Sea set asides to provide additional contrast.

The ACL and harvest guidelines (HG) the Council is considering for 2015-2016 are displayed in Table B-79. To simplify the simulations, we focused only the lower of the preliminary preferred ACLs ("Preferred Alternative ACLs"), which is 1,897 mt. And we focused on the ACL instead of the HG because the simulations take into account the amounts deducted from the ACL to produce the Fishery HG (i.e. tribal catches are part of the simulations and other amounts, e.g. research, are assumed to be fixed yet still added to the total simulated catch).

The high variability of Spiny Dogfish catch makes the choice of a set aside challenging. As shown below, the At Sea sectors, primarily the catcher processor sector, can be major sources of Spiny Dogfish catch. In turn, set asides for the At Sea sectors could be effectively used to lower the probability of an ACL overage. However, the high variability in catch across all sectors means that in some years the At Sea set aside levels would not prevent overages that would be caused primarily by high catch years in other sectors. In addition, the high variability means that in many years the At Sea sectors could reach their set aside level and be negatively affected while catch in total remains below the ACL. The same would be true for other sectors. The simulation results shown below help demonstrate this dynamic.

The factors leading to high and low catches of Spiny Dogfish in each sector are uncertain. We therefore explored multiple simulations based on different assumptions about the frequency of annual Spiny Dogfish catch rates. All approaches considered, however, suggest that total Spiny Dogfish catch is more likely than not to remain below the Preferred Alternative ACLs proposed for 2015 and 2016 whether new set asides are established or not. While not recommending the simulation results as precise forecasts, we do interpret the results as suggesting that overages of the Spiny Dogfish ACL would be expected to occur with low to moderate frequency, from less than 10 percent to less than 30 percent of the time, depending on assumptions about current conditions in the bottom trawl and non-nearshore fixed gear sectors. Furthermore, under these low to moderate probabilities of an annual overage we can conclude with some confidence that that there is less than a 50 percent probability that Spiny Dogfish catch would fail the performance standard of exceeding an ACL more than once in four years suggested by the National Standard 1 (NS1) Guidelines.

The analysis presented in this section was not reviewed by the full GMT. The full GMT will review the analysis at the April meeting and will advise the Council accordingly.

Table B-79. The Spiny Dogfish annual catch limit (ACL) and harvest guideline (HG) amounts under consideration for 2015 and 2016.

	2015 ACL	2015 HG	2016 ACL	2016 HG
Preferred Alternative	1,912	1,737	1,897	1,722
P-star = 0.25	1,552	1,377	1,540	1,365
P-star = 0.45	2,303	2,128	2,285	2,110

Spiny Dogfish Catch and Outline of the Data and Simulation Approach

The patterns and management history of Spiny Dogfish catch were evaluated in the 2013-14 EIS. An extra year of catch estimates, as well as some revisions to past years' estimates, have become available since that analysis was completed. However, the Council recommended no new management measures for Spiny Dogfish in the current 2013-2014 management period and the management circumstances for Spiny Dogfish remain largely unchanged from last cycle. Here we focus on the most salient aspects of Spiny Dogfish catch to the simulations and the At Sea set aside consideration. The 2013-14 EIS can be consulted for a more thorough treatment of the history of the Council's management of Spiny Dogfish. The total mortality estimates used in this analysis are displayed in Table B-80.

A few key characteristics of Spiny Dogfish catch led the GMT to explore this simulation approach for this cycle. First, catch of Spiny Dogfish has been highly variable across a number of sectors (Figure B-43). With such variability, point estimates and focus on single sectors is of limited value for forecasting. The reality is that Spiny Dogfish catch is unpredictable and may fall over a wide range both at the sector level and in total. The simulations provide a means of exploring this range of outcomes and the relative frequency of catch events across sectors.

Second, in most years total mortality on the stock has remained below the ACLs being considered for 2015-2016. Catch only exceeded those levels twice since 2003 and approached them in two other years (Table B-80). And in those years catch was considerably over the average in one or more sectors. So it is the combination of variability across a sector that appears to be key to evaluating the risk of ACL overages for Spiny Dogfish. The simulation approach is a convenient method of evaluating the variability in sectors in combination.

Lastly, Spiny Dogfish have been caught mostly as incidental bycatch in recent years. Targeting and marketability have been on the decline. No management measures are thought to directly affect incentives to target or avoid Spiny Dogfish and so it appears that variations in catch rates have been the result of outside factors like management measures targeted at other stocks. The high and low catch years in each sector very much appear to be behaving as stochastic, random variables whose pattern can be described with simple statistical/phenomenological models.

The input data for the simulation is based on the total mortality estimates shown in Table B-80and Table B-82. The simulations focus on the sectors where catch has been relatively high and variable. Those where catch has been relatively low and stable are combined into an Other category. The catch estimates from these combined sectors are displayed elsewhere in the 2015-2016 analysis. The simulations fix the catch from these sectors at the 2009-2012 average of 36 mt.

To account for variations in fishing activities in each sector from year to year, the ratio of Spiny Dogfish to total catch of all species is the main unit of analysis used in the simulations (Table B-82). For the At

Sea commercial and tribal sectors, the denominator used to calculate the ratio is total catch of all species. For the other sectors, we used total landings of all species as the denominator.

Table B-80. Total annual estimated fishing mortality (mt) of Spiny Dogfish by sector (sources: PacFIN npac4900 for the At Sea landings, WCGOP's GMMultiYr_DataProduct (23-Dec-2013 version), state recreational data). Note that total fishing mortality assumes 50 percent survival of fish discarded in the fixed gear sectors.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Bottom trawl (BT)	625.8	643.8	1,591.3	736.9	637.0	1,024.4	663.3	522.6	366.9	340.3
Fixed gear (FG)	183.3	246.8	298.5	346.8	342.1	286.1	119.9	132.7	89.6	111.2
Catcher processors (CP)	10.1	331.0	42.2	6.0	63.2	488.2	28.2	110.3	640.5	147.9
Mothership (MS)	1.0	9.9	27.9	16.9	23.2	23.9	6.8	45.4	85.0	30.0
Shoreside whiting (SS)	4.3	30.3	95.6	34.3	51.4	59.5	20.7	151.5	181.0	160.1
Tribal at sea (TAS)	259.5	274.5	285.2	35.3	68.9	159.4	128.2	122.0	58.6	0.6
Tribal shoreside (TSS)	3.8	40.1	5.7	76.8	119.2	302.9	125.4	6.9	127.7	1.8
Other (OTR)	181.6	139.8	46.1	27.8	21.9	40.4	21.6	33.2	46.2	39.0
Total	1,269.4	1,716.3	2,392.5	1,280.8	1,326.9	2,384.8	1,114.2	1,124.6	1,595.5	831.0

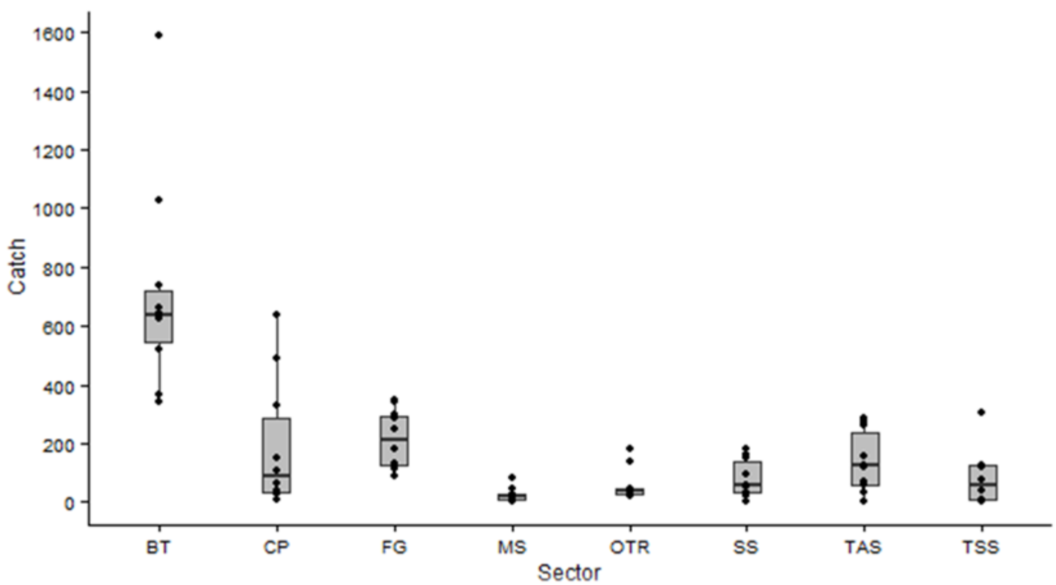

Figure B-43. Variation of annual catches (mt) of Spiny dogfish by sector over the ten year period 2003-2012. Boxplots are used to show location of 25th percentile, median, and 75th percentile catch levels by sector (corresponding to the lower edge, middle line, and upper edge of the box respectively) and outliers. Order of the sectors is alphabetical. See Table B-81 for abbreviations.

Table B-82. The upper panel shows total catch, for at sea deliveries, and total landings, for all other sectors, used in this analysis to standardize the Spiny Dogfish catch by annual fishing activity in each sector. The lower panel shows the ratio between total Spiny Dogfish catch and the numbers in given in the upper panel. See Table B-80 for abbreviations.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BT	18,506.1	17,716.4	19,321.4	17,838.2	20,473.8	24,117.7	26,081.5	22,655.1	17,298.9	17,142.4
FG	3,189.7	3,222.2	3,713.2	3,647.5	2,830.5	3,099.4	3,967.2	4,083.1	4,784.8	3,743.7
CP	41,214.4	73,175.3	78,890.0	78,864.0	73,262.3	108,199.6	34,800.4	54,291.6	71,678.8	55,262.7
MS	26,021.3	24,101.9	48,636.3	55,355.3	47,809.9	57,497.2	24,089.6	35,713.5	50,050.9	38,480.3
SS	51,530.3	90,201.8	98,515.3	97,637.1	73,878.1	51,951.3	40,605.0	63,085.7	91,117.3	66,267.0
TAS	19,373.3	23,459.2	23,541.8	5,568.5	5,166.9	14,943.3	13,459.2	16,308.8	6,343.6	32.1
TSS	6,905.6	10,812.3	16,234.9	33,048.8	21,895.1	20,435.5	12,877.7	5,504.8	15,968.7	5,159.3

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BT	0.03382	0.03634	0.08236	0.04131	0.03111	0.04248	0.02543	0.02307	0.02121	0.01985
FG	0.05747	0.07659	0.08039	0.09508	0.12086	0.09231	0.03022	0.03250	0.01873	0.02970
CP	0.00025	0.00452	0.00053	0.00008	0.00086	0.00451	0.00081	0.00203	0.00894	0.00268
MS	0.00004	0.00041	0.00057	0.00031	0.00048	0.00042	0.00028	0.00127	0.00170	0.00078
SS	0.00008	0.00034	0.00097	0.00035	0.00070	0.00115	0.00051	0.00240	0.00199	0.00242
TAS	0.01339	0.01170	0.01212	0.00633	0.01333	0.01067	0.00953	0.00748	0.00923	0.02011
TSS	0.00055	0.00370	0.00035	0.00232	0.00544	0.01482	0.00974	0.00125	0.00800	0.00036

Table B-83. The assumed sector-level landings and total catch estimates applied to the Spiny Dogfish annual catch ratios to total fishing mortality (mt).

Sector	Projected	Source
CP	77,950	EIS projection
MS	52,450	EIS projection
SS	97,940	EIS projection
BT	20,765	EIS projection with 2011-12 avg. discard applied
FG	3,630	Projection based on the percentage increase of the sablefish ACL from 2014 to 2015-16, includes IFQ fixed gear.
TAS	10,217	2008-2012 average
TSS	11,989	2008-2012 average

Simulation methods and Scenarios

We performed all simulations with the R statistical program.[15] For each sector, we took the natural logarithm of the annual Spiny Dogfish catch ratios shown in Table B-82, calculated the means and standard deviations for each sector, and then inputted those into R's function for generating lognormal random variables. The lognormal parameters used for each sector are shown in Table B-84, displayed as means and coefficients of variation (CVs). To produce simulated catch in metric tons for each sector, we used the function to generate 100,000 estimates of annual catch ratios and then multiplied them by the total catch amounts displayed in Table B-83.

[15] R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/. Boxplots and time series plots were produced using the ggplot2 package: H. Wickham. ggplot2: elegant graphics for data analysis. Springer New York (2009).

We chose the lognormal probability distribution to model the annual catch ratios in each sector because higher rates of catch in a year would tend to have a multiplicative effect on deviations from average. In addition, the catch ratios only take non-negative values; and, for multiple sectors, the observed catches have large coefficients of variation and are skewed toward higher values than would be expected under a normal, bell-curve. Lognormal distributions are commonly used for random variables having these two characteristics.

Simulating catch in this manner is a statistical/phenomenological approach where the goal is to describe the observed pattern rather than to identify and model the factors or causal process that produce the pattern. The fundamental assumption is that the pattern can described by parameters of a statistical distribution (e.g. mean and standard deviation) and that future annual catches will be drawn from this distribution. In essence, the main assumption is that the future as has the past. This approach is common in many methods used by the GMT and others yet it is an oversimplification to say that Spiny Dogfish bycatch is a random variable that will simply follow a fixed probability distribution over time.

Because of this and the uncertainty in the drivers of Spiny Dogfish bycatch, we explored multiple simulations scenarios based on different probability distributions and parameters. Two are presented here. The first ("Simulation 1") uses all 10 years of data for every sector. The second ("Simulation 2") uses only a subset of those years for sectors where we saw evidence for more recent change in the patterns of Spiny Dogfish catch. The intent of Simulation 2 is to reflect possible change in recent conditions in a few key sectors. The years and corresponding lognormal estimates for the annual Spiny Dogfish catch ratios used in Simulation 2 are displayed in Table B-84.

To arrive at the set of years used in Simulation 2, we evaluated patterns across the ten year time series for each sector (Figure B-44). Welches t-tests were used to compare the Spiny Dogfish catch ratios over the 2003-2007 and 2008-2012 periods as well as a number of other splits of earlier and later time periods where visual evaluation of the time series suggested such differences might exist. Statistically significant differences in the later-year average catch ratios of Spiny Dogfish exist for the non-nearshore fixed gear (2009-2012), bottom trawl (2009-2012), and shoreside whiting sectors (2008-2012).[16]

Other indications of changed trends in these sectors were apparent as well. First, discard patterns of Spiny Dogfish changed substantially after 2008 in the non-nearshore fixed gear sectors. The percentage of total mortality coming from discarded Spiny Dogfish increased in those sectors from an average of 31.5 percent over 2003-2008 to 87.4 percent over 2009-2012. Such a change suggests a major change in the marketability of Spiny Dogfish in that sector after 2008. In addition, log-linear regression on the time series data shows decreasing trends in the bottom trawl and non-nearshore fixed gear sector over 2008-2012. The shoreside whiting sector shows an increasing trend over the full ten years.[17] Based on this evidence, we selected the Simulation 2 set of years with the intent of contrasting the full set of full 2003-2012 period with patterns that may better reflect recent conditions in the fisheries.

[16] *Non-nearshore fixed gear*: -7.04, df = 6.5, p-value < 0.001*; bottom trawl*: t = -4.16, df = 6.3, p-value = 0.005; *shoreside whiting*: t = 2.66, df = 7.11, p-value = 0.03.

[17] *Bottom trawl*: -12.5% per year over 2008-2012, Adj. $R^2 = 0.62$, p = 0.03; *non-nearshore fixed gear sector*: -33.5% per year over 2008-2012, Adj. $R^2 = 0.67$, p = 0.04; *shoreside whiting sector*: +29.8% per year over 2003-2012, Adj. $R^2 = 0.68$, p = 0.002.

Table B-84. Years used in the two simulation scenarios and observed lognormal means and coefficients of variation for each sector.

	Scenario 1	Mean	CV	Scenario 2	Mean	CV
Bottom trawl (BT)	2003 - 2012	0.03568	44.3%	2009-2012	0.02242	33.6%
Fixed Gear (FG)		0.06583	70.3%	2009-2012	0.02806	25.5%
Catcher Processor (CP)		0.00354	272.7%	2003-2012	Same as Scenario 1	
Mothership (MS)		0.00074	136.1%	2003-2012	Same as Scenario 1	
Shoreside Whiting (SS)		0.00130	146.2%	2008-2012	0.00183	74.4%
Tribal At Sea (TAS)		0.01144	33.5%	2003-2012	Same as Scenario 1	
Tribal Shoreside (TSS)		0.00615	244.4%	2003-2012	Same as Scenario 1	

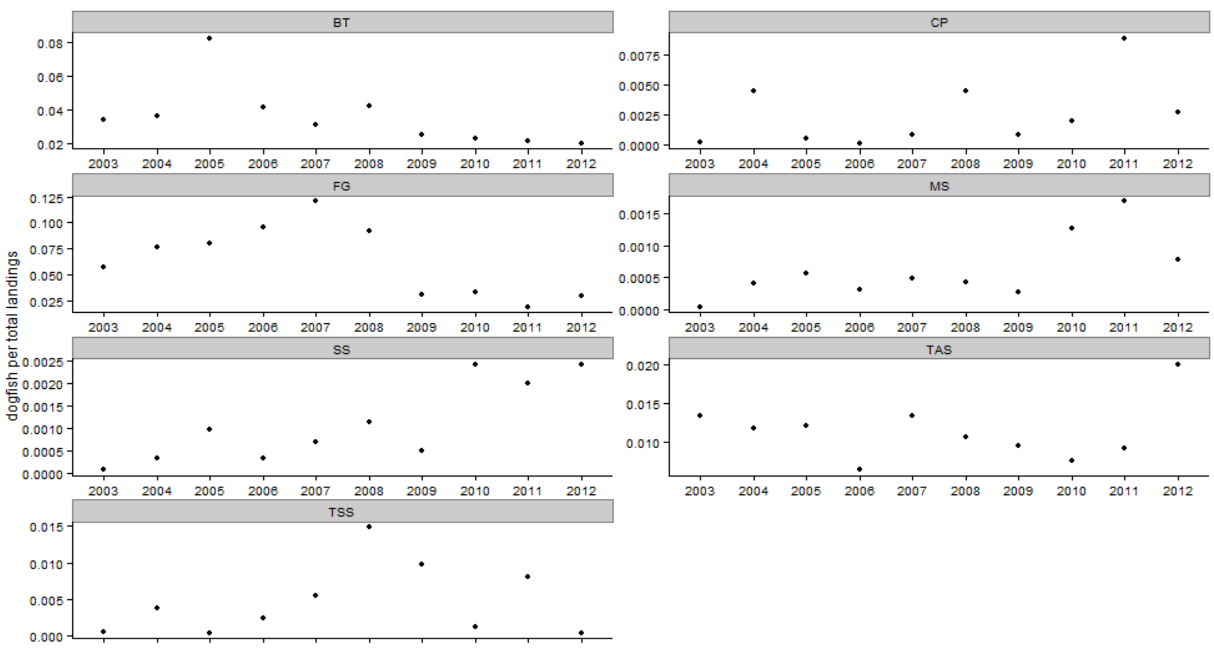

Figure B-44. Ratios of total Spiny Dogfish catch per landings of all stocks by year and sector, 2003-2012, displayed as time series. More recent years in the bottom trawl (2009-2012), non-nearshore fixed gear (2009-2012) and shoreside whiting sectors (2008-2012) show statistically significant differences from the respective early years. No such differences were detected for the other four sectors.

We also evaluated the 2003-2012 time series for correlation between sectors and for serial (a.k.a. auto-) correlation within sectors. As to the latter, the only sector showing serial correlation over 2003-2012 was the non-nearshore fixed gear sector (Durbin-Watson statistic, d = 1.079, p-value = 0.03). Serial correlation describes the situation where difference from the mean value tend follow a pattern across time (i.e. high catch years would be likely to follow one another). This would be of interest here because ACL overages could occur in streaks and mean that, in some periods, overages would occur more often the average probability of an overage would suggest. At the same time, catch would remain below the ACL for streaks as well. The serial correlation in the non-nearshore fixed gear sector is likely due to the change seen after 2008 in discarding (i.e. the above average catch ratios appear in the early part of the 2003-2012 time period and below average values in the later period). We did not attempt to incorporate the serial correlation into the simulations. Comparing Simulation 1 with Simulation 2 allows exploration of the impact of the changed discarding behavior in the sector.

As to correlation in catch among sectors, this too could make overages more likely as high catch years in sectors would tend to occur together. Evaluating the time series, statistically significant correlation did exist between the mothership and shoreside whiting sectors (r = 0.93, $p < 0.001$) over 2003-2012. And marginally significant (at the alpha = 0.05 level) moderately high positive correlation was detected between the At Sea sectors (r = 0.611, p = 0.06) and between the catcher processor sector and shoreside whiting sector (r = 0.610, p = 0.06). We explored the sensitivity of the simulations to these correlation coefficients using a multivariate random number generator. However, the results differed only by roughly 0.5 percent from the results in Simulation 1 and Simulation 2 and so are not shown here as to simplify the presentation.

Simulation Results and Discussion

The results for the No Action scenario for Simulation 1 and Simulation 2 are summarized in Table B-85. The performance metrics shown that table and the tables below include:

- *Avg. total catch (mt)*: the average annual total catch over all simulation runs.
- *% with overages*: the percentage of simulation runs were the annual total catch was greater than 1,897 mt.
- *Avg. overage amount*: the average size of overages in metric tons.
- *Avg. At Sea catch when overage*: the average total catch from the At Sea sectors in runs where there was an overage.
- *% of years At Sea catch >= Set Aside*: the percentage of runs with a total catch greater than 1,897 mt if the At Sea sector was capped e set aside amount (e.g., 163, 300, 500, 725)
- *% of years where 4-year average At Sea Catch >= 1,897*: we computed rolling averages with a window period of 4 years. This statistic reports the number of years where that rolling average was over the ACL.

Table B-85. Simulation results for the No Action scenario. See text for explanation.

	"No Action"				
	Avg. total catch (mt)	% with overages	Avg. overage amount (mt)	Avg. At Sea catch when overage (mt)	% of years where 4-year avg >= 1,187
Sim. 1	1,583	22.6%	421	566	10.9%
Sim. 2	1,212	6.5%	303	1,186	0.1%

While we do not view the simulations as providing precise forecasts, the general pattern they show suggests that overages of the ACL would occur with low to moderate frequency. Under both Simulation 1 and Simulation 2, the total catch of Spiny Dogfish remains below the Preferred Alternative ACL levels for 2015 and 2016 on average. And the frequency of overages in both Simulation 1 and Simulation 2 is lower than the level at which ACL averages of more than one per four-year period become of concern.

To elaborate, considering just the number of overages (i.e. not the magnitude of the overage), the expectation for seeing overages in a 4 year period can be evaluated as binomial probabilities. Table B-86 displays the theoretical binomial probabilities of observing 0-4 overages over a four year period for a range of probabilities of experiencing an annual overage. For example, if the probability of annual overage is 30 percent then we would expect to see exactly one overage 26.5 percent of the time over the four years. And we would expect to see more than one overage 34.8 percent of the time. Therefore, based on the frequency of annual overages in Simulation 1, we would expect to see more than 1 overage less than 20 percent of time in a four year period. And for Simulation 2, we would expect less than a 5 percent chance of seeing more than 1 overage.

The 4-year rolling average statistic reported above was also inspired by the NS1 Guidelines ACL performance standard. More than a simple count of overages, the rolling average gives some sense of the magnitude of overages and is more in line with the SSC's advice about average catch over a multi-year period being the important mark for preventing overfishing. This advice applies especially to a stock like Spiny Dogfish where the harvest control rule takes into account the stock's relatively "slow" population dynamics. Annual overages of the ACL would not be expected to affect the stock's status much. As long as catch stays at or below the ACL on average then the expectations for harvest control rule remain unaffected. As reported in Table B-85, in Simulation 1 the 4-year rolling average is above the ACL only 11 percent of the runs, and in Simulation 2, in only 0.1 percent of the runs. Under the assumptions of the simulation models, we would not expect average catch to deviate too far from the ACL.

To explore the effect of the At Sea set side, we capped the total At Sea catch at each level and calculated the same performance statistics as for the No Action scenario (Table B-87). The general impact of each set aside level can be evaluated by comparing the results to the No Action scenario and to one another. For example, if the At Sea set aside were set at 500 mt then the frequency of overages in Simulation 1 drops by around 5 percent. The other consideration shown is that the At Sea sectors reached that set aside level in roughly 14 percent of the simulation runs. Then at the 300 mt set aside scenario, the percentage of overages drops roughly 3 percent from 500 mt scenario yet the At Sea sectors reached that level in 10 percent more of the simulation runs. The GMT can expand this initial set of performance metrics if the Council wishes to explore the issue further.

Lastly, a portion of the simulation runs produced what we deemed implausibly high results (e.g., catches of Spiny Dogfish reached into the 10,000+ range). We therefore capped the highest value in the simulations at twice the observed maximum catch of Spiny Dogfish, in terms of metric ton, for each sector. The doubling of the maximum catch was thought to be a conservative assumption, yet it does affect the simulation results. As an illustration of the effect, the capping affected roughly 4 percent of the simulation runs for the catcher processor sector. While the capping affected the estimate of the average size of an overage and the average catch for each sector, we do not see much effect on the number of simulated overages. For instance, of the 100,000 runs in the base Simulation 1 only 12 of the catcher processor's capped runs were under the ACL (i.e. 0.012 percent). The GMT may further discuss this capping of the lognormal results at the April meeting.

Table B-86. Theoretical binomial probabilities for the number of overages over a four-year period at various probabilities of an annual overage (e.g., if the annual probability of an overage is 0.25 then the probability of observing more than 1 overage in four years is 26.2 percent).

	Annual prob. of an ACL overage									
Prob. of # of overages:	**0.05**	**0.10**	**0.15**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	**0.45**	**0.50**
0	81.5%	65.6%	52.2%	41.0%	31.6%	24.0%	17.9%	13.0%	9.2%	6.3%
1	17.1%	29.2%	36.8%	41.0%	42.2%	41.2%	38.4%	34.6%	29.9%	25.0%
2	1.4%	4.9%	9.8%	15.4%	21.1%	26.5%	31.1%	34.6%	36.8%	37.5%
3	0.0%	0.4%	1.1%	2.6%	4.7%	7.6%	11.1%	15.4%	20.0%	25.0%
4	0.0%	0.0%	0.1%	0.2%	0.4%	0.8%	1.5%	2.6%	4.1%	6.3%
Prob. > 1 overage	1.4%	5.2%	11.0%	18.1%	26.2%	34.8%	43.7%	52.5%	60.9%	68.8%

Table B-87. Simulation results where the simulated At Sea catch was capped at the four set aside levels examined in this analysis. See text for explanation.

	if set aside = 725 mt			if set aside = 500 mt		
	% with overages	% of years At Sea Catch >= set aside	% of years where 4-year avg >= 1,187	% with overages	% of years At Sea Catch >= set aside	% of years where 4-year avg >= 1,187
Sim. 1	20.2%	8.7%	6.7%	17.7%	14.0%	4.8%
Sim. 2	1.1%	8.9%	0.0%	0.4%	14.3%	0.0%

	if set aside = 300 mt			if set aside = 163 mt		
	% with overages	% of years At Sea Catch >= set aside	% of years where 4-year avg >= 1,187	% with overages	% of years At Sea Catch >= set aside	% of years where 4-year avg >= 1,187
Sim. 1	14.9%	24.7%	3.2%	12.6%	44.0%	2.0%
Sim. 2	0.1%	24.8%	0.0%	0.0%	44.4%	0.0%

Sector-level Patterns and Comparing Simulation 1 and Simulation 2

As shown above, the results between Simulation 1 and Simulation 2 are markedly different. The difference is attributable largely to the changed patterns in the bottom trawl and fixed gear sectors. The magnitude and variability of catch in both to decrease substantially in Simulation 2 as can be seen by comparing the distributions of simulation runs shown in Figure B-45 and Figure B-46. Looking to the bottom trawl sector, the median simulated catch hardly shifts in Simulation 2 (Figure B-45) relative to Simulation 1 (Figure B-46).

The catcher processor sector, in comparison, shows much larger differences in Simulation 2 than Simulation 1 demonstrating that catch in that sector is largely responsible for overage years in Simulation 2. In overage years, the 25th percentile of simulated catcher processor catches is above 1,000 mt. And a large portion of the catcher processor simulated catches in overage years is pushed up against the level at which catch for the sector was capped. This suggests that in the conditions modeled in Simulation 2 extreme catch events in the catcher processor sector are largely what drive total catch above the ACL. Yet overages are less than half as frequent in Simulation 2 as they are in Simulation 1, again, because of the major differences in the mean and standard deviations used for the bottom trawl and non-nearshore fixed gear sectors.

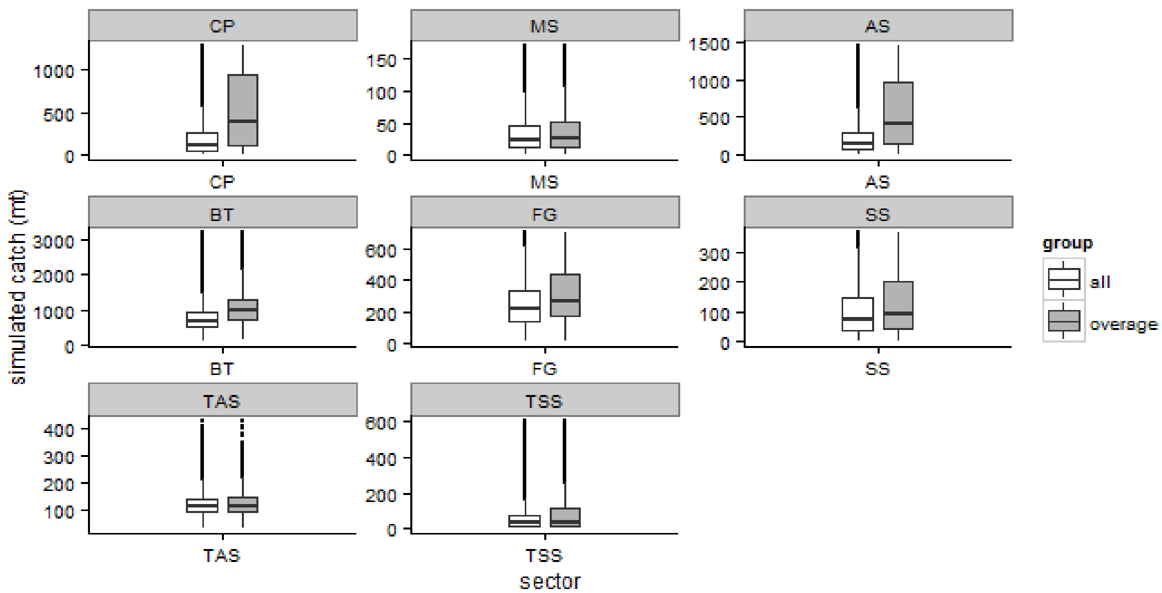

Figure B-45. Simulated catches by sector, including the At Sea sectors combined, for Simulation 1. The shaded boxes include only the simulation runs where the total catch was over the proposed ACL. See Figure B-43 for explanation of boxplots.

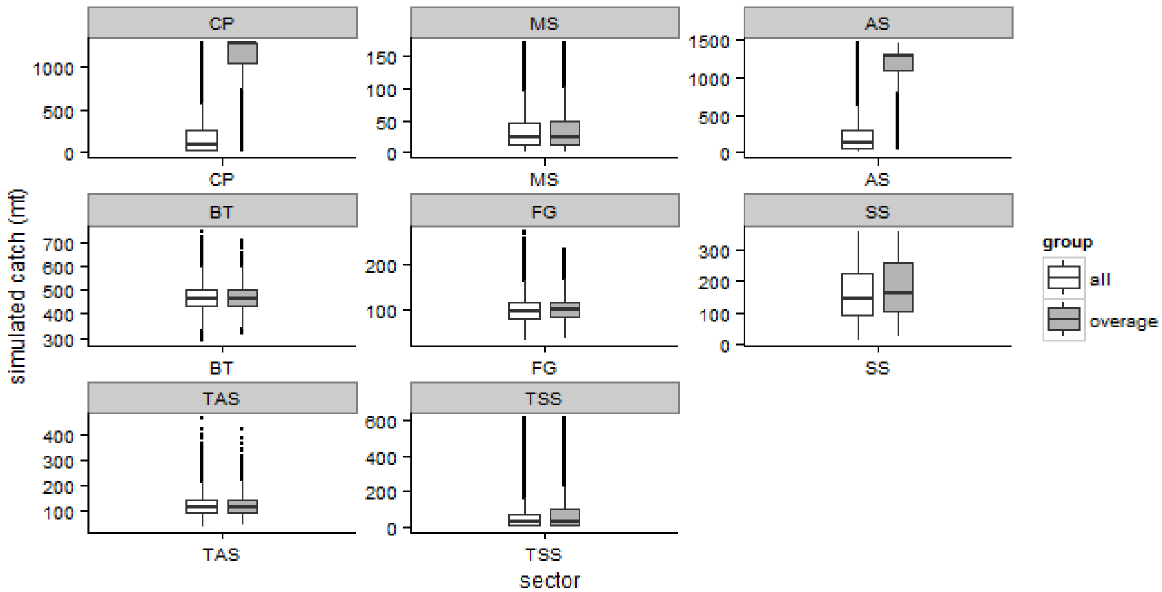

Figure B-46. Simulated catch by sector, including the At Sea sectors combined, for Simulation 2. The shaded boxes include only the simulation runs where the total catch was over the proposed ACL. See Figure B-43 for explanation of boxplots.

Other Analyses Explored

The results presented here are based on the idea that Spiny Dogfish catch in each sector follows a lognormal distribution following the means and standard deviations observed in the past. We also explored using the Gamma probability distribution as the basis for the simulations. The Gamma distribution is also commonly used where coefficients of variation are greater than 50 percent.[18] Without capping the simulated catches as was done in Simulation 1 and Simulation 2, the gamma based simulation using all 2003-2012 observations showed 19 percent of the runs reaching the overage level. This is largely consistent with the Simulation 1 results.

The Gamma and lognormal distributions assume that high catch events are less likely to occur than events closer to the mean. To explore sensitivity to that assumption, we also consider basing the simulations on uniform probability distributions where observed catches were as likely to occur in a year as any other. This approach also showed results that were consistent with Simulation 1 with overages occurring in ~17 percent of the runs. The implied assumption is that annual catch in each sector could be no larger than already observed. While this may be problematic when evaluating sector-level simulated catches, when focused on total catch across all sectors the method is akin to the widely used bootstrap method for evaluating uncertainty in data where the probability distribution is unknown. Again, however, all are based on the assumption that the future will continue to follow the same pattern as in the past.

Lastly, while we did not run multiple simulations to explore the sensitivity to the assumed whiting catches to which the simulated catch ratios are applied, we did explore the issue for the At Sea sectors using the bootstrap methods for calculating confidence intervals. The results are reported in Table B-88 and displayed graphically in Figure B-47 and Figure B-48. The bootstraps and confidence intervals were

[18] Benjamin M. Bolker, Ecological Models and Data in R (2005).

computed using the boot package in R.[19] As in the simulations, the ratios were assumed to follow a lognormal distribution (i.e. the bootstrap replicates calculated the lognormal mean). The confidence intervals shown in Table B-88 were calculated with the BCa method.[20] As that table shows, large whiting catches can push the expected Spiny Dogfish catch higher with the upper 95th percentile intervals skewed high. Initial explorations of the data did not show a statistically significant relationship between total whiting catch and the ratio of Spiny Dogfish catch to total whiting catch (i.e. the average bycatch ratio does not appear to change as a function of how much whiting is caught).

The GMT can incorporate different assumptions about the whiting catch in each sector at or after the April meeting after the 2015 Total Allowable Catch for whiting is determined.

Table B-88. Bootstrap 95 percentile confidence intervals for the ratio of Spiny Dogfish to whiting catch in the catcher processor and mothership sectors applied to four levels of possible whiting catches. See text for explanation.

		Whiting Catch Scenarios			
		2003-12 Avg.	**2003-12 Max.**	**2013**	**2013 + 50%**
CP	**ratio**	*66,964*	*108,200*	*77,950*	*116,925*
Mean	0.0035	237	383	276	414
Lower 95th	0.0016	107	173	125	187
Upper 95th	0.0096	643	1,039	748	1,122
MS	**ratio**	*40,776*	*57,497*	*52,450*	*78,675*
Mean	0.0007	29	40	37	55
Lower 95th	0.0005	20	29	26	39
Upper 95th	0.0014	57	80	73	110
At Sea Combined	Mean	266	423	313	469
	Lower 95th	128	202	151	226
	Upper 95th	700	1,119	822	1,233

[19] Angelo Canty and Brian Ripley (2013). boot: Bootstrap R (S-Plus) Functions. R package version 1.3-9.
[20] DiCiccio, Thomas J., and Bradley Efron. "Bootstrap confidence intervals." Statistical Science (1996).

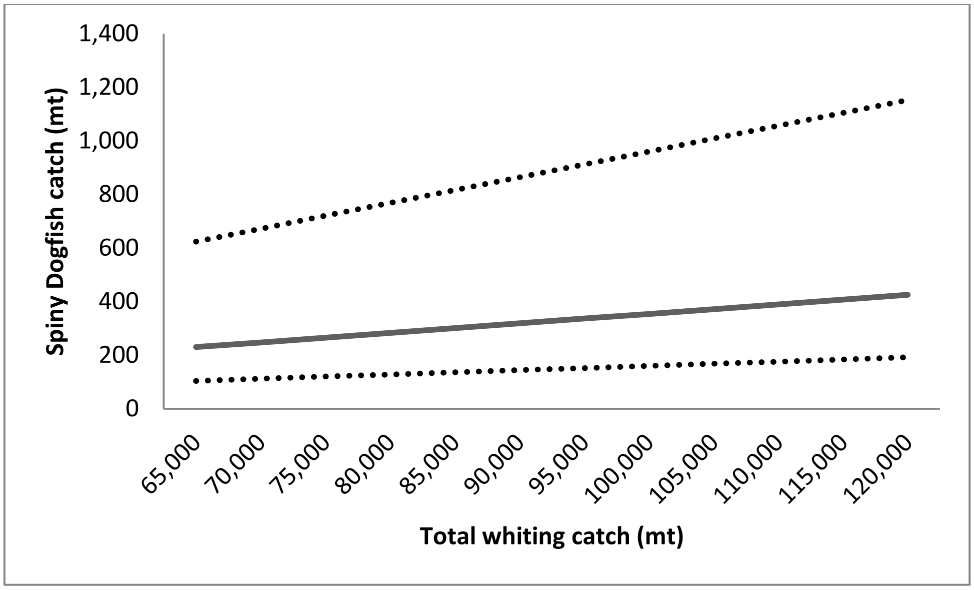

Figure B-47. Spiny Dogfish catch in the catcher processor sector at the mean and 95th percentile levels shown in Table B-87 applied to a range of possible total whiting catches.

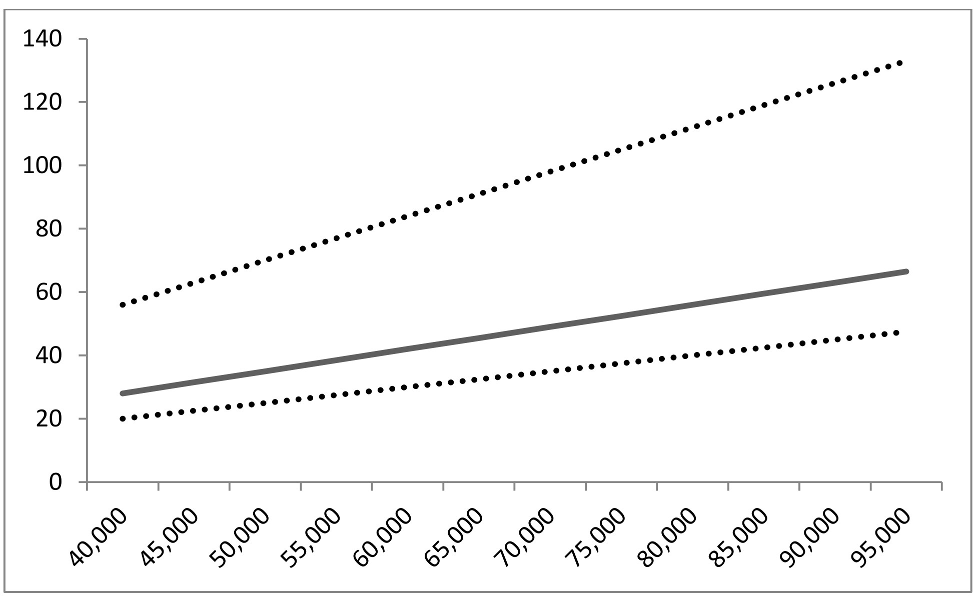

Figure B-48. Spiny Dogfish catch in the mothership sector at the mean and 95th percentile levels shown in Table B-87 applied to a range of possible total whiting catches.

Conclusion

Choosing sector set asides for Spiny Dogfish in such circumstances of high catch variability is challenging compared to situations when catch is stable relative to average levels. These simulations were intended to given the Council a thorough evaluation of variability in catch and how that variability affects: (1) the probability that the Spiny Dogfish will be exceeded and (2) how often the At Sea sector might be expected to reach given levels of an At Sea set aside. The simulation results suggest that the At Sea sectors, mainly the catcher process sector, are major contributors to the risk of ACL overages. However, the simulations also suggest that the risk should be weighed against the variability of catch seen in other sectors with the bottom trawl and non-nearshore fixed gear sectors in particular. If the catches observed in those sectors over 2009-2012 are indicative of what is likely to occur in 2015-2016, then the likelihood of a Spiny Dogfish ACL overage would be low. The GMT may discuss these results and further advise the Council at the April meeting.

B.16 Trawl: Use of excluder devices to reduce catch of rougheye rockfish in non-tribal at-sea and shoreside Pacific whiting fisheries

This analysis evaluates the potential mandatory use of excluder devices for reducing the catch of rougheye rockfish in the non-Tribal at-sea and shoreside Pacific whiting trawl sectors. Alternatives ranged from mandatory use for all trips north of 40° 10′ N latitude, to mandatory use only within limited areas (e.g., areas with highest rougheye rockfish catches). Although this analysis shows that use of excluder devices in these midwater Pacific whiting trawl sectors may reduce the catch of rougheye rockfish, it also shows that these reductions alone may not be enough to prevent exceeding the 2015 component OFL. Numerous assumptions were necessary to perform this analysis. Guidance is sought from various advisory groups (e.g., SSC, GAP, and EC) and the Council regarding these assumptions and to further refine this analysis.

Overview

The National Marine Fisheries Service (NMFS) recommended that the Council analyze removing or reorganizing blackgill, rougheye, and shortraker rockfishes from the minor slope complexes (north and south) because recent average catches (2007-2012) would have exceeded the 2015 OFL contributions for these component species (Agenda Item H.4.b, Supplemental NMFS Report, November 2013). The NMFS believed that management measures applied to address these OFL-contribution overages without removing these species from or reorganizing the slope rockfish complexes may be unnecessarily disruptive to fisheries and result in more complicated regulations. Subsequent Council discussion during the November 2013 meeting resulted in motions to analyze various management measures for reducing catch of rougheye rockfish by west coast commercial fisheries. If proven effective, some of these management measures may reduce the catch of rougheye rockfish (and other slope-rockfish species) with or without removing them from the complexes. One motion was to evaluate the use of excluder devices to reduce the catch of rougheye rockfish in shoreside and at-sea Pacific whiting fisheries (PFMC, Motion 30, November 2013). This analysis focuses on that motion. A hot-spot analysis, designed to identify areas with high catch ratios of rougheye-to-Pacific whiting is also included within this group of management measures, see above. These analyses may be considered collectively.

Background

This report focuses on reducing catch of rougheye rockfish in the non-Tribal at-sea and shoreside-whiting fisheries using bycatch reduction devices (BRDs) that are commonly referred to as excluder devices (e.g., mesh or grid ramps installed in trawls that lead to escape windows). Use of excluder devices to reduce catch addresses species selectivity based on a gear change (i.e., a change in fishing gear that promotes differential selectivity for different species). In this case, the theory is that trawl-gear modifications (e.g., the installation of excluder devices and escape windows) may reduce the catch of rougheye rockfish while minimizing escapement (or loss) of Pacific whiting.

Excluder Devices (general)

Excluder devices, along with escape windows, may be installed in trawls to “sort” fish (and invertebrates) by size and/or species while towing at fishing depth. These devices may take on various designs and shapes, such as rigid or flexible grids/grates/meshes, that “block” the trawl somewhere in front of the codend (e.g., at the fore end of the intermediate), thereby forcing larger individuals or species out of the net through escape windows (e.g., at the top of the trawl) while allowing smaller individuals or species to pass between the bars or meshes and into the codend. Some examples of excluder devices include those placed in shrimp trawls to exclude fishes (Hannah and Jones 2007), bottom trawls to exclude Pacific halibut while retaining groundfish (Lomeli and Wakefield 2013a, 2014), bottom trawls to exclude rockfishes and large roundfishes (e.g., sablefish) while retaining flatfishes (Lomeli (PSMFC) and Wakefield (NMFS-NWFSC), personal communication), and pelagic trawls to exclude salmon and rockfish while retaining most Pacific whiting (Lomeli and Wakefield 2012).

Excluder Devices Tested in Pacific Whiting Fisheries
Initial Trial: Lomeli and Wakefield (2012) described two excluder-device designs that were developed to increase escapement of rockfish and salmon while maintaining the catch of Pacific whiting in pelagic trawls. Although results of this study suggested the potential of these designs for reducing Chinook salmon bycatch, the designs were less effective for reducing the catch of widow rockfish. In addition, the authors described other limitations to this study that included small sample sizes of bycatch species and fishing under non-commercial conditions (i.e., trials were primarily conducted with the terminal end of the codend open).

Second Trial with Improved Results: A pilot study was conducted in 2013 that implemented recommendations made at a collaborative workshop by vessel owners, captains and crew, seafood company operators, regional net manufacturers, and gear researchers (Lomeli and Wakefield 2013b). The workshop participants concluded that a flexible sorting grid showed most promise for an excluder device designed for reducing rockfish bycatch from pelagic trawls targeting Pacific whiting.

The pilot study (Lomeli and Wakefield 2013b) was conducted during 2012 off Oregon and Washington on board a commercial trawl vessel. Results were relatively successful: one design (Design-B) retained a relatively high proportion of Pacific whiting (>93 percent by weight) while reducing the catch of rougheye rockfish by 95 percent, widow rockfish by 83 percent, and yellowtail rockfish by 69 percent (by weight). Note that although the size (length) of Pacific whiting was similar for retained and “escaped” individuals, Pacific whiting encountered during the study were relatively small (mean fork lengths ranged from 36.4 to 40.0 grams, approximately 300 gram fish).

It is important to note that Lomeli and Wakefield (2013b) showed that excluder designs used during this trial were effective only under low-to-moderate fish volumes. When whiting volumes were large, the designs tended to clog and the hauls were aborted early. Tows in this fishery may exhibit catch volumes exceeding 75 mt in less than 30 minutes. For these cases, the excluder design described by Lomeli and Wakefield (2013b) may be ineffective at reducing rougheye rockfish bycatch while maintaining catch levels of target species. This excluder design may be useful for Pacific whiting fishermen during low-to-moderate catch rates, but the authors noted that further refinement of the excluders would be needed to properly function under heavy fish volumes.

Third Trial - Most Promising Results: Additional sea trials were conducted in 2013 to evaluate a new BRD design (Design C) developed to exclude rockfish from pelagic trawls targeting Pacific whiting (Lomeli and Wakefield 2013c; personal communication). During these trials, widow rockfish was the primary rockfish species caught. Results showed their overall bycatch was reduced 26.6 percent by weight. The retention of Pacific whiting was 92.3 percent by weight. Single haul catches of Pacific whiting ranged from 40 to 100 mt. Catches producing over 90 mt of Pacific whiting were observed for haul durations less than 2.5 hours. However, clogging would occur under heaviest fish volumes (i.e., when over 90 mt of Pacific whiting were caught in less than 45 minutes of towing). This excluder design could potentially be useful for Pacific whiting fishermen during moderate-to-high catch rates, but further refinement of the excluder would be needed to properly function under heavy fish volumes.

It was unfortunate that rougheye rockfish and other rockfish species larger than widow rockfish were not encountered during the 2013 trials. The authors of this study suggest that escapement would likely be higher than 26.6 percent for rougheye and other rockfish species that are larger than widow rockfish. Further refinements and testing are needed to improve the performance of this excluder-device design under highest fish volumes (i.e., > 90 mt in less than 45 minutes of towing).

Catch of Rougheye Rockfish – By sector

In order to evaluate any potential effect of this measure to rougheye rockfish mortality, the average catch by sector north of 40° 10´ N latitude was calculated using 2008-2012 WCGOP data (Table B-89). Using these data, non-Tribal at-sea whiting and shoreside whiting catch represent 18.8 percent and 4.7 percent (totaling 23.5 percent) of the rougheye rockfish catch across all sectors. The annual average catch of rougheye rockfish for these sectors combined was 58.8 mt north of 40° 10´ N latitude. Of this 58.8 mt caught by non-Tribal whiting fisheries, 80.1 percent was caught by the at-sea sectors while 19.9 percent was caught by the shoreside whiting fishery. Note that for some cases, inter-annual variation is high within sectors (Table B-89).

Table B-89. Five-year average, minimum, and maximum mortality (mt; 2008-2012) of rougheye rockfish by sector. Data were from WCGOP and includes retained and discarded fish. Note that some landings included a rougheye/shortraker combined category. These combined landings had little effect on sector-specific results, except for the Non-nearshore Fixed Gear sector, where average catch was 72.0 mt (including the rougheye/shortraker category) and 55.9 mt (without the rougheye/shortraker category). These landings do not include blackspotted rockfish.

Sector	5-year Average Catch (mt; 2008-2012)	Min – Max (mt; 2008-2012)
Incidental	0.9	0.3 – 2.2
LE shoreside trawl	90.2	47.7 – 143.8
IFQ Fixed Gear (2011-2012)	18.7	15.6 – 21.7
Nearshore Fixed Gear	0.1	0.0 – 0.05
Non-nearshore Fixed Gear	72.0	41 – 89.1
Non-Tribal At-Sea Pacific Whiting	47.1	8.7 – 78.6
Pink Shrimp	0.0	0 – 0.02
Shoreside Pacific Whiting	11.7	0.6 – 47.1
Tribal At-Sea Pacific Whiting	1.2	0 – 2.9
Tribal shoreside trawl	19.7	15.2 – 33.5

Area of Rougheye Catch by the Non-Tribal At-Sea Whiting Fishery

Table B-89 provides an example of an ongoing analysis intended to identify areas where high or low values of rougheye catch may be clustered spatially during the 2002-2012 time period. More refined results of this analysis and more detail about the methods can be found in section B.13 herein. In Figure B-49, any rougheye rockfish caught on a haul was attributed to a point location, the midpoint of that haul, and hauls that did not catch rougheye were excluded. These points were then evaluated spatially to determine whether there were areas where high catch levels of rougheye were clustered. Figure B-49 shows areas where higher levels of catch are clustered (boxes outlined in green) seaward of 150 – 200 fm and north of the Oregon-Washington border. The largest area with higher catch densities is north of 47^{o} 30' N latitude. Areas with moderate catch densities (empty boxes) are generally seen off the Oregon coast. Areas where lower levels of catch are clustered (boxes outlined in purple) were found to occur south of the Oregon-California border. Relative catch densities of Pacific whiting are also shown in Figure B-49, with highest densities occurring in areas with the darkest shading. Pacific whiting catch is typically highest off of northern Washington and numerous areas along the Oregon coast.

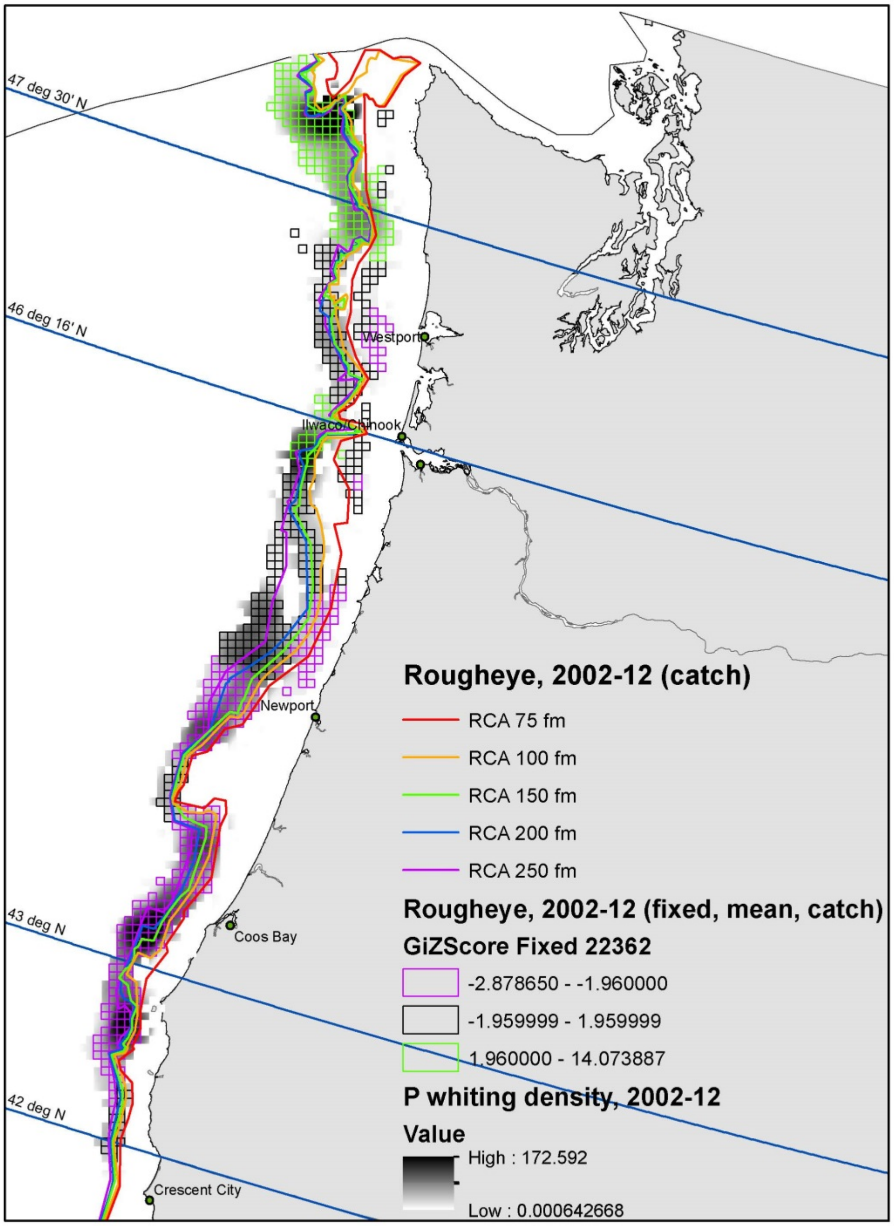

Figure B-49. Catch of rougheye rockfish north of 40° 10´ N latitude by the non-Tribal at-sea whiting sector. Data were acquired from NORPAC (2002-2012). Areas where high levels of catch are clustered are shown by the boxes outlined in green (i.e., north of 47° 30´ N latitude; z-scores greater than or equal to 1.96), moderate catches are shown by the empty boxes, and areas of low catches are shown as boxes outlined in purple (z-scores less than or equal to -1.96). Density plots of Pacific whiting catch are shown in the background (i.e., darkest = highest catch of target species).

More recent catches for rougheye rockfish and Pacific whiting (2008-2012) are shown by depth and area for the non-tribal at-sea whiting sectors (2008-2012) in Table B-90 and Table B-91, respectively. During these years, most rougheye rockfish were caught between 200 fm and 400 fm by the at-sea sectors (Table B-89). Conversely, most whiting catch was also caught over bottom depths ranging from 200 fm and 400 fm (Table B-91). Similar to that shown in Table B-89, although most rougheye rockfish catch by the non-Tribal at-sea whiting sectors occurred off the Washington coast (81.8 percent; Table B-90), whiting catches by these sectors were more evenly distributed between Washington (46.6 percent) and Oregon (51.5 percent; Table B-91).

Table B-90. Rougheye rockfish catch (2008-2012) by area and depth for non-Tribal at-sea Pacific whiting sectors, north of 40° 10′ N. latitude. Average catch (mt) and percentage of catch are shown by depth and area. Data were acquired from NORPAC and include only one code for rougheye rockfish. NoCAL = California north of north of 40° 10′ latitude; NoWA = Washington north of 47° 30′ N. latitude; SoWA = Washington between the Oregon-Washington border and 47° 30′ N. latitude.

(A) Average Rougheye Rockfish Catch (mt), 2008-2012

Bottom depth (fm)	Area				TOTAL
	NoCAL	OR	SoWA	NoWA	
< 100	0.0	0.0	0.0	0.0	0.0
100-200	0.0	0.4	0.0	0.2	0.6
200-300	0.0	4.7	1.7	15.2	21.6
300-400	0.0	2.4	3.4	13.8	19.5
> 400	0.0	1.3	1.1	4.0	6.4
TOTAL	0.0	8.7	6.2	33.2	48.2

(B) Percent Rougheye Rockfish Catch (mt), 2008-2012

Bottom depth (fm)	Area				TOTAL
	NoCAL	OR	SoWA	NoWA	
< 100	0.0%	0.0%	0.0%	0.0%	0.0%
100-200	0.0%	0.8%	0.0%	0.5%	1.3%
200-300	0.0%	9.8%	3.6%	31.5%	44.9%
300-400	0.0%	4.9%	7.0%	28.7%	40.5%
> 400	0.0%	2.7%	2.3%	8.2%	13.2%
TOTAL	0.0%	18.1%	12.9%	68.9%	100.0%

Table B-91. Percentage of Pacific whiting catch by area and depth (2008-2012) for non-Tribal at-sea Pacific whiting sectors, north of 40° 10´ N. latitude. Data were acquired from NORPAC. NoCAL = California north of north of 40° 10´ latitude; NoWA = Washington north of 47° 30´ N. latitude; SoWA = Washington between the Oregon-Washington border and 47° 30´ N. latitude.

Percent Whiting Catch (mt), 2008-2012

	Area				
Bottom depth (fm)	**NoCAL**	**OR**	**SoWA**	**NoWA**	**TOTAL**
< 100	0.0%	0.1%	1.5%	0.9%	2.4%
100-200	0.0%	10.3%	0.9%	5.2%	16.4%
200-300	0.3%	32.0%	3.9%	11.6%	47.9%
300-400	0.6%	7.9%	4.1%	9.4%	22.0%
> 400	0.0%	2.3%	3.7%	5.4%	11.4%
TOTAL	1.0%	52.5%	14.0%	32.6%	100.0%

Management Options

Data shown above was used to evaluate alternatives. The baseline catch (mt) for rougheye rockfish north of 40° 10´ N latitude is shown in Table B-89 for non-Tribal at-sea sectors (47.1 mt) and the shoreside whiting sector (11.7 mt). Proportions of rougheye rockfish catch shown in Table B-90 B were then applied to both the non-Tribal shoreside whiting and at-sea whiting catches (Table B-89) to estimate the contribution of catches by depth and area. Although these percentages were based only on at-sea sector catches, we applied them to the shoreside whiting sector to estimate their catch by area and depth. We were unable to analyze depth- and area-specific WCGOP data for the shoreside whiting sector prior to the deadline for this analysis. If requested by the Council, we can provide more accurate depth-area catches of rougheye rockfish for the shoreside whiting sector by June.

Since shoreside whiting is part of the shoreside IFQ sector (IFQ whiting and non-whiting trawl; IFQ fixed gear), for this analysis, we assumed that vessels declaring Pacific whiting mid-water trawl were part of the shoreside-whiting "sector".

For the action alternatives, we assumed that reductions of rougheye rockfish catch when using excluder devices would be similar among all non-Tribal whiting sectors (i.e., non-Tribal shoreside whiting and non-Tribal at-sea whiting sectors).

Lomeli and Wakefield (2013b; personal communication) provided two "rougheye rockfish escapement percentages", depending on gear design and trial (see above). The most effective design resulted in a 95 percent reduction of rougheye rockfish catch (Lomeli and Wakefield, 2013b); however, that design was prone to clogging at high Pacific whiting catch rates. A second design showed 26.6 percent reduction in catch of widow rockfish, even under high catch rates of Pacific whiting (Lomeli and Wakefield 2013c; personal communication). Unfortunately these latter trials were conducted in areas with no rougheye rockfish. It is likely that exclusion of rougheye rockfish would have been greater than that shown by widow rockfish, because rougheye are typically larger. Hence, for this analysis, we assumed that rougheye rockfish reduction would be 50 percent for non-Treaty at-sea whiting and shoreside whiting sectors (which is between 26.6 percent and 95 percent, but weighted closer to the lower escape percentage). This analysis will assume that that the excluder design (and specifications) are similar to that shown by Lomeli and Wakefield (2013c; personal communication) during the third trial. Specifications for the most appropriate design can be provided by Lomeli (PSMFC) and Wakefield (NOAA).

No Action: Midwater trawl design would be implemented as specified in current regulations, and would be allowed in all areas and periods specified in current regulations. Declaration reports would also be filed as shown in current regulations.

Current regulations do not preclude the use of excluder devices and escape windows by any trawl fishery along the U.S. west coast. Hence, under No Action, excluder devices may be used voluntarily by any of the trawl sectors, if so desired. This voluntary action may reduce the catch of rougheye rockfish by midwater trawl sectors targeting Pacific whiting without additional regulation. However, for this analysis, it is assumed that voluntary use of excluder devices in the various Pacific whiting trawl sectors does not occur, and that fishing behavior will emulate that seen during 2008-2012. It is likely that some voluntary use will occur, and that fishing behavior may change in 2015-2016 relative to the recent past. These changes cannot be easily quantified, however, and are therefore not included in this analysis.
Under no action, it is assumed that the 5-year average (2008-2012) catch of rougheye rockfish will occur, with no impact to whiting catch (Table B-92).

Table B-92. Projected rougheye rockfish catch (mt) under No Action. Catch was estimated as the 5-year average (2008-2012) from WCGOP data.

Variable	Non-Tribal At-Sea Whiting	Non-Tribal Shoreside Whiting	Total
Rougheye Rockfish Catch (mt)	47.1	11.7	58.8 mt
Relative Impact to Whiting Fisheries	None	None	

Option 1 (most restrictive): For all non-Tribal midwater whiting trawl sectors for the area North of 40^{o} 10´ N. latitude, the current regulations would be modified as follows:

(1) The midwater trawl design, as specified under current regulations, would be modified to require excluder devices and escape windows while fishing for Pacific whiting, to increase escapement of rockfish (including rougheye rockfish) while minimizing escapement of Pacific whiting. Specifications to be provided at a later date through consultations with Dr. Waldo Wakefield (NOAA) and Mr. Mark Lomeli (PSMFC), fishing industry representatives, and net manufacturers.
(2) Non-Tribal midwater whiting fisheries (all sectors) shall be allowed in all areas and periods as specified in current regulations, with trawl modifications described in Option 1, (1) above.
(3) Declaration reports would be filed as shown in current regulation.

Under Option 1, it is assumed that 50 percent of the rougheye rockfish encountered by non-Tribal whiting fisheries would escape at fishing depth and survive. Hence, rougheye rockfish catch by these sectors would be 50 percent lower than the 5-year average (or 29.4 mt; Table B-93).

This action would result in some loss of Pacific whiting during each haul (see Lomeli and Wakefield, 2013b,c), and therefore, additional fishing effort (numbers of hauls) may be needed to fully attain quotas. Lomeli and Wakefield (2013c; personal communication) showed that up to 8 percent of Pacific whiting encountered may escape the trawl when using excluder devices, if clogging does not occur. Hence this action may increase towing duration (or number of tows) required to achieve whiting allocations by at least 8 percent. This is likely a low estimate, because a much higher percentage of Pacific whiting might escape the trawl at fishing depth (or released (bled) from the trawl at the surface) when clogging of the excluder device occurs. Finally, although it is uncertain how much fishing time may be lost due to handling and repair requirements when using excluder devices, impacts would be highest under this alternative (Table B-93).

Table B-93. Projected rougheye rockfish catch (mt) under Option 1, where excluder devices would be used for all non-Tribal whiting trips (at-sea and shoreside) north of 40° 10′ N. latitude. Rougheye rockfish catch was estimated as 50 percent of the 5-year average (2008-2012; WCGOP data). Pacific whiting loss may be > 8 percent per haul. Potential impact to whiting fisheries is demonstrated by number of negative symbols (largest impact = most negative symbols); this measure is subjective.

Variable	Non-Tribal At-Sea Whiting (mt)	Non-Tribal Shoreside Whiting (mt)	Total Catch (mt)
Rougheye Rockfish Catch (mt)	23.5	5.9	29.4
Relative Impact to Whiting Fisheries	(----)	(----)	

Option 2: For all non-Tribal midwater whiting trawl sectors and the area North of 40° 10′ N. latitude, if any fishing occurs between the 200 fm RCA and 400 fm "GCA" (to be specified at a later date), then the current regulations would be modified as follows:

(1) The midwater trawl design, as specified under current regulations, would be modified to require excluder devices and escape windows while fishing for Pacific whiting, to increase escapement of rockfish (including rougheye rockfish) while minimizing escapement of Pacific whiting. Specifications to be provided at a later date through consultations with Dr. Waldo Wakefield (NOAA) and Mr. Mark Lomeli (PSMFC), fishing industry representatives, and net manufacturers.
   a. Midwater trawl specifications shown in current regulations (unmodified) would be allowed only if fishing occurred outside of the 200 fm – 400 fm "GCA" (to be determined at a later date) for all hauls during a Pacific whiting declared trip.

(2) Non-Tribal midwater whiting fisheries (all sectors) would be allowed during all periods specified under current regulations, with the additional restrictions shown in Option 2, (1) above.

(3) Declaration reports would be filed as shown in current regulation, but modified to identify the intent of fishing within the "GCA" with an excluder.

Under Option 2, it is assumed that 50 percent of the rougheye rockfish encountered by non-Tribal whiting fisheries when using excluder devices would escape at fishing depth and survive. The highest estimate of rougheye rockfish mortality under this scenario would be to assume that all fishing within the 200 – 400 fm "GCA" north of 40° 10′ N. latitude is conducted with excluder devices installed (and these trips would not venture outside of the "GCA"). Consequently, it follows that all sets made outside of the "GCA" would be conducted without an excluder device. In actual practice, those declaring to fish inside the "GCA" with an excluder would likely make some tows outside of the GCA with the excluder during the same trip. In addition, it is likely that some individuals may voluntarily use excluders even if no hauls are made inside a "GCA". Hence, under the worst-case scenario (i.e., reductions only applied to rougheye catch inside the "GCA"), 33.6 mt of rougheye rockfish would be caught (Table B-94): 26.9 mt by the at-sea whiting sectors and 6.7 mt by the shoreside whiting trips (see Table B-90 for proportions among sectors).

This action would result in some loss of Pacific whiting during each haul when excluders are used (see Lomeli and Wakefield, 2013b,c), and therefore, additional fishing effort (numbers of hauls) may be required to fully attain the whiting quota. Lomeli and Wakefield (2013c; personal communication) showed that up to 8 percent of Pacific whiting encountered may escape the trawl when using excluder devices, if clogging does not occur. Table B-91 shows that 69.6 percent of the Pacific whiting is caught between 200 and 400 fm. Hence this action may increase towing duration (or number of tows) required to achieve whiting allocations by at least 5.6 percent (on average across all areas and depths). This is likely a low estimate, because a much higher percentage of Pacific whiting will escape the trawl when clogging of the excluder device occurs. In addition, some hauls will likely be made outside of the 200 – 400 fm "GCA" with the excluder device installed. Finally, it is uncertain how much fishing time may be lost due to handling and repair requirements when using excluder devices, but this additional impact is likely (Table B-94).

Table B-94. Projected rougheye rockfish catch (mt) under Option 2, where excluder devices would be used for non-Tribal whiting trips (at-sea and shoreside) made between 200 – 400 fm and north of 40^{o} 10′ N. latitude. Rougheye rockfish catch was estimated as 50 percent of the 5-year average (2008-2012; WCGOP data) when excluder devices were used, and 100 percent of the 5-year average when excluder devices were not used. Projected rougheye rockfish catch is divided between at-sea whiting (80.1 percent) and shoreside whiting (19.9 percent). Pacific whiting loss may be > 5.6 percent per haul (on average for all depths combined). Potential impact to whiting fisheries demonstrated by number of negative symbols (largest impact = most negative symbols); this measure is subjective.

Variable	Non-Tribal At-Sea Whiting (mt)	Non-Tribal Shoreside Whiting (mt)	Total Catch (mt)
Rougheye Rockfish Catch (mt)	26.9	6.7	33.6
Relative Impact to Whiting Fisheries	(--)	(--)	

Option 3: For all non-Tribal midwater whiting trawl sectors, if any fishing occurs between the 200 fm RCA and 400 fm GCA (to be specified at a later date) and north of 46^{o} 16′ N. latitude, then the current regulations would be modified as follows:

(1) The midwater trawl design, as specified under current regulations, would be modified to require excluder devices and escape windows while fishing for Pacific whiting, to increase escapement of rockfish (including rougheye rockfish) while minimizing escapement of Pacific whiting. Specifications to be provided at a later date through consultations with Dr. Waldo Wakefield (NOAA) and Mr. Mark Lomeli (PSMFC), fishing industry representatives, and net manufacturers.
   a. Midwater trawl specifications shown in current regulations (unmodified) would be allowed only if fishing occurred outside of the 200 fm – 400 fm "GCA" (to be determined at a later date) for all hauls during a Pacific whiting declared trip.

(2) Non-Tribal midwater whiting fisheries (all sectors) would be allowed during all periods specified under current regulations, with the additional restrictions shown in Option 3, (1) above.

(4) Declaration reports would be filed as shown in current regulation, but modified to identify the intent of fishing within the "GCA" with an excluder.

Under Option 3, it is assumed that 50 percent of the rougheye rockfish encountered by non-Tribal whiting fisheries when using excluder devices would escape at fishing depth and survive. The highest estimate of rougheye rockfish mortality under this scenario would be to assume that all fishing within the 200 – 400 fm "GCA" north of 46^{o} 16′ N. latitude would be conducted with excluder devices installed (and these trips would not venture outside of the "GCA"). Consequently, it follows that all sets made outside of the "GCA" would be conducted without an excluder device. In actual practice, those declaring to fish inside the "GCA" off Washington with an excluder would likely make some tows outside of the GCA with the excluder during the same trip. In addition, it is likely that some individuals may voluntarily use excluders even if no hauls are made inside of a "GCA". Hence, under the worst-case scenario (i.e., reductions only applied to rougheye catch inside the "GCA"), 38.0 mt of rougheye rockfish would be caught (Table B-95): 30.4 mt by the at-sea whiting sectors and 7.6 mt by the shoreside whiting trips (see Table B-90 for proportions among sectors).

This action would result in some loss of Pacific whiting during each haul that excluder devices were used (see Lomeli and Wakefield, 2013b,c), and therefore, additional fishing effort (numbers of hauls) may be required to catch quotas. Lomeli and Wakefield (2013c; personal communication) showed that up to 8 percent of Pacific whiting encountered may escape the trawl when using excluder devices, if clogging does not occur. Table B-91 shows that 29 percent of the Pacific whiting is caught north of 46° 16′ N latitude and between 200 and 400 fm. Hence this action may increase towing duration (or number of tows) required to achieve whiting allocations by at least 2.3 percent (on average across all areas and depths). This is likely a low estimate, because a much higher percentage of Pacific whiting will escape the trawl when clogging of the excluder device occurs. In addition, some hauls will likely be made outside of the 200 – 400 fm "GCA" when fishing north of 46° 16′ N latitude with the excluder device installed. Finally, it is uncertain how much fishing time may be lost due to handling and repair requirements when using excluder devices, but this additional impact is likely (Table B-95).

Table B-95. Projected rougheye rockfish catch (mt) under Option 3, where excluder devices would be used for non-Tribal whiting trips (at-sea and shoreside) made between 200 – 400 fm for declared trips north of 46° 16′ N. latitude. Rougheye rockfish catch was estimated as 50 percent of the 5-year average (2008-2012; WCGOP data) when excluder devices were used, and 100 percent of the 5-year average when excluder devices were not used. Projected rougheye rockfish catch is divided between at-sea whiting (80.1 percent) and shoreside whiting (19.9 percent). Pacific whiting loss may be > 2.3 percent per haul (on average for all depths combined). Potential impact to whiting fisheries demonstrated by number of negative symbols (largest impact = most negative symbols); this measure is subjective.

Variable	Non-Tribal At-Sea Whiting (mt)	Non-Tribal Shoreside Whiting (mt)	Total Catch (mt)
Rougheye Rockfish Catch (mt)	30.4	7.6	38.0
Relative Impact to Whiting Fisheries	(-)	(-)	

Option 4: For all non-Tribal midwater whiting trawl sectors, if any fishing occurs north 47° 30′ N. latitude (all depths), then the current regulations would be modified as follows:

(1) The midwater trawl design, as specified under current regulations, would be modified to require excluder devices and escape windows while fishing for Pacific whiting, to increase escapement of rockfish (including rougheye rockfish) while minimizing escapement of Pacific whiting. Specifications to be provided at a later date through consultations with Dr. Waldo Wakefield (NOAA) and Mr. Mark Lomeli (PSMFC), fishing industry representatives, and net manufacturers.

   a. Any declared trips south 47° 30′ N. latitude (where all tows during the declared trips would be made) would not require a rockfish excluder.

(2) Non-Tribal midwater whiting fisheries (all sectors) would be allowed during all periods specified under current regulations, with the additional restrictions shown in Option 4, (1) above.
(3) Declaration reports would be filed as shown in current regulation, but modified to identify the intent of fishing within the "GCA" with an excluder.

Under Option 4, it is assumed that 50 percent of the rougheye rockfish encountered by non-Tribal whiting fisheries when using excluder devices would escape at fishing depth and survive. The highest estimate of rougheye rockfish mortality under this scenario would be to assume that all fishing within "GCA" (i.e., north of 46^{o} 16´ N. latitude) would be conducted with excluder devices installed (and these trips would not venture outside of the "GCA"). Consequently, it follows that all sets made outside of the "GCA" would be conducted without an excluder device. In actual practice, those declaring to fish inside the "GCA" off Washington with an excluder would likely make some tows outside of the "GCA" with the excluder during the same trip. In addition, it is likely that some individuals may voluntarily use excluders, even if no hauls are made inside a "GCA". Hence, under the worst-case scenario (i.e., reductions only applied to rougheye catch inside of "GCAs"), 38.6 mt of rougheye rockfish would be caught (Table B-96): 30.9 mt by the at-sea whiting sectors and 7.7 mt by the shoreside whiting trips (see Table B-90 for proportions among sectors).

This action would result in some loss of Pacific whiting during each haul that excluder devices were used (see Lomeli and Wakefield, 2013b,c), and therefore, additional fishing effort (numbers of hauls) may be required to catch quotas. Lomeli and Wakefield (2013c; personal communication) showed that up to 8 percent of Pacific whiting encountered may escape the trawl when using excluder devices, if clogging does not occur. Table B-91 shows that 32.6 percent of the Pacific whiting is caught north of 47^{o} 30´ N latitude at all depths. Hence this action may increase towing duration (or number of tows) required to achieve whiting allocations by at least 2.6 percent (on average across all areas and depths). This is likely a low estimate, because a much higher percentage of Pacific whiting will escape the trawl (or be released (bled) from the trawl at the surface) when clogging of the excluder device occurs. In addition, some hauls will likely be made outside "GCA" with the excluder device installed. Finally, it is uncertain how much fishing time may be lost due to handling and repair requirements when using excluder devices, but this additional impact is likely and would be lowest among the action alternatives (Table B-96).

Table B-96. Projected rougheye rockfish catch (mt) under Option 4, where excluder devices would be used for non-Tribal whiting sector (at-sea and shoreside) trips declared north of 47^{o} 30´ N. latitude (all depths). Rougheye rockfish catch was estimated as 50 percent of the 5-year average (2008-2012; WCGOP data) when excluder devices were used, and 100 percent of the 5-year average when excluder devices were not used. Projected rougheye rockfish catch is divided between at-sea whiting (80.1 percent) and shoreside whiting (19.9 percent). Pacific whiting loss may be > 2.6 percent per haul (on average for all depths combined). Potential impact to whiting fisheries demonstrated by number of negative symbols (largest impact = most negative symbols); this measure is subjective.

	Non-Tribal At-Sea Whiting (mt)	Non-Tribal Shoreside Whiting (mt)	Total Catch (mt)
Rougheye Rockfish Catch (mt)	30.9	7.7	38.6
Relative Impact to Whiting Fisheries	(-)	(-)	

Biological Impacts
This analysis demonstrated that rougheye rockfish caught by non-Tribal at-sea and shoreside Pacific whiting sectors may range from 58.8 mt (No Action) to 29.1 mt (Option 1; Table B-97). Other options

were explored, where excluders would be required only on trips where at least one haul was conducted within specific depth ranges exhibiting highest rougheye rockfish catch (i.e., between 200 and 400 fm, "GCA") and/or within specific latitude ranges (i.e., north of 47^o 30' N latitude; Table B-97) regardless of depth. Option 1 provided the largest rougheye rockfish savings but would also result in the most wide-spread use of excluder devices and highest escapement of Pacific whiting across the fleets (i.e., excluders would be required for all trips north of 40^o 10′ N latitude). Rougheye rockfish catch for Options 2 – 4 are up to 9 mt higher than that shown for Option 1, but substantially lower than shown under No Action. It is important to note that there is virtually no difference in rougheye rockfish catch (or whiting escapement) between Options 3 and 4 (Table B-97). Option 3 would require excluders along the entire Washington coast when fishing is anticipated to occur between 200 and 400 fm (within the "GCA"), whereas Option 4 would require excluders only be used when fishing occurs north of 47^o 30' N latitude (all depths).

The 2015 and 2016 component OFLs for rougheye rockfish north of 40^o 10' N latitude are 201.9 mt and 206.8 mt. The five-year average catch (2008-2012) by all fisheries (250.1 mt; Table B-89) would exceed this 2015 component OFL by 48.2 mt under No Action. Options 1 – 4 may reduce the catch of rougheye rockfish by 20.2 mt (Option 4) to 29.4 mt (Option 1). These reductions alone may not be enough to prevent exceeding the 2015 component OFL for rougheye rockfish north of 40^o 10' N latitude (i.e., 201.9 mt), or the 2015 component OFL coastwide (i.e., 206 mt). It is important to note that these projections are based on 5-year average catches. Annual projections could be much higher (or lower), if minimum or maximum historical catch values were used, or if some upper or lower percentile for catches were applied to the projection. In addition, including more or fewer years for the baseline average may change interpretations.

Impacts to whiting and bycatch species that escape the trawl under Options 1 –4 relative to No Action are uncertain. The potential mortality for those species escaping the trawl through the escape windows is unknown and would be unaccounted. Escapement at fishing depth of both whiting and bycatch species could be much higher than shown under Options 1 – 4 if clogging of the BRD occurs. Furthermore, if clogging occurs, it is likely that some fish may have to be bled at the surface before bringing the net up the trawl ramp. Mortality for fish bled at the surface would likely approximate 100 percent. These fish would be accounted for by 100 percent observer coverage.

Table B-97. Summary of biological and socio-economic impacts by alternative. The "relative impact to whiting fisheries" is a subjective measure, with no quantitative basis.

Alternative	Excluder Requirement	Rougheye Rockfish Catch (mt)	Projected Additional Whiting Escapement (%)	Relative Impact to Whiting Fisheries
No Action	None	58.8	0.0%	No Impact
1	North 40^o 10′ N latitude (all depths)	29.4	> 8.0%	(----)
2	North 40^o 10′ N latitude (200-400 fm)	33.6	> 5.6%	(---)
3	North 46^o 16′ N latitude (200-400 fm)	38.0	> 2.3%	(--)
4	North 47^o 30′ N latitude (all depths)	38.6	> 2.6%	(-)

Socioeconomic Impacts

The expense incurred by purchasing flexible excluders for shoreside midwater trawls (and trawls for catcher vessels in the at-sea whiting fishery) may approximate $22,000, based on research gear-related expenses (Lomeli (PSMFC) and Wakefield (NOAA), personal communication). These BRDs are built within a straight tube of netting designed to be inserted (i.e., zippered) between the intermediate section of the trawl and the packer/stuffing tube forward of the codend. The price for catcher-processor (C/P) trawls will likely be higher, because the trawls are larger.

Relative impacts by alternative are shown in Table B-97. Implementation of a new gear regulation requiring use of excluder devices in midwater whiting trawls for non-Tribal at-sea and shoreside whiting sectors may reduce the catch efficiency for whiting (i.e., there will be some additional escapement), increase net handling time (e.g., if fish and debris need to be removed forward of or from the excluder after each haul), and require net modifications. For example, when clogging occurs, the vessel may have to bleed or release fish from the net until the volume at the clog can be brought up the stern ramp without further damaging the intermediate section of the trawl net in front of the excluder. The time required to bleed fish, the economic loss of fish bled from the net, and repair costs to the net will likely represent economic impacts. Since these trips are 100 percent observed, fish bled from the net at the surface would be deducted from the quota. It is uncertain how often this may occur. At any rate, each of these outcomes may increase the operating costs of fishing operations. In addition, reduced efficiency may result in additional hauls and time at sea to attain the quota of Pacific whiting. Additional time at sea equates to not only additional expense, but also additional exposure to hazards.

The most complex regulations may be the most difficult (and expensive) to enforce. Note that some analyses focused on use of excluders only under a single condition (i.e., north or south of a specific latitude), whereas others incorporated both latitudinal split and depth requirements (i.e., 200 – 400 fm). The latter requirements would clearly be the most complex to manage.

Discussion and Considerations

For this report, five options were provided for consideration (including No Action). Additional options may be considered after input from the public and advisory groups (e.g., GAP, EC, SSC, and GMT). Council guidance is needed to refine this analysis (i.e., add and/or delete options). For example, gear regulations are difficult to define and enforce, hence, comments from the EC (and all advisory groups) must be weighed when considering regulatory changes to fishing gear. In addition, regulatory complexity is highest when regulating by latitude and depth, versus regulating by latitude only.

For options where midwater trawls with excluders are required for fishing within specific areas or depths (i.e., to legally fish within a “GCA”), the Council may consider recommending measures to minimize complexity for enforcement. Some examples include: (a) intended fishing trips within these special “GCAs” must be declared prior to leaving port, which would require a new declaration category in regulation, and (b) only a midwater trawl with a legal excluder device installed may be onboard during trips where any hauls occur inside a “GCA” (i.e., no other trawl may be onboard).

If regulations are adopted that define new fishing gear (i.e., installation of an excluder device and escape windows), the regulation could be specific only where needed to ensure adequate escapement of rockfishes at fishing depth. Specificity could be minimal and only apply to the most important aspects of the excluder and escape windows (e.g., length and width of grids within a panel that allow passage of whiting while blocking the passage of larger rockfish). Different sizes of vessels and different operators may require different designs (i.e., placement within the trawl due to different types of nets, etc.). It may be advantageous if fishermen were allowed the flexibility to fine-tune the device for their specific net and fishing operations to ensure that whiting escapement is minimal while maximizing escapement of rockfish. It would be beneficial for experts to convene to help draft regulatory language that ensures appropriate escapement along with adequate flexibility. In addition to NMFS regulatory writers and

Council staff, these experts may include Pacific whiting vessel owners/operators (shoreside whiting vessels, catcher vessels, and catcher/processors), net manufactures, and researchers.

For this draft, impacts were estimated using a 5-year average catch of rougheye rockfish in non-Tribal at-sea and shoreside Pacific whiting fisheries. Other averages could be used (e.g., 6-year average, which would reduce the baseline value for rougheye rockfish catch). It has also been suggested that the average and a range (e.g., minimum and maximum catches over a longer time period) be used to estimate rougheye rockfish impacts. This would provide some measure of risk that the Council may evaluate when selecting alternatives. If this measure moves forward, we seek guidance from the SSC and the Council regarding bycatch amounts that may be most appropriate for projecting catches of rougheye rockfish among alternatives (i.e., 5-year average, 6-year average, 75^{th} percentile, etc.).

Interannual variability may result in different outcomes than predicted here. Annual catches of rougheye rockfish are highly variable (see Table B-89). This variability may be due to areas and times that fishing occur (e.g., fishing occurs where Pacific whiting may be most abundant, and this may change from year to year depending on environmental conditions). In addition, Pacific whiting ACLs vary annually, which may directly impact the amount of fishing effort. Finally, sizes of Pacific whiting may vary annually. For example, the majority of the Pacific whiting catch in 2013 was age 3, which approximates individual weights of about 360 grams and lengths of 36-38 cm. In 2014, the majority of Pacific whiting catch is expected to be age 4, which are typically 40-43 cm and may average approximately 500 g. It is likely that larger Pacific whiting may exhibit higher escapement than smaller individuals when using excluder devices. This information collectively illustrates that encounter rates with rougheye rockfish will likely vary from year to year, and retention (or escapement) of Pacific whiting may vary depending on clogging rates and sizes of Pacific whiting available (e.g., larger Pacific whiting may exhibit highest escapement when using excluder devices).

Fishermen behavior should be considered when selecting alternatives. Fishing strategies may change if stock complexes are reorganized, or if consequences of exceeding component OFLs become recognized. Fishermen may voluntarily use excluder devices when fishing in areas with known high concentrations of rougheye rockfish, or may avoid these areas all together if consequences of catching rougheye rockfish are high. On the other hand, fishermen may be more inclined to fish within areas of high rougheye rockfish concentrations if excluder devices selectively enhance their escapement from trawls.

It is important to note that research results are always tenuous. Sample sizes are typically small (i.e., number of vessels, types of vessels, fishing areas, bycatch species encountered, etc.). The effectiveness of a new gear design is uncertain until applied to the commercial fishery under purely commercial conditions. Furthermore, research results described here were conducted on shoreside-whiting vessels. The net types used by these vessels are similar to those used by catcher vessels in the mothership sector. However, nets used by C/Ps are much larger. The design, cost, and effectiveness may be much different for C/Ps. Input from the GAP and others is necessary to help elucidate potential costs and benefits among sectors.

Finally, the potential escapement rate for rougheye rockfish using excluders was assumed to be 50 percent, which was less than the midpoint between rougheye rockfish escapement during Trial 2 (= 95 percent escapement by weight) and widow rockfish escapement during Trial 3 (= 26 percent escapement by weight). There were no rougheye rockfish available to the trawl during Trial 3. The authors of the excluder research projects point out that rougheye rockfish, which are generally larger than widow rockfish, would exhibit higher escapement than widow rockfish using the excluder devices. Guidance is sought from the SSC regarding the most appropriate assumption for rougheye rockfish escapement when excluder devices are used.

To summarize, the socio-economic and biological impacts may be more (or less) than described here. The pros and cons of applying research results to regulation should be considered. Input from the public and advisory groups will be paramount when considering this management measure.

B.17 Non-Trawl: Sablefish Trip Limits under the Harvest Specifications Alternatives

As described in Section B.10, a range of sablefish trip limits for the limited entry and open access sectors were explored under the sablefish ACL alternatives (Preferred, Alternative 1, and Alternative 2). Section B.10 details the Preferred Alternative whereas the sections below detail the analysis for trip limits under Alternatives 1 and 2.

B.17.1 Alternative 1 – Sablefish Trip Limits

Alternative 1, P*0.45 for 2015

*Trip limits and projected impacts under Alternative 1, P*0.45 for 2015*

The trip limit structures in 2016 under Alternative 1 for each fishery are presented in Table B-98. Differences between the Alternative 1 and No Action limits also appear in the table. Trip limits are higher under Alternative 1 than for No Action. Higher limits were needed to influence similar attainment, under the higher shares. Differences range from zero for bimonthly and weekly limits and 20 pound higher daily limits in the OA South fishery, to 375 lb per two months higher in the LE North fishery. The daily limit in the OA North fishery does not change among the alternatives.

Table B-98. Trip limits under Alternative 1, No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2015. Limits are in lb of landed catch per time period listed.

		2015 Alt. 1, P*0.45			2014 No action trip limits			Difference		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	3,225	1,075	NA	2,850	950	NA	375	125	NA
OA	**N**	1,900	950	300	1,600	800	300	300	150	0
LE	**S**	NA	2,125	NA	NA	2,000	NA	NA	125	NA
OA	**S**	3,200	1,600	320	3,200	1,600	300	0	0	20

Projected landings, attainment, and remainder amounts under Alternative 1 are presented in Table B-99. The same values for the No Action Alternative are also presented in the table, as well as the differences between these two alternatives.

Attainment rates are very similar between Alternative 1 and No Action, with the exception of the OA North fishery, for reasons explained in the No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is consistently higher under Alternative 1 than No Action; between 25.9 mt and 73.8 mt higher, due to the higher trip limits which were produced, in order to influence similar attainment under the higher landed shares of Alternative 1.

Table B-99. Model-projected landings under Alternative 1, No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2015. Landed shares and projected landings are in metric tons (mt).

2015 Alt. 1, P*0.45	LE N	OA N	LE S	OA S	South sum
Projected landings	230.3	380.0	511.6	327.0	838.6
Landed share	247	406	555	451	1,006.0
Percent attainment	93%	94%	92%	72%	83%
Difference	16.7	26.0	43.4	124.0	167.4
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	25.9	63.4	73.8	47.3	121.1
Landed share	33.0	87.0	72.0	58.0	130.0
Percent attainment	-2%	-6%	2%	1%	1%
Remainder	7.1	23.6	-1.8	10.7	8.9

Alternative 1, P*0.45 for 2016

Trip limits and projected impacts under Alternative 1, P=0.45 for **2016***

The potential trip limit structures for 2016 under Alternative 1 are presented in Table B-100 for each fishery. Differences between the Alternative 1 and No Action limits also appear in the table. Trip limits are substantially higher under Alternative 1 than for No Action. Higher limits were needed to influence similar attainment, under the higher shares. Differences range from 30 lb per day higher for the OA South, to 675 lb per two months higher in the LE North fishery. The daily limit in the OA North fishery does not change among the alternatives.

Table B-100. Trip limits under Alternative 1, No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2015. Limits are in lb of landed catch per time period listed.

		2016 P*=0.45			2014 No action trip limits			Difference		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	3,525	1,175	NA	2,850	950	NA	675	225	NA
OA	**N**	2,050	1,025	300	1,600	800	300	450	225	0
LE	**S**	NA	2,200	NA	NA	2,000	NA	NA	200	NA
OA	**S**	3,300	1,650	330	3,200	1,600	300	100	50	30

Projected landings, attainment, and remainder under the Alternative 1 are presented in Table B-101. The same values for the No Action Alternative, and the differences between these two alternatives, are also presented in the table.

Attainment rates are very similar between Alternative 1 and No Action, with the exception of the OA North fishery, for reasons explained in No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is consistently higher under the Alternative 1 than No Action; between 47.6 mt and 121.8 mt higher, due to the higher trip limits which were produced in order to influence similar attainment under the higher landed shares of the this alternative.

Table B-101. Model-projected landings under Alternative 1, No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2016. Landed shares and projected landings are in metric tons (mt).

2016 Alt. 1, P*0.45	LE N	OA N	LE S	OA S	South sum
Projected landings	252.0	413.9	559.6	361.9	921.6
Landed share	269	443	606	492	1,098.0
Percent attainment	94%	93%	92%	74%	84%
Difference	17.0	29.1	46.4	130.1	176.4
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	47.6	97.2	121.8	82.2	204.0
Landed share	55.0	124.0	123.0	99.0	222.0
Percent attainment	-2%	-6%	2%	2%	2%
Remainder	7.4	26.8	1.2	16.8	18.0

B.17.2 Alternative 2 – Sablefish Trip Limits

Alternative 2, P*=0.25 for 2015

Trip limits and projected impacts under Alternative 2, P=0.25 for* ***2015***

The trip limit structures in 2015 under Alternative 2 are presented in Table B-102 for each fishery. Differences between the Alternative 2 and No Action limits also appear in the table. Trip limits are generally lower under Alternative 2 than for No Action. Lower limits were needed to influence similar attainment, under the lower shares. Differences range from zero, no difference in weekly or bimonthly limits, for the OA North, to 225 lb per two months lower in the LE North fishery. The daily limit in the OA North fishery does not change among the alternatives.

Table B-102. Trip limits under Alternative 2, the No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2015. Limits are in lb of landed catch per time period listed.

		2015 Alt. 2, P*0.25			2014 No action trip limits			Difference		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	2,625	875	NA	2,850	950	NA	-225	-75	NA
OA	**N**	1,600	800	300	1,600	800	300	0	0	0
LE	**S**	NA	1,975	NA	NA	2,000	NA	NA	-25	NA
OA	**S**	3,000	1,500	300	3,200	1,600	300	-200	-100	0

Projected landings, attainment, and remainder under the Alternative 1 are presented in Table B-103. The same values for the No Action Alternative, and the differences between these two alternatives, are also presented in the table.

Attainment rates are very similar between Alternative 2 and No Action with the exception of the OA North fishery, for reasons explained in the No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected ranges between slightly higher to slightly lower under Alternative 2 than No Action; between no difference and 17.2 mt lower, due to the similar to lower trip limits, which were produced in order to influence similar attainment under the different landed shares of the this alternative.

Table B-103. Model-projected landings under Alternative 2, the No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2015. Landed shares and projected landings are in metric tons (mt).

2015 Alt. 2, P*0.25	LE N	OA N	LE S	OA S	South sum
Projected landings	189.5	316.7	424.0	262.5	686.4
Landed share	202	333	455	370	825.0
Percent attainment	94%	95%	93%	71%	83%
Difference	13.0	16.8	31.0	107.5	138.6
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	-14.9	0.0	-13.9	-17.2	-31.1
Landed share	-11.5	14.5	-28.0	-23.0	-51.0
Percent attainment	-2%	-4%	3%	0%	1%
Remainder	3.4	14.5	-14.1	-5.8	-19.9

Alternative 2, P*=0.25 for 2016

Trip limits and projected impacts under Alternative 2, P=0.25 for* ***2016***

The trip limit structures for 2016 under Alternative 2 are presented in Table B-104 for each fishery. Differences between the Alternative 2 and No Action limits also appear in the table. Trip limits are lower in some cases, but more often are slightly higher under Alternative 2 than for No Action. Different limits were needed to influence similar attainment, under the different shares. Differences range from -100 lb per two months for the OA South, to 100 lb per two months lower in the LE North fishery. The daily limit in the OA North fishery does not change among the alternatives.

Table B-104. Trip limits under Alternative 2, the No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2016. Limits are in lb of landed catch per time period listed.

		2016 Alt. 2, P*0.25			2014 No action trip limits			Difference		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	2,925	975	NA	2,850	950	NA	75	25	NA
OA	**N**	1,700	850	300	1,600	800	300	100	50	0
LE	**S**	NA	2,050	NA	NA	2,000	NA	NA	50	NA
OA	**S**	3,100	1,550	310	3,200	1,600	300	-100	-50	10

Projected landings, attainment, and remainder under the Alternative 1 are presented in Table B-105. The same values for the No Action Alternative, and the differences between these two alternatives, are also presented in the table.

Attainment rates are very similar between Alternative 2 and No Action with the exception of the OA North fishery, for reasons explained in the No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is slightly higher under Alternative 2 than No Action; between 5.1 mt and 28.6 mt higher. This is due to the trip limits which were produced in order to influence similar projected attainment under the higher landed shares of this alternative.

Table B-105. Model-projected landings under Alternative 2, the No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2016. Landed shares and projected landings are in metric tons (mt).

2016 Alt. 2, P*0.25	LE N	OA N	LE S	OA S	South sum
Projected landings	209.4	337.1	466.4	293.8	760.3
Landed share	223	367	503	409	912.0
Percent attainment	94%	92%	93%	72%	83%
Difference	13.6	29.9	36.6	115.2	151.7
No Action					
Projected landings	204.4	316.7	437.8	279.7	204.4
Landed share	214	319	483	393	214
Percent attainment	95%	99%	91%	71%	95%
Remainder	9.6	2.3	45.2	113.3	9.6
Difference					
Projected landings	5.1	20.5	28.6	14.1	42.7
Landed share	9.0	48.0	20.0	16.0	36.0
Percent attainment	-2%	-7%	2%	1%	1%
Remainder	3.9	27.5	-8.6	1.9	-6.7

Uncertainty surrounding future ex-vessel prices in the LE North fishery

The main axis of uncertainty in the LE North fishery was ex-vessel price. This is one predictor in the model, and projected landings depend upon assumptions regarding future prices. We addressed this by showing three scenarios for projected landings according to potential ex-vessel price, for each of the alternatives.

The current 2014 projection for the LE North fishery assumes a uniform seasonal ex-vessel price throughout 2014, at the current 2013 bimonthly average ex-vessel price of $2.57 per pound. Assumptions about ex-vessel price in the LE North fishery under the alternatives are shown in Table B-106 and Table B-107. From 2004 through 2011, the bimonthly price followed a predictable seasonal pattern, peaking with the highest prices ever in fall of 2011. However, during 2012 and 2013, that pattern disappeared, and was replaced with one of general decline, following the 2011 boom. However, current landings data show some small increases in prices, and some market reports tell of a potential recovery for the sablefish market, to an unknown degree. Thus, a working assumption of a uniform seasonal price was assumed for projections, since the beginning date, and extent of a potential recovery is not known with any certainty.

Uncertainty in the forecasted landings in this fishery is bracketed by using the lowest and highest bimonthly price during 2013. Projected attainment under the alternatives using the low price was between 86 and 88 percent, and for the high price, projected attainment was between 99 and 101 percent of the landed share (Table B-106 and Table B-107).

Table B-106. Forecasted landings and attainment for 2015, under different assumptions about ex-vessel sablefish price, for each of the alternatives, in the LE North DTL fishery.

	2013 low price	**2013 avg. price**	**2013 high price**
LE N, No Action	**2.38**	**2.57**	**2.71**
Projected landings	187.3	204.4	216.9
Landed share	214	214	214
Percent attainment	88%	95%	101%
Difference	26.7	9.6	-2.9
LE N, Preferred Alternative			
Projected landings	202.0	219.7	232.8
Landed share	236	236	236
Percent attainment	86%	93%	99%
Difference	34.0	16.3	3.2
LE N, Alt. 1, P*0.45			
Projected landings	212.0	230.3	243.7
Landed share	247	247	247
Percent attainment	86%	93%	99%
Difference	35.0	16.7	3.3
LE N, Alt. 2, P*0.25			
Projected landings	173.1	189.5	201.5
Landed share	202	202	202
Percent attainment	86%	94%	100%
Difference	28.9	12.5	0.5

Table B-107. Forecasted landings and attainment for 2016, under different assumptions about ex-vessel sablefish price, for each of the alternatives, in the LE North DTL fishery.

	2013 low price	2013 avg. price	2013 high price
LE N, No Action	187.3	204.4	216.9
Projected landings	214	214	214
Landed share	88%	95%	101%
Percent attainment	26.7	9.6	-2.9
Difference	187.3	204.4	216.9
LE N, Preferred Alternative			
Projected landings	222.3	241.0	254.8
Landed share	258	258	258
Percent attainment	86%	93%	99%
Difference	35.7	17.0	3.2
LE N, Alt. 1, P*0.45			
Projected landings	232.8	252.0	266.1
Landed share	269	269	269
Percent attainment	86%	93%	99%
Difference	37.2	18.0	3.9
LE N, Alt. 2, P*0.25			
Projected landings	192.1	209.4	222.2
Landed share	223	223	223
Percent attainment	86%	93%	99%
Difference	31.9	14.6	1.8

B.18 Non-Trawl: Remove or Modify the Commercial Gear Restrictions for Flatfish

Overview

The current commercial gear restriction for the “Other Flatfish” complex in the waters off California reads, “South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches).” The intent of this management measure was initially to prevent bycatch of overfished rockfish while fishing for members of the “Other Flatfish” complex including Pacific sanddab. Similar regulations in place in the recreational fishery, which uses similar vertical hook and line gear, were removed because they did not provide additional protection, as originally intended. Bycatch rates when targeting Pacific sanddabs and “Other Flatfish” are very low irrespective of the gear employed, thus gear restrictions are not needed to limit bycatch. Removal or liberalization of gear restrictions would simplify regulations and allow the fixed gear fleet to effectively target and attain trip limits of ”Other Flatfish”.

Background

Starting in 2004, gear restrictions were implemented for the commercial and recreational fisheries to allow some risk adverse targeted fishing opportunity for Pacific sanddabs inside the RCA, while minimizing bycatch of overfished species. In 2009, the analogous gear restriction on the recreational fishery was removed because encounter rates with overfished species in the fishery were so low that gear restrictions did not provide additional protection, as originally intended. In subsequent years removal of the gear restrictions in the recreational fishery have not resulted in a noticeable increase in overfished species impacts. The Council also considered removing the gear restriction from the commercial fishery in 2011, but it was not implemented due to initial concerns regarding potential for incidental take of petrale sole – a stock which had recently been declared overfished (Agenda Item I.4.b, Supplemental GMT Report 2, April 2010).

The Council has again requested analysis of removing the gear restriction in the California commercial fixed gear fishery south of 42° N latitude to enable fishery participants to more efficiently target "Other Flatfish", particularly Pacific sanddabs. In addition to the No Action Option, three other options were analyzed to bracket the potential range of regulatory modifications for Council consideration. These include maintaining the gear restriction but modifying the weight and number of hooks allowed (Option 2); eliminating the gear restriction and prohibiting access to the groundfish conservation areas (GCAs) (Option 3); and eliminating the gear restriction while still allowing fishing in GCAs, but adding a landing limit to prevent species other than "Other Flatfish" from being retained while fishing in the GCAs (Option 4).

Summary of Options

Option 1: No Action – maintain gear restrictions on fishing for "Other Flatfish" and maintain access to the Groundfish Conservation Areas (GCA), which includes the Cowcod Conservation Areas (CCA), Farallon Islands, Cordell Bank, and RCAs. Only allow "Other Flatfish" in the GCA to be retained when the specified gear is used.

Option 2: Modify the gear restriction to eliminate weight restriction and limit the number of hooks to no more than 300 hooks per set and use of a maximum of 600 hooks per vessel using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches). Maintain access inside the RCA. Prohibit access to the CCA, Farallon Islands and Cordell Bank when targeting the "Other Flatfish" complex. Only allow "Other Flatfish" to be retained in the RCA when the specified gear is used.

Option 3: Eliminate the gear restriction on fishing for "Other Flatfish", while prohibiting fishing within the GCA~~s~~.

Option 4: Eliminate the gear restrictions and allow fishing within the GCA when targeting "Other Flatfish". Add a landing restriction preventing the landing of any species other than the "Other Flatfish" complex while in possession of "Other Flatfish".

Data
Commercial fixed gear state landing receipt data from historical data (1995-1999) from California waters were used to examine catch composition prior to regulation and provide proxy bycatch rates for trips targeting Pacific sanddab (>50 percent of landings composed of Pacific sanddabs). Recent state landing receipt data (2008-2012) were used to evaluate recent catch composition and bycatch rates. Raw WCGOP onboard sampling data from (2003-2011) were examined, but insufficient data was available to inform recent bycatch rates.

Comparison of Options

Option 1: No Action

Under Option 1 (No Action), the current gear restrictions would remain in place. Fishing inside GCAs for "Other Flatfish" is only allowed when using this gear.

Fishing Activity in Commercial Fixed Gear Fisheries under Option 1

An average of 150 trips per year were made between 2008 and 2012 in California that targeted Pacific sanddabs[1]. California scorpionfish was the next most common species composing 9.6 percent of the landings, almost exclusively caught south of Point Conception. Examination of landing receipts from recent years 2008-2012 indicates that 86 percent of landings from trips that targeted Pacific sanddab were composed of Pacific sanddabs. The landings of each remaining species landed composed less than 0.8 percent of the total indicating that most other species were relatively uncommon when targeting Pacific sanddab. This indicates that the primary target within the "Other Flatfish" is Pacific sanddabs and limited bycatch accrues with the current fishing activity. In addition, the remaining species within the "Other Flatfish" are not common in the catch when targeting Pacific sanddab (<0.01 mt of any one species) and thus assumed to be relatively uncommon and/or primarily caught as incidental take while pursuing other species.

In part, the limited effort exerted in targeting "Other Flatfish" may be due to an inability to efficiently harvest Pacific sanddab under the current gear restrictions. Of the non-trawl sectors, the recreational fishery accounts for the majority (79.7 mt, 92 percent) of mortality; commercial and recreational fisheries combined 86.5 mt, less than 9 percent of the 986.5 mt non-trawl allocation on average. Under the current regulations on the "Other Flatfish" complex, mortality from the fixed gear fleet averaged 7.2 mt in 2011-2012, less than one percent of the total the non-trawl allocation of 986.5 mt. Currently the trip limit for the "Other Flatfish" complex in the limited entry fishery is "5000 lb./month", while in the open access fishery the trip limit is "3,000 lb./month, no more than 300 lb. of which may be species other than Pacific sanddabs". The hook and weight restrictions in place prevent the deployment of longline gear and relegate the fishery to vertical hook-and-line fishing, which limits the ability of the limited gear fishery to attain the trip limits.

No data on the distribution of effort in state vs. federal waters are available from Vessel Monitoring System (VMS) declarations or log books. Given the differences in bathymetry with distance from shore along the coast, fishing in state or federal waters may be more prevalent in some areas than others. The proportion of the grounds in state or federal waters depends on the distance of the primary depth distribution of "Other Flatfish" species from shore in each area. When depth changes abruptly with distance from shore, effort may be more focused in state waters; whereas gradual changes in bathymetry may result in more effort exerted in federal waters. The depth distribution of species in the "Other Flatfish" complex indicates that all species except rex sole are predominantly distributed in depths shallower than other federally-managed flatfish species including petrale sole (Table B-108, Love 1996).

The "Other Flatfish" are almost exclusively fished over soft bottoms where encounters with overfished rockfish species and other rocky reef species are exceedingly uncommon, negating concern regarding bycatch while fishing within the GCA, as long as gear is deployed over soft bottom when targeting members of the "Other Flatfish" complex. In addition, retention of groundfish species occurring over rocky reef habitat is prohibited in GCAs, thus removing the impetus to target them. Lastly, the hooking and handling discard mortality rate for petrale sole is expected to be 7 percent when rod and reel is used[21], thus flatfish discarded due to prohibition on retention in the RCA are expected to experience relatively low mortality.

[21] http://www.pcouncil.org/groundfish/current-season-management/past-management-cycles/2009-2010-final-environmental-impact-statement/, pg. 307.

Table B-108. Depth distribution and habitat preference of component species in the "Other Flatfish" complex (Love 1996).

Species	Common Depth	Depth Range	Habitat Preference
Sand Sole	<50 fm	1 - 284 fm	Soft
Rock Sole	<50 fm	0 - 316 fm	Pebble, semi-rocky
Butter Sole	25 - 60 fm	9 - 234 fm	Soft
Pacific Sanddab	25 - 75 fm	0 - 300 fm	Soft
Curlfin Sole	NA	24 - 291 fm	Soft
Flathead Sole	<100 fm	3 -300 fm	Soft
Rex Sole	50 -200 fm	0 - 475 fm	Soft

Biological Impacts under Option 1

Projected "Other Flatfish" Mortality

The fixed gear fishery took an average of 7.2 mt or 0.7 percent of the non-trawl allocation coastwide in 2011 and 2012 (Table B-109) and similar tonnage is expected to accrue in the fixed gear fisheries under the No Action Option. The majority of the mortality in the "Other Flatfish" complex is from Pacific sanddab comprising 89.6 percent of the total. Under the No Action option, mortality of "Other Flatfish" would be expected to be the same as in recent years, assuming trip limits for other co-occurring target species and fishing behavior do not change.

Table B-109. Average mortality the "Other Flatfish" complex coastwide in the recreational and commercial fixed gear fisheries by sector from 2011-2012. (source: West Coast Groundfish Total Mortality reports)

Species	Average Fixed Gear Mortality (mt)	Average Recreational Mortality (mt)	Ave Non- Trawl Mortality Total (mt)	Percent Mortality from Fixed Gear
Butter Sole	0.00	0.01	0.01	0%
Curlfin Turbot	0.00	0.00	0.00	NA
Flatfish Unid	0.12	3.87	3.99	3%
Flathead Sole	0.50	0.00	0.50	100%
Pacific Sanddab	5.12	72.34	77.46	7%
Rex Sole	0.18	0.00	0.18	100%
Rock Sole	0.08	1.24	1.32	6%
Sand Sole	0.28	2.28	2.55	11%
Sanddab Unid	0.97	0.00	0.97	100%
Total	7.24	79.73	86.47	8%

Projected Overfished Species Mortality

Commercial landings from fixed gear trips between 2008 and 2012 targeting Pacific sanddabs, indicate that less than 0.1 percent of the catch was composed of petrale sole (<0.01 mt on average) and bocaccio

(<0.01 mt on average). The resulting bycatch rates relative to landings of sanddabs are 0.0005 mt of petrale sole per ton of sanddab and 0.001 mt of bocaccio per ton of sanddab. No canary rockfish, yelloweye rockfish or cowcod were observed in the landings in large part due to prohibition on their retention. Attempts to analyze discard data from the WCGOP were unsuccessful since very few records of sampled trips targeting Pacific sanddab were available. Historical landing receipt data from 1994 to 1999 when rockfish retention was allowed, showed that less than 0.01 mt each of canary rockfish, yelloweye rockfish, bocaccio or cowcod were landed when targeting Pacific sanddabs, and only 0.06 mt of petrale sole was taken on average. The contribution to overfished species impacts from fixed gear fishery participants targeting "Other Flatfish" are expected to be extremely low and compose a small fraction of the total given the bycatch rates observed in the absence of gear restrictions in the past.

Additional mortality on petrale sole is not expected to be negligible since they cannot be retained within the non-trawl RCA, are typically found in depths greater than those occupied by the "Other Flatfish" and discards are expected to have a low mortality rate since they do not suffer from barotrauma. In addition, bycatch rates for petrale sole in state landing receipt data (1994 to 1999) were exceedingly low while targeting sanddabs. This indicates that effort will be focused on shallower depths to target sanddabs and deeper waters where petrale sole are more commonly encountered will be avoided (Table B-108, Love 1996).

Fishery participants infrequently encounter overfished species while targeting sanddabs and species in the "Other Flatfish" complex since gear is deployed over soft bottoms where cowcod, canary rockfish, yelloweye rockfish and bocaccio are extremely rare and in depths shallower than the primary depth distribution of petrale sole.

Data Uncertainty

Historical landing receipt data from 1994 to 1999 for trips targeting Pacific sanddabs were used as a proxy for bycatch rates may over-project mortality due to the possibility that gear was set over rocky reef habitats in addition to sandy bottoms where Pacific sanddabs are found on the same set or different sets on the same trip. This would bias bycatch rates high compared to what might accrue when fishing only over soft bottom to target Pacific sanddabs. The landings data used to calculate these "bycatch rates" are from landings rather than total catch, so some of the small or unmarketable fish discarded on the trip may not accounted for in the landings. In addition, the recent landing receipts used to evaluate current bycatch rates do not provide an accurate projection of bycatch for prohibited species since their retention is prohibited and not reflected in landings data. The estimated mortality for 2011 and 2012 from WCGOP may be biased high relative to impacts from California since they are coastwide including mortality in Oregon and Washington as well.

Stock Status

<u>"Other Flatfish" Complex</u>

The "Other Flatfish" complex is comprised mainly of unassessed stocks. A full assessment conducted in 2013 for Pacific sanddab indicated the stock status was healthy at 96 percent of its unfished spawning stock biomass. Despite not being adopted for use in management, it was acknowledged that this stock was extremely healthy.

<u>Overfished Species</u>

The depletion of each overfished species in 2013 was as follows, cowcod (34 percent), bocaccio (31 percent), canary rockfish (24 percent), yelloweye rockfish (22.3 percent) and petrale sole (22 percent). While cowcod, bocaccio, canary and yelloweye rockfish, and petrale sole have been historically encountered while targeting Pacific sanddabs, bycatch rates have been extremely low. Thus mortality from the targeting of "Other Flatfish" does not contribute appreciably to the aggregate mortality of overfished species and is not expected to adversely affect their stock status or rebuilding progress.

Socioeconomic Impacts under Option 1
The current gear restrictions prevent the fixed gear fishery from being able to effectively harvest healthy "Other Flatfish" stocks. Thus gear restrictions would continue to prevent the fixed gear fishery from attaining monthly trip limits. Forgone yield of Pacific sanddabs or other species in the "Other Flatfish" complex due to the gear restrictions would prevent fishery participants and coastal communities from more fully benefiting from increased ex-vessel revenue.

Option 2

Under Option 2, the gear restriction would be modified to eliminate weight restriction and limit the number of hooks to no more than 300 hooks per set and use of up to 600 hooks per vessel using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches). In addition, access to the rockfish conservation area would be maintained, but prohibit access to the CCA, Farallon Islands and Cordell Bank when targeting the "Other Flatfish" complex. Lastly, only "Other Flatfish" could be retained when fishing in the RCA with the specified gear onboard.

Change in Fishing Activity Compared to Option 1
Hook size restrictions would still be less than size 2 hooks, which are not expected to affect efficiency, but will maintain selectivity for smaller mouthed flatfish species. As a result of removing the weight restriction fishery participants may employ longline gear instead of or in addition to vertical hook-and-line gear deployed with rod and reel as the primary means of fishing. The 12 hook per line restriction would be replaced with a more liberal restriction of no more the 300 hooks per set and use of no more than 600 hooks per vessel. The gear restriction changes are intended to increase efficiency in targeting "Other Flatfish" while maintaining an impetus to focus effort where the target species is likely to reside, on soft bottom, which might be otherwise lost if a hook restriction on the number of hooks was removed completely making placement of gear less discriminant. The restriction on the number of hooks may also motivate participants to check their gear frequently to retrieve their catch, which may reduce mortality on encountered bycatch species. Vessels would still have access to fish in the RCA where adult sanddab habitat is often distributed depending on the bathymetry of the region. Fishing in the waters around the Farallon Islands and Cordell Bank as well as the CCA would be prohibited. Allowing only retention of other flatfish while fishing in the RCA with the proscribed gear will remove the impetus to fish near hard substrate where bycatch of overfished species may occur.

The proposed actions would increase the efficiency of vessels targeting "Other Flatfish" while maintaining precautionary limitations on the number of hooks, areas that can be fished and species that can be retained to focus effort on areas with soft bottoms where overfished species are uncommon. Under this alternative, effort is expected to increase as the opportunity would be more profitable than under the No Action alternative. The magnitude of the increase in participation is difficult to anticipate since there is an open access component to the fishery. The sub-trip limit of no more than 300 lb per month for "Other Flatfish" species other than Pacific sanddabs may not provide much of an incentive to target the remaining species. Thus effort is expected to be focused on Pacific sanddabs, which data indicate can be targeted with negligible bycatch. Closure of the small areas around the Farallon Islands, Cordell Banks and habitat residing within the CCA are unlikely to adversely affect participation since areas in the RCA hold sufficient adult Pacific sanddab biomass to allow productive targeting. Closure of these smaller areas is intended to focus effort on areas with large expanses of soft bottom habitat, preventing bycatch of rocky reef species.

Biological Impacts Compared to Option 1
<u>Other Flatfish Mortality</u>

The mortality of component species in the “Other Flatfish” complex under Option 2 is expected to increase relative to Option 1, given the increase in the number of allowable hooks. If participation also increases, mortality would be expected to be even higher but still within the non-trawl allocation. “Other Flatfish” effort from the fixed gear fishery would have to increase by more than 10 fold to exceed the non-trawl allocation assuming a twelve fold increase in capacity with 48 hooks (for four rods with 12 hooks each) vs. a 600 hook restriction, while accounting for recent mortality in the recreational fishery in 2011 and 2012. The projection may be biased high considering that some of the catch expanded by the increased capacity originated from Oregon and Washington where the current gear restrictions would not change.

Overfished Species Mortality

Under this option, overfished species mortality was estimated using a combination of historical and recent landings data to inform how much, if any, increase in mortality would be expected as a result of increasing the number of allowable hooks. Given the paucity of WCGOP data and the biases with recent data (i.e., non-retention of some OFS), historical data from a time period when rockfish and sanddabs could be retained on the same trip was used as a proxy to estimate bycatch rates of OFS. This historical bycatch rate was then applied to the allowable take of sanddabs to estimate the OFS mortality that could be expected assuming the entire non-trawl allocation of 327.7 mt Pacific sanddabs after subtracting recent recreational mortality is taken by the commercial fixed gear fishery. Since retention of bocaccio and petrale sole is currently allowed, recent bycatch rates were calculated and used to estimate OFS mortality assuming the entire Pacific sanddab contribution to the non-trawl allocation of is utilized.

Historical data revealed higher bycatch rates of rockfish taken with Pacific sanddabs in recent years though the rates were still negligible. This is not unexpected given that regulations at the time permitted mixed trips (i.e., targeting hard bottom and soft bottom species on the same trip). Applying these higher bycatch rates to recent data increases impacts of OFS relative to No Action (Table B-110). The actual mortality may be lower since these estimates assume attainment of the entire sanddab non-trawl allocation. This analysis is simply meant to highlight the maximum bycatch expected given target species allocations and even under this extreme example, OFS impacts would still be low, especially when compared to sources of mortality from other sectors.

Although projected mortality using recent bycatch rates could only be calculated for bocaccio rockfish and petrale sole, these projections better inform what is more likely to occur out on the water for these two species. Projected mortality for both of these stocks, assuming full attainment of Pacific sanddabs, is at least half of that calculated using historical bycatch rates.

Overall, mortality of overfished species under Option 2 is expected to be similar to Option 1. Though the total mortality may increase slightly due to the increase in number of hooks, bycatch rates on a per hook basis are extremely low and not expected to increase; therefore any increased mortality if realized is expected to be negligible.

Table B-110. Comparison of projected mortality of overfished species in the fixed gear fishery while targeting Pacific sanddabs and other flatfish in recent years (2008-2012) and historically (1994-1999) prior to gear restrictions. Projected mortality is based on full attainment of the non-trawl allocation (after accounting for recreational mortality).

Species	Recent Bycatch Rate	Projected Mortality assuming recent bycatch rate(mt)	Historical Bycatch Rate	Projected Mortality assuming historical bycatch (mt)
Canary	NA	NA	0.00056	0.18
Yelloweye	NA	NA	0.00011	0.04
Bocaccio	0.00116	0.38	0.00197	0.65
Cowcod	NA	NA	0.00087	0.29
Petrale	0.00047	0.16	0.01703	5.58

Data Uncertainty Compared to Option 1

The uncertainties noted under Option 1 relative to the data also apply under Option 2. In addition, there is greater uncertainty in participation. While it was assumed that all of the remaining non-trawl allocation of Pacific sanddabs is taken after accounting for recreational catch, mortality may be lower as market conditions may prevent sufficient effort from being exerted to reach attainment.

Stock Status

Other Flatfish

Mortality of other flatfish would be expected to increase compared to Option 1, but is expected to be far below the non-trawl allocation, let alone the ACL. Thus, the stock status is not expected to be affected.

Overfished Species

Under Option 2 no changes in stock status and rebuilding progress are expected compared to Option 1.

Socio-economic Impacts compared to Option 1

Allowing greater capacity through an increase in the number of hooks and eliminating weight restrictions allowing the use of longlines, would make the fishery more efficient and increase revenue. This would provide an additional facet to the portfolio of fishing opportunities available to the fixed gear fleet during periods when more profitable opportunities are unavailable. The revenue from additional landings would provide increased income to coastal communities.

Option 3

Under Option 3 the gear restrictions on fishing for "Other Flatfish" would be eliminated and fishing within the GCAs would be prohibited.

Change in Fishing Activity Compared to Option 1

Under Option 3, there would be no restriction on the number or size of hooks or the weights used in targeting "Other Flatfish," but access inside the GCAs would not be permitted. Since most adult sanddabs are found in depths deeper than those open the shoreward RCA line in most management regions (except south of Point Conception), fleet behavior would likely be affected under this option. Although vessels could catch sanddabs more efficiently if the gear restriction is removed, they would not be able to access waters inside the RCA where the target species is found; thus fishing activity is likely to be lower compared to Option 1.

Biological Impacts Compared to Option 1

Other Flatfish Mortality

In areas north of Point Conception the shoreward fixed gear RCA is 30 fm or shallower, and grounds in deeper waters where adult sanddabs are available would be inaccessible. Thus the ability to harvest sanddabs efficiently with hook-and-line gear would be limited by a lack of access to adult Pacific sanddab habitat in deeper waters within the RCA north of Point Conception. Though the magnitude of reduction is difficult to determine, if RCAs are closed to fishing, effort and mortality are expected to decrease under this option.

Overfished Species Mortality

Mortality of overfished species under Option 3 is expected to be lower than Option 1 because vessels would be excluded from fishing inside RCAs where the few encounters would be expected to occur. If effort were directed to shallower depths, in targeting members of the other flatfish complex, mortality rates of what few overfished rockfish are encountered are expected to be reduced due to the lower barotrauma experienced in shallower depths. Any increase in mortality resulting from eliminating the gear restriction would be offset by lack of access inside the RCAs north of Point Conception. South of Point Conception, the shoreward RCA line is 60 fm allowing access to adult Pacific sanddab, thus mortality of cowcod and bocaccio may increase slightly compared to Option 1 as a result of increased efficiency with the elimination of gear restrictions. The aggregate mortality is expected to increase only slightly as the encounter rates are extremely low in any case.

Data Uncertainty Compared to Option 1

An additional uncertainty relative to Option 1 is whether effort would decrease substantially due to a lack of access to the RCA or whether effort would shift shoreward of the RCA in targeting "Other Flatfish" that occur in shallower depths. Current catch data indicates that the other species are relatively uncommon in the fixed gear fishery compared to Pacific sanddabs, making it unlikely that effort would be exerted in shallower waters. In addition, the greater capacity of the fishery in the absence of a limit on the number hooks that can be deployed increases uncertainty in the mortality that will result from this alternative.

Stock Status

Other flatfish

The mortality of "Other Flatfish" under Option 3 is projected to be far below the non-trawl allocation, thus the stock status is not expected to be affected.

Overfished Species

Bycatch rates for overfished species are expected to be sufficiently low as not to contribute appreciably to aggregate mortality from the fixed gear fishery. Under Option 3 no changes in stock status and rebuilding progress are expected compared to Option 1.

Socio-economic Impacts compared to Option 1

Under this alternative, assuming the current RCA restrictions north of Point Conception, fishery participants would not be able to access the primary depth distribution of adult Pacific sanddabs. While removal of the gear restrictions would allow deployment of an unlimited number or size of hooks or weights, the primary depth distribution of adult Pacific sanddabs would be inaccessible. This would adversely affect fishery participants that would otherwise benefit from landings of primary target species available within the RCA. Allowing the needed gear to be employed while denying access to adult Pacific sanddab is expected to result in a barrier to harvest that is more detrimental than Option 1, in which access is available, but not sufficient means to harvest given the current gear restrictions.

Option 4

Under Option 4, the gear restriction on fishing for members of the “Other Flatfish” complex would be eliminated, while allowing fishing within the GCAs when targeting them. A landing restriction would also be implemented that prohibits landings of species that are not “Other Flatfish” when members of the “Other Flatfish” complex are onboard.

Change in Fishing Activity Compared to Option 1

Under Option 4, fishery participants would not be subject to gear restrictions and could fish both inside and outside the GCAs, but the landing restriction would prohibit landing of any other species when “Other Flatfish” are onboard. The intent is to address enforcement concerns to prevent participants from landing fish for which retention is prohibited within the RCA while fishing for “Other Flatfish” within the GCAs. This would also have the consequence of prohibiting incidental catch of “Other Flatfish” when targeting other species outside the GCAs.

As a result of removing gear restrictions, fishery participants may deploy longline gear instead of or in addition to vertical hook-and-line gear deployed with rod and reel. Vessels would still be allowed to fish in the RCA, GCA, around the Farallon Islands and Cordell Banks to access marketable sized adult sanddabs, which are expected to be the primary target of fishing activity. The main concern is that if thousands of hooks are deployed in the RCA, it is more likely they will be deployed inadvertently over rocky reefs resulting in overfished species bycatch, since targeting may not be as focused on soft bottom habitat as it would be if a gear restriction was imposed. In the absence of gear restrictions, a landing restriction would be put in place as a disincentive to fish in the GCAs except where “Other Flatfish” are caught. This would help ensure that effort targeting “Other Flatfish” within the GCAs does not result in targeting of other species likely to reside on rocky reefs. Retention of such species in the GCAs is already prohibited, but the landing restriction would eliminate the impetus to target them within the GCAs under the guise of targeting “Other Flatfish”.

Fishing effort for “Other Flatfish” would be expected to increase under Option 3 as participants would have both access to the fishing grounds and the means to harvest the target stock. As long as the market demand will support an adequate price per pound to make the target worth pursuing relative to other opportunities due to equal or greater profit, additional entrants may participate. Once the market is saturated, the price per pound could decline and reduce the number of participants. The actual participation is difficult to predict, but is expected to increase relative to Option 1.

Biological Impacts Compared to Option 1

Other Flatfish Mortality

The mortality of component species in the “Other Flatfish” complex is expected to increase relative to Option 1 and be similar to that presented in Option 2. Removing gear restrictions would make it more likely that trip limits would be attained by participants if they had access to the primary depth distribution of adult Pacific sanddabs within the GCAs. While aggregate landings would be expected to increase as a result of eliminating gear restrictions, prohibition of landing “Other Flatfish” caught as bycatch while targeting other species, would moderate the increase in impacts to some degree since incidental “Other Flatfish” catch would have to be discarded in order to land other species.

Overfished Species Mortality

The potential overfished species impacts would be similar to projections provided under Option 2, with increased mortality relative to Option 1 as a result of eliminating gear restrictions while maintaining access to fishing grounds within the GCAs. Without a limitation on the number of hooks that can be deployed, targeting may be less discriminant relative to the habitat they set their gear, increasing the potential for fishing over rocky reef habitat where encounters with overfished rockfish species are more common.

In addition, the lack of a hook size restriction may increase the effectiveness of the gear in hooking larger overfished species and other non-target stocks should the gear be deployed near rocky substrate where bycatch species are likely to be encountered. Retention of groundfish species occurring over rocky reef habitat is prohibited in the GCAs, removing the impetus to target them, yet bycatch may still occur while fishing in the GCAs, especially if gear is not placed on soft bottom. Prohibition on landing other species when landing species in the "Other Flatfish" complex with fixed gear would further dissuade fishery participants from targeting rocky reef species and focus effort on soft bottom where the "Other Flatfish" are commonly found.

Data Uncertainty Compared to Option 1
If fishery participants are indiscriminant in the placement of their longline gear relative to small outcrops of rocky reef habitat in the absence of hook restrictions, uncertainty in the bycatch of overfished rockfish would be expected to increase relative to Option 1. The inability to land species other than members of the "Other Flatfish" complex would decrease the impetus to fish within the GCAs for species that inhabit rocky reef habitat, reducing uncertainty regarding encounters with overfished rockfish species, in part mitigating this concern.

Stock Status
<u>Other Flatfish</u>
The projected mortality of "Other Flatfish" under Option 4 is below the non-trawl allocation, thus the stock status is not expected to be affected.

<u>Overfished Species</u>
Under Option 4 no changes in stock status and rebuilding progress are expected compared to Option 1. Bycatch rates for overfished species are expected to be sufficiently low as not to contribute appreciably to aggregate mortality from the fixed gear fishery, thus the stock status and rebuilding plans of overfished species are not expected to be adversely affected.

Socio-economic Impacts compared to Option 1
Elimination of gear restrictions while allowing access to depths where adult Pacific sanddabs are encountered will increase the ability of fishery participants to attain trip limits. Increased landings of other flatfish would result in increased economic benefit to coastal communities. The prohibition on landing "Other Flatfish" with other species would reduce revenues from landings of incidental catch of "Other Flatfish" while targeting other species that would have to be forgone, but may be compensated for by increased harvest within the GCAs when targeting adult Pacific sanddabs and the remaining "Other Flatfish".

B.19 Within Non-Trawl: Analysis of Harvest Guidelines for Nearshore Rockfish North Complex with a P* of 0.25

This analysis provides the state harvest guideline allocations with three proposed methods reflected under Options 2, 3 and 4 when a P* of 0.25 under ACL Alternative 2 is applied to the Nearshore Rockfish complex. Management measures that may be used to keep mortality from exceeding the state harvest guidelines are also included. The preceding analysis was conducted applying the same allocation methods to the ACL resulting from a P* of 0.45, compared to the status quo and ACLs under the Preferred Alternative. Similar analyses are provided below to allow comparison of the implications of ACL Alternatives in terms of mortality, stock status and socio-economic impacts.

<u>**Review of Options**</u>

Option 1 (“No Action”): Continue to manage the Nearshore Rockfish complex, holding impacts to the complex level ACL in each region.

Option 2: Manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the miles of coastline in each state.

Option 3: Manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the historical recreational and commercial catch between 2004 and 2012.

Option 4: Manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and the historical recreational and commercial catch between 2004 and 2012 for the remaining species.

B.19.1 Comparison of Options

Option 1 (“No Action”)

Same as analysis under P* of 0.45, see Section B.5.1.1.

B.19.1.1 Option 2: Miles of Coastline (P* = 0.25)

Option 2 is to manage the Nearshore Rockfish complex according to state-specific harvest guidelines stratified north and south of 40°10′ N. Lat., with apportionment north based on the miles of coastline in each state as reflected in Table B-111. The 3 nm state boundary was measured as the proxy for miles of coastline.

Table B-111. Allocations of Nearshore Rockfish north of 40°10′ N. Lat under Option 2 derived using miles of coastline in each state (at P* = 0.25).

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black and yellow	*0.0*	0.26	0.49	0.25	0.00	0.00	0.00
Blue (CA)	*12.7*	NA	NA	1.00	0.00	0.00	12.71
Blue (OR & WA)	*12.2*	0.34	0.66	0.00	4.16	8.08	0.00
Brown	*1.2*	0.26	0.49	0.25	0.31	0.58	0.29
Calico	-	NA	NA	NA	-	-	-
China	*4.2*	0.26	0.49	0.25	1.09	2.05	1.05
Copper	*6.5*	0.26	0.49	0.25	1.70	3.21	1.64
Gopher	-	NA	NA	NA	-	-	-
Grass	*0.2*	0.26	0.49	0.25	0.06	0.12	0.06
Kelp	*0.0*	0.26	0.49	0.25	0.00	0.00	0.00
Olive	*0.1*	0.26	0.49	0.25	0.03	0.06	0.03
Quillback	*2.8*	0.26	0.49	0.25	0.73	1.37	0.70
Treefish	*0.1*	0.26	0.49	0.25	0.02	0.04	0.02
Total	*40.1*				8.1	15.5	16.5
							40.1

Option 2: Change in Fishing Activity Compared to Option 1

Washington

Recreational: The Washington HG under Option 2 is 8.1 mt which is lower than the projected impacts Under No Action (Option 1). The Washington recreational fishery would operate under season structure and management measures described under the Preferred Alternative. However because the WA HG under Option 2 is lower than the historical catch, additional management measures would be needed to keep nearshore rockfish catch under the WA HG for this alternative. To keep total mortality under the WA HG, retention of nearshore rockfish would not be permitted for a portion of the year. Attainment of the WA HG under this alternative is projected to occur in mid-August with retention of nearshore rockfish prohibited for 4.5 months from August 15 through December. Alternate combinations of months when nearshore rockfish would be prohibited may be explored.

Commercial: Closed

Oregon

Under Option 2, the Oregon Nearshore Rockfish complex harvest guideline is lower than the current combined commercial and recreational state-specified landing caps and average annual catches. We showed above that expected Nearshore Rockfish mortality for Oregon fisheries combined is 45.6 mt for No Action and 48.9 mt for Preferred Alternative. The Oregon harvest guideline under this option is 15.5 mt (Table B-111), or 66 percent lower than expected mortality under No Action and 68 percent lower than expected under Preferred Alternative. State landing caps for both commercial and recreational fisheries will have to be reduced dramatically to accommodate this lower target. The GMT understands that Oregon intends to develop the commercial-recreational split of the Oregon HG through subsequent state processes.

Recreational: Once the state determines the sector-specific allocation, management measures will need to be examined, and then implemented through state rules. A preliminary examination of possible management measures has begun. A bag limit analysis revealed that the majority of anglers encounter less than one nearshore rockfish per trip. Therefore changes in bag limit will likely not be a viable option. The likely measure will be non-retention for most or all of the fishing season, incorporating discard mortality for the non-retention months into the impact projections. Even though most anglers encounter less than one nearshore rockfish per angler trip and they are generally not targeted, prohibiting retention for most or all of the season, could influence the number of angler trips, how often, when or where anglers go fishing. Additionally, it may require anglers to be on the water longer to fill their daily bag limit. Since the majority of anglers do not fill their entire bag each day, this is anticipated to have minimal impacts in the short term, but there is the potential for long term or cumulative impacts.

Commercial: Under Option 2, the RCA depth restriction of 30 fm would remain in place because projected catch of overfished species would remain at or below the Oregon catch share. Measures other than depth management will have to be implemented to reduce the mortality of Nearshore Rockfish (including blue rockfish) under this option. For example, under No Action, the commercial fishery was projected to land 15 mt of Nearshore Rockfish (including blue rockfish), resulting in total mortality of 15.1 mt, including discard. Using proportions of current landing caps and average landings between Oregon recreational and commercial fisheries (see Preferred Alternative in the DEIS), the Oregon commercial fishery would receive 5.35 mt of Nearshore Rockfish (including blue rockfish), or a reduction of 65 percent relative to No Action and a 71 percent reduction relative to Preferred Alternative. If one assumes that catch of Nearshore Rockfish is incidental and unavoidable, then the No Action landings value (i.e., 15.0 mt) may be encountered, caught, and discarded under this scenario. Some of the discard will survive. The resulting mortality of Nearshore Rockfish under this assumption is estimated to be 6.49 mt, which would exceed the Oregon commercial allocation of 5.35 mt.

California

Recreational: Under Option 2, 16.5 mt would be allocated to California, of which, the recreational catch share is 9.18 mt, accommodating a May 1 to September 15 season with a 20 fm depth restriction in the Northern Management Area. This would provide one month less fishing opportunity relative to the status quo. The recreational fishing season would have to be reduced by five and a half months relative to the longest season under the Preferred Alternative of March 1 to December 31 to prevent the recreational share of Nearshore Rockfish complex from being exceeded. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Under Option 2 the RCA depth restriction of 20 fm would remain in place as well as the trip limit structure. Because the minor nearshore rockfish complex harvest has been at or below the ACLs in recent years (see), it is not anticipated that Option 2 will have an adverse effect on the northern nearshore rockfish fishery; thus fishing activity is expected not to change. However, trip limit reductions could be implemented should the need arise, with possible decreases that may be nearly 50 percent less than the current trip limit amount. Another possibility to be considered is to have period closures. Additionally, California's northern management region is somewhat isolated from the adjacent region(s). Because of this, northern region participants tend not to fish in other management regions (for those holding a deeper nearshore rockfish permit), nor would they be likely to because the trip limits for the northern region are higher than any of the other regions. Also, it is not expected that holders of a deeper nearshore rockfish permit, who may also hold a shallow permit in any of the other southerly regions, would travel to the northern management region to fish because they would only be allowed to catch and land the deeper nearshore rockfishes – their shallow nearshore permit would not be valid north of 40°10' N. latitude. In effect, it would probably not be economically justifiable for them to fish north of 40°10' N. latitude.

Option 2: Biological Impacts Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 4 are summarized in Table B-112. Further description of the mortality in each state and sector is provided in the text below.

Table B-112. Projected Nearshore Rockfish mortality north of 40°10′ N. Lat. from each state and sector under Option 2 (at P* = 0.25).

State	**Washington**		**Oregon**		**California**		**Total**
Sector	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	
Mortality	8.1	Closed	5.6	9.9	9	7.32	39.92
State Total	8.1		15.5		16.32		
Allocation	8.1		15.5		16.5		40.1
Percent	100%		100%		98.9%		99.6%

Washington

Recreational: Under Option 2 the projected Washington recreational catch of nearshore rockfish would decrease by approximately 23 percent compared to Option 1. No negative biological impacts are expected.

Commercial: Closed

Oregon

Recreational: Under this option, impacts to nearshore rockfish will need to be reduced. Oregon intends to allocate between the commercial and recreational sectors, and take management measures to stay within those allocations, through subsequent state processes. The most likely management measure will be non-retention of nearshore rockfish (other nearshore rockfish and/or blue rockfish[22]) for most or all of the fishing season. Table B-113 below shows the projected landings for the other nearshore rockfish and blue rockfish under the preferred season structure (Section 4.2.2.8) and the projected discard mortality from non-retention by month. Both are calculated on a month by month basis, as that is the smallest time unit currently available in the Oregon recreational model. To project total impacts, and determine which months might need to have non-retention, the landings for months open are added to the release mortality for non-retention months.

Table B-113. Oregon recreational fishery impacts (in mt) by month under preferred season structure and non-retention for the nearshore rockfish.

Projections	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Other Nearshore Rockfish												
Landings under SQ regulations	0.19	0.24	0.58	0.90	1.64	2.13	2.59	2.91	1.22	0.43	0.10	0.06
Non-retention release mortality	0.08	0.10	0.23	0.33	0.61	0.79	0.96	1.08	0.45	0.17	0.04	0.03
Blue Rockfish												
Landings under SQ regulations	0.27	0.34	0.82	1.25	2.24	2.90	3.54	3.98	1.66	0.61	0.14	0.09
Non-retention release mortality	0.27	0.11	0.27	0.39	0.70	0.91	1.10	1.24	0.52	0.21	0.05	0.03

As one example, non-retention for the entire year would reduce impacts of all nearshore rockfish species (including blue rockfish) from 30.5 mt to 10.6 mt, or a 65 percent reduction. The GMT understands that Oregon intends to go through their public process to get angler input on which months to have non-retention.

[22] In Oregon state regulations, blue rockfish is managed and has a state-specified landing cap separate from the remaining or "other nearshore" rockfish.

Commercial: Under this option, commercial management measures necessary to reduce Nearshore Rockfish mortality to near 5.35 mt (from No Action Mortality of 15.1 mt) would likely be non-retention, possibly year-around. Even with non-retention, estimated discard mortality (6.49 mt) would exceed the Oregon commercial allocation, if the recreational-commercial split remained the same as under No Action.

California

Recreational: The projected mortality on nearshore rockfish under Option 2 with a May 1 to September 15 season in the Northern Management Area with a 20 fm depth restriction is 9.0 mt of which 2.3 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 9.18 mt under this option.

Commercial: No anticipated negative biological impacts are expected for this option compared to Option 1. Because this option (as well as Options 3 and 4) could require reductions in harvest, biological impacts could actually be reduced to a small degree depending upon the amount of the reduction. Since California's northern fishery has taken less than 10 mt per year on average during the past five years, resultant decreases would be small. Nevertheless, under this option, commercial management measures will need to be applied to reduce nearshore rockfish mortality.

Projected Overfished Species Mortality

Washington

Recreational: Projected overfished species impacts under this Option are the same as for the season structure under the Washington recreational Preferred Alternative.

Commercial: Closed

Oregon

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than a 1 percent increase in canary and yelloweye rockfish impacts, assuming no other changes to angler behavior.

Commercial: Under Option 2, if fishermen behavior remains the same as under No Action regarding fishing locations and fishing methods, but increased discarding of Nearshore Rockfish becomes necessary, then mortality of Overfished Species will remain unchanged relative to No Action. If, on the other hand, selection of fishing locations changes dramatically because of changes in trip limits or required non-retention of Nearshore Rockfish, then overfished species impacts may increase or decrease, depending on geographic locations selected. The direction or level of this potential change in catch of overfished species cannot be predicted in this analysis.

California

Recreational: Assuming season lengths under Option 1 of ACL Alternative 2 in Management Areas south of 40°10′ N. latitude and the May 1 to September 15 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 2 are 2.6 mt of yelloweye rockfish, 17.9 mt of canary rockfish, 116.8 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Harvest of canary and yelloweye rockfish has been near the respective allocation amounts for these two species. As such, under Option 2, projected mortality may have to be reduced. Using the nearshore bycatch model as a predictor, decreases in the black rockfish component may need to be considered as a means to achieve the necessary projected mortality decreases for these two overfished species so as to not exceed their allocations.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 2.

Overfished Species

Under Option 2 (miles of coastline), the overfished species mortality is expected to be below the harvest limits/guidelines. Thus stock status and rebuilding plans would not be adversely affected management under Option 2.

Socio-economic Impacts compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 2, recreational fishing opportunity would be further reduced. Prohibiting retention of nearshore rockfish for a portion of the season on top of other management measures already in place to protect overfished species may discourage angler participation in recreational groundfish fisheries. While it's difficult to predict angler behavior, any reduction in angler fishing effort will have negative socioeconomic impacts. If these management measures resulted in 10 percent fewer anglers participating in recreational groundfish fisheries, effort would be reduced by approximately 2,400 angler trips targeting bottomfish. This reduction would have negative economic impacts to coastal communities that are dependent on recreational fishing.

Commercial: Closed

Oregon

Recreational: Since most anglers encounter less than one nearshore rockfish per angler trip and they are generally not targeted, non-retention for a few months to reduce mortality of nearshore rockfish species is not expected to impact angler behavior, angler trips, nor any other socio-economic indicators. Non-retention for most or all of the season has the potential to influence angler behavior, but to what extent is unknown. Additional outreach and education on species identification will likely be necessary to help anglers stay within retention/non-retention regulations. It is impossible to predict how the additive impact of adding this regulation to others already in place might impact anglers' decisions on fishing activities.

Commercial: It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may have to be reduced from 15.0 mt (No Action) to 0 mt (i.e., non-retention). The 2013 average price for Other Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenario shown here, lost ex-vessel revenue may reach $125,662 relative to No Action (the loss is higher relative to Preferred Alternative).

California

Recreational: Under Option 2, the season length would decrease by a month (1,983 angler trips) relative to the status quo fishery in the Northern Management Area. The season would be reduced by five and a half months (6,362 angler trips) relative to the Preferred Alternative ACL with the Option 1 season resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: The northern commercial fishery is still recovering from the 2011 tsunami event and the loss of buyers during the past year or two. Currently, there is only one major active buyer in Crescent City. The economic structure of the northern area (essentially only Crescent City) is in a rebuilding phase with no expected time frame, at the present, that predicts when a return to status quo would be reestablished. This, however, is not a result of the options themselves, but an artifact of unavoidable events that have impacted this area. (See also the comments in the Change in Fishing Activity section, above.)

B.19.1.2 Option 3: Historical Catch (P* = 0.25)

Option 3 is to manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. latitude reflecting apportionment based on the historical catch between 2004 and 2012 reflected in Table B-114.

Table B-114. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 3 (historical catch) derived using the historical recreational catch between 2004 and 2012.

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black and yellow	*0.0*	0.00	0.21	0.79	0.00	0.00	0.00
Blue (CA)	*12.7*	NA	NA	1.00	0.00	0.00	12.71
Blue (OR & WA)	*12.2*	0.06	0.94	NA	0.76	11.48	0.00
Brown	*1.2*	0.00	0.08	0.92	0.00	0.09	1.08
Calico	-	NA	NA	NA	-	-	-
China	*4.2*	0.18	0.68	0.14	0.77	2.84	0.58
Copper	*6.5*	0.13	0.53	0.34	0.84	3.46	2.25
Gopher	-	0.00	0.29	0.71	-	-	-
Grass	*0.2*	0.00	0.49	0.51	0.00	0.12	0.13
Kelp	*0.0*	NA	NA	NA	0.00	0.00	0.00
Olive	*0.1*	0.00	0.03	0.97	0.00	0.00	0.12
Quillback	*2.8*	0.16	0.47	0.36	0.46	1.32	1.01
Treefish	*0.1*	0.00	0.00	1.00	0.00	0.00	0.08
Sum Total	40.1				2.82	19.33	17.97
							40.11

<u>Option 3: Change in Fishing Activity Compared to Option 1</u>

<u>Washington</u>
Recreational: The Washington recreational fishery would operate under season structure and management measures similar to those described under the Preferred Alternative. However because the WA HG under Option 3 is not only lower than historical catch, it is lower than the discard mortality associated with non-retention of nearshore rockfish year round in all recreational fisheries including

salmon and halibut. To keep nearshore mortality under the WA HG for this Option the recreational bottomfish fishery would need to be closed for a significant portion of the year. Different combinations of months that could remain open to the recreational bottomfish fishery while still prohibiting retention of nearshore rockfish could be considered with similar results. For example, bottomfishing could remain open during only one of the peak high effort summer months (May-August) again, with nearshore rockfish retention prohibited, but would require the bottomfish fishery to be closed the remainder of the year to keep nearshore rockfish morality under the Option 3 WA HG.

Commercial: Closed

Oregon

Under Option 3, the Oregon Nearshore Rockfish complex harvest guideline is lower than the current combined commercial and recreational state-specified landing caps and average annual catches, but higher than Option 2. We showed under No Action for Nearshore Rockfish that the expected mortality for recreational and commercial fisheries combined is 45.6 mt (the expected mortality under Preferred Alternative is 48.9 mt). The Oregon harvest guideline under this option is 19.3 mt (Table B-114), 58 percent lower than expected mortality under No Action, and 60 percent lower than expected mortality under Preferred Alternative. State landing caps for both commercial and recreational fisheries will have to be reduced to accommodate this lower target. As noted under Option 2, Oregon intends to develop or modify the commercial- recreational split of the Oregon HG through state processes.

Recreational: Similar to Option 2, most or all of the season will require non-retention of nearshore rockfish species to keep impacts within the Oregon recreational HG.

Commercial: Similar to Option 2. Using the same assumptions as shown under Option 2, non-retention would be required year around. As such, resulting mortality of Nearshore Rockfish under these assumptions is estimated to be 6.49 mt, exceeding the Oregon commercial allocation of 5.35 mt. Hence, non-retention may be required year around.

California

Recreational: Under Option 3, 17.97 mt would be allocated to California, of which, the recreational catch share established by the state Fish and Game Commission is 10.0 mt, accommodating a May 1 to December 31 season with a 20 fm depth restriction in the Northern Management Area. This would reduce fishing opportunity by a month relative to the status quo. The recreational fishing season would have to be reduced by five and a half months relative to the longest season under the Preferred Alternative ACL of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish Species during part of the season.

Commercial: The same as Option 2.

Biological Impacts Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 3 are summarized in Table B-115. Further description of the mortality in each state and sector is provided in the text below.

Table B-115. Projected Nearshore Rockfish mortality north of 40°10′ N. Lat. from each state and sector under Option 3 (P* = 0.25).

State	**Washington**		**Oregon**		**California**		**Total**
Sector	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	
Mortality	2.8	Closed	13.13	6.2	9.4	5.6	37.13
State Total	2.82		19.33		15		
Allocation	2.82		19.33		17.97		40.12
Percent	100%		100%		83.5%		92.5%

Washington

Recreational: Under Option 3, additional management measures will be implemented to reduce nearshore rockfish mortality in the Washington recreational fishery by 73 percent compared to the No Action Option 1.

Commercial: Closed

Oregon

Recreational: Under Option 3, similar to Option 2, non-retention will likely be required for most or all of the season to keep impacts within the Oregon recreational HG. Table B-113 has the projections by month for the nearshore rockfish complex minus blue rockfish for retention and non-retention.

Commercial: Similar to Option 2, under this option, commercial management measures necessary to reduce Nearshore Rockfish mortality to near 6.2 mt (from No Action Mortality of 15.1 mt) would likely be non-retention year-around. Even with non-retention, estimated discard mortality (6.49 mt) would exceed the Oregon commercial allocation, if the recreational-commercial split remained the same as under No Action.

California

Recreational: The projected mortality on nearshore rockfish under Option 3 with a May 15 to September 30 season with a 20 fm depth restriction in the Northern Management Area is 9.4 mt of which 2.2 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 10.0 mt under this option.

Commercial: The projected mortality on nearshore rockfish under Option 3 is estimated to be 5.6 mt with no other management changes implemented.

Projected Overfished Species Mortality

Washington

Recreational: No additional overfished species mortality are projected compared to the No Action alternative. Overfished species impacts could be less than what is projected depending on the timing of the recreational bottomfish fishery closure necessary under this option.

Commercial: Closed

Oregon

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 1 percent increase in canary and yelloweye rockfish impacts. This assumes no other changes to angler behavior.

Commercial: Same as Option 2.

California

Recreational: Assuming season lengths under Option 1 of ACL Alternative 2 in Management Areas south of 40°10′ N. Lat. and the May 15 to September 30 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 2 are 2.6 mt of yelloweye rockfish, 17.9 mt of canary rockfish, 116.8 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: The same as Option 2.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 3.

Overfished Species

The projected mortality under Option 3 is the same as No Action (Option 1), which are below the respective harvest limits/guidelines. No adverse effects on stock status or rebuilding progress are expected under Option 3.

Option 3: Socio-economic Impacts compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 3, not only would recreational fishing opportunity be further reduced by requiring non retention of nearshore rockfish in all recreational fisheries year round, it would also require the complete closure of the recreational bottomfish fishery for a significant portion of the year. Prohibiting retention of nearshore rockfish for a portion of the season on top of other management measures already in place to protect overfished species may discourage angler participation in recreational fisheries that remain open under nearshore rockfish retention restrictions. While it can be difficult to predict angler behavior when nearshore rockfish retention is prohibited, Option 3 will have direct and quantifiable reduction in the number of angler trips targeting bottomfish. Under Option 3, angler trips targeting bottomfish would be reduced by approximately 20,000 angler trips or 80 percent compared to the No Action Option resulting from closure of the bottomfish fishery. Closure of the recreational bottomfish fishery for a significant portion of the year will have significant negative socioeconomic impacts to coastal communities that are dependent on recreational fishing.

Commercial: NA

Oregon

Recreational: Same as under Option 2

Commercial: Same as under Option 2.

California

Recreational: Under Option 2, the season length would decrease by a month (787 angler trips) relative to the status quo fishery in the Northern Management Area. The season would be reduced by five and a half months (5,167 angler trips) relative to the Preferred Alternative ACL with the Option 1 season resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: The same as Option 2.

B.19.1.3 Option 4: Hybrid Method (P* = 0.25)

Option 4 is to manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. latitude reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and the historical catch between 2004 and 2012 for the remaining species reflected in Table B-116.

Table B-116. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 4 (P* = 0.25) derived using miles of coastline for China, quillback and copper rockfish and the historical commercial catch between 2004 and 2012 for the remaining species.

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black and yellow	*0.0*	0.00	0.21	0.79	0.00	0.00	0.00
Blue (CA)	*12.7*	NA	NA	1.00	0.00	0.00	12.71
Blue (OR & WA)	*12.2*	0.06	0.94	NA	0.76	11.48	0.00
Brown	*1.2*	0.00	0.08	0.92	0.00	0.09	1.08
Calico	-	NA	NA	NA	-	-	-
China	*4.2*	0.26	0.49	0.25	1.08	2.07	1.04
Copper	*6.5*	0.26	0.49	0.25	1.69	3.23	1.62
Gopher	-	0.00	0.29	0.71	-	-	-
Grass	*0.2*	0.00	0.49	0.51	0.00	0.12	0.13
Kelp	*0.0*	NA	NA	NA	0.00	0.00	0.00
Olive	*0.1*	0.00	0.03	0.97	0.00	0.00	0.12
Quillback	*2.8*	0.26	0.49	0.25	0.72	1.38	0.69
Treefish	*0.1*	0.00	0.00	1.00	0.00	0.00	0.08
Sum Total	40.1				4.25	18.38	17.48
							40.11

Option 4: Change in Fishing Activity Compared to Option 1

Washington

Recreational: The Washington recreational fishery would operate under season structure and management measures similar to those described under the Preferred Alternative. However because the WA HG under Option 4 is lower than the historical nearshore rockfish catch, additional management measures would be needed to keep nearshore rockfish catch under the WA HG. To keep total mortality under the WA HG, retention of nearshore rockfish would be prohibited in all recreational fisheries year round. Projected impacts of nearshore rockfish under Option 4 are 4.3 mt, 0.05 mt higher than the WA HG. If angler effort and fishing success result in catch estimates higher than what is projected, inseason action through state regulations such as closure of the recreational bottomfish fishery may be considered to keep nearshore rockfish catch under the Option 4 WA HG.

Commercial: Closed

Oregon

Under Option 4, the Oregon harvest guideline is similar to that shown under Option 3; Option 4 provides a harvest guideline of 18.4 mt and Option 3 shows a harvest guideline of 19.3 mt. As such, overall impacts will be similar between Option 4 and Option 3. See Option 3 for more details.

Recreational: Similar to Options 2 and 3 above, non-retention will likely be required for most or all of the season to keep impacts within the Oregon recreational HG.

Commercial: Similar to Option 3. Using the same assumptions as shown under Option 3, non-retention may be required year around. As such, resulting mortality of Nearshore Rockfish under these assumptions is estimated to be 6.5 mt, exceeding the Oregon commercial allocation of 5.7 mt. Hence, non-retention would be required year around.

California

Recreational: Under Option 4, 17.48 mt would be allocated to California, of which, the recreational catch share established by the state Fish and Game Commission is 9.73 mt, accommodating a May 15 to September 30 season with a 20 fm depth restriction in the Northern Management Area. This would result in a one month reduction in fishing opportunity relative to the status quo. The recreational fishing season would have to be reduced by five and a half months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish Species during part of the season.

Commercial: The same as Option 2.

Option 4: Biological Impacts Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 4 are summarized in Table B-117. Further description of the mortality in each state and sector is provided in the text below.

Washington

Recreational: Under Option 4, additional management measures will be implemented to reduce nearshore rockfish mortality in the Washington recreational fishery by 59 percent compared to Option 1.

Commercial: NA

Oregon

Recreational: Similar to Options 2 and 3 above, a combination of months of retention and non-retention will be required. Table 8 has projected impacts by month for allowing retention and requiring non-retention.

Commercial: Similar to Options 2 and 3 above. Non-retention will likely be required. Even with non-retention, estimated discard mortality (6.5 mt) would exceed the Oregon commercial allocation (5.7 mt) if the recreational-commercial split remained the same as under No Action.

California
Recreational: Recreational: The projected mortality on nearshore rockfish under Option 4 with a May 15 to September 30 season with a 20 fm depth restriction in the Northern Management Area is 9.4 mt of which 2.2 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 9.7 mt under this option.

Commercial: The same as Option 2.

Table B-117. Projected Nearshore Rockfish mortality north of 40°10′ N. Lat. from each state and sector under Option 4 (P* = 0.25).

State	**Washington**		**Oregon**		**California**		**Total**
Sector	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	
Mortality	4.25	Closed	12.18	6.2	9.4	7.32	39.35
State Total	4.25		18.38		16.72		
Allocation	4.25		18.38		17.48		40.11
Percent	100%		100%		95.7%		98.1%

Option 4: Projected Overfished Species Mortality

Washington
Recreational: No additional overfished species mortality is projected compared to the No Action alternative. Overfished species mortality could be lower than what is projected if angler effort is reduced or if closure of the recreational bottomfish fishery is needed to keep nearshore rockfish mortality within the WA HG under Option 4.

Commercial: NA

Oregon
Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 1 percent increase in canary and yelloweye rockfish impacts.

Commercial: Same as Options 2 and 3.

California
Recreational: Assuming season lengths under Option 1 of ACL Alternative 2 in Management Areas south of 40°10′ N. latitude and the May 15 to September 30 season with a 20 fm depth restriction in the

Northern Management Area, overfished species mortality projected to accrue under Option 2 are 2.6 mt of yelloweye rockfish, 17.9 mt of canary rockfish, 116.8 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: That which applies to Option 2 would also apply for Option 4.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 4.

Overfished Species

The projected mortality under Option 4 is the same as No Action (Option 1), which are below the respective harvest limits/guidelines. No adverse effects on stock status or rebuilding progress are expected under Option 3.

Socio-economic Impacts compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 4, retention of nearshore rockfish in all recreational fisheries would be prohibited year round. If inseason catch estimates show that nearshore rockfish catch is higher than projected, closure of the recreational bottomfish fishery may be necessary to keep nearshore rockfish mortality within the WA HG under Option 4. Prohibiting retention of nearshore rockfish year round on top of other management measures already in place to protect overfished species is likely to discourage angler participation in recreational groundfish fisheries. While it's difficult to predict angler behavior, any reduction in angler fishing effort will have negative socioeconomic impacts. If these management measures resulted in 10 percent fewer anglers participating in recreational groundfish fisheries, effort would be reduced by approximately 2,400 angler trips targeting bottomfish. This reduction would have negative economic impacts to coastal communities that are dependent on recreational fishing.

Commercial: Closed

Oregon

Recreational: Similar to Options 2 and 3 above.

Commercial: Similar to Options 2 and 3 above.

California

Recreational: Under Option 2, the season length would decrease by a month (787 angler trips) relative to the status quo fishery in the Northern Management Area. The season would be reduced by five and a half months (5,167 angler trips) relative to the Preferred Alternative ACL with the Option 1 season resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: That which applies to Option 2 would also apply for Option 4.

Discussion

More restrictive management measures are needed to keep Nearshore Rockfish complex mortality below the state HGs resulting from allocation of ACL Alternative 2 with a P* of 0.25 to HGs. For Oregon and Washington, this lower HG may result in non-retention (i.e., discard), in some cases year around. It was shown that under full year non-retention in both the commercial and recreational fisheries, discard mortality may still exceed the Oregon state HGs under Options 2-4. This would result in forgone fishing opportunity and in some cases potentially severe socio-economic consequences compared to the Preferred Alternative ACL Alternative assuming a P* of 0.45 and the status quo ACL. The stock status is not expected to be greatly improved as a result of the ACLs from the lower P* and ACL Alternative 2. The Council may want to consider the trade-off between buffering against scientific uncertainty in the nearshore rockfish assessments and the socioeconomic consequences of lower ACLs for fishing communities in weighing the most appropriate P* value.

B.20 Recreational: Washington and California Canary Sub-Bag Limits

B.20.1 Washington

Retention of canary rockfish has been prohibited in Washington recreational fisheries since 2004 to keep mortality (including discard mortality) within the HG. Management measures are in place to keep total impacts of canary rockfish to state specific harvest guidelines (HG). The presumptive HGs are 3.4 mt for 2015 and 3.5 mt for 2016. Management measures vary by management area to reflect increasing encounters with canary rockfish as you move from south to north along the Washington coastline. Canary rockfish total mortality often falls well under the Washington HG a result of restrictive management measures in place to keep yelloweye rockfish total mortality under the state specific HG.

Management options
No Action**:** Retention of canary rockfish would remain prohibited

> Under the No Action option, anglers would continue to be required to discard all canary rockfish encountered during all recreational fishing.

Option1**:** One canary rockfish per day as a sub-limit to the rockfish bag limit of ten and the total groundfish bag limit of twelve.

Option2**:** Up to ten canary rockfish per day as part of the rockfish sub-bag limit.

Analysis
Projected Impacts under the No Action option
Under the No Action option management measures would be the same as those analyzed under the Preferred Alternative harvest specifications for canary rockfish (Section 4.2.2.7). The projected canary rockfish mortality would be 0.75 mt. The Washington recreational HG of 3.4 mt (2015) and 3.5 mt (2016) would not be attained.

Under Option 1, anglers would be allowed to retain one rockfish per day as part of the rockfish sub-bag limit of 10 and the total bottomfish bag limit of 12. All other management measures would be the same as those analyzed under the Preferred Alternative in Section 4.2.2.7.

Table B-118. Projected mortality (mt) of canary rockfish under canary sub-bag limit Option 1 and management measures under the Preferred Alternative (Section 4.2.2.7).

Washington canary HG 2015/2016	3.4 / 3.5
Projected Mortality	2.5

Under Option 2, anglers would be allowed to retain up to ten rockfish per day as part of the rockfish sub-bag limit of 10 and the total bottomfish bag limit of twelve. Management measures would be the same as those analyzed under the Preferred Alternative in Section 4.2.2.7.

Table B-119. Projected mortality (mt) of canary rockfish under canary sub-bag limit Option2 and management measures under the Preferred Alternative.

Washington canary HG 2015/2016	3.4 / 3.5
Projected Mortality	2.6

Methods

Washington Ocean Sampling Program (OSP) data as provided to RecFIN from 2009-2013 was used to project canary rockfish mortality for both sub-bag limit options. All canary rockfish encounters up to one (Option 1) or ten (Option 2) per angler were assumed to be retained. Canary per angler of more than one (or 10) was assumed discarded. Mortality for the discarded canary was estimated based on the proportion of canary caught by depth based on angler interview data with the corresponding surface release mortality rates applied. Mortality from the one canary bag limit analysis was added to the projected mortality for the Preferred Alternative management measures to project the total canary mortality for the canary sub-bag limit alternatives. The highest estimate of canary mortality over the 2009-2013 time period was used to project mortality for the sub-bag limit alternatives.

Discussion

If canary retention is allowed, actual estimates of canary mortality may be higher than what is estimated in this analysis due to the difficulty in projecting changes in angler behavior. Anglers that normally wouldn't encounter a canary rockfish during the course of their typical fishing trip under current regulations prohibiting canary retention may be inclined to fish longer with the hope of catching a canary rockfish or may seek out areas where canary rockfish abundance is higher if canary retention is allowed.

B.20.2 California

The California recreational fishery is currently managed to a canary harvest guideline (HG), of 23.0 mt in 2014; the presumptive HGs are expected to increase to 24.3 mt (2015) and 25.0 mt (2016; Table B-120). Retention of canary rockfish in the California recreational fishery is prohibited. The majority of canary encounters occur in the San Francisco Management Area, which is open six months of the year to depths of 30 fm, and in Central Management Area where access is allowed seven months of the year to depths of 40 fm.

Because canary rockfish have a high susceptibility to barotrauma [23], non-retention results in regulatory discarding and associated mortality that increases with depth of capture. Rather than adding the extra canary rockfish to their bag, anglers must discard them and fish longer to achieve their 10 fish Rockfish,

[23] Canary rockfish have a surface discard mortality of 100 percent in waters 30 fm or greater (Agenda Item D.5.b. GMT Report, April 2013)

Cabezon and Greenling (RCG) complex bag limit, which may increase the likelihood of encounters with other overfished species.

<u>Management Options</u>

<u>Option 1-No Action</u>: Maintain prohibition on retention of canary rockfish

<u>Option 2</u>: Increase the sub-bag limit to one fish within the rockfish-cabezon-greenling (RCG) complex bag limit under the Preferred Alternative season structure in Option 1

<u>Option 3</u>: Increase the sub-bag limit to one fish within the RCG complex bag limit under a decreased season length

2015-2016 Management Considerations

Anglers have reported that "they can't get away from canary rockfish" and that encounters are becoming more frequent in shallow waters. These encounters are not unexpected and are expected to increase as the population continues to rebuild (i.e. the rebuilding paradox). Due to barotrauma, a portion of discarded canary rockfish will not survive and anglers are forced to discard dead (or dying) fish rather than adding them to the 10 fish RCG complex bag limit. In order to minimize discards of canary rockfish, the Council requested analysis of a one fish sub-bag limit of canary rockfish within the 10 fish RCG complex bag limit. If retention were allowed angler behavior could change, as anglers may continue fishing in locations where canary rockfish are encountered rather than moving.

Under Option 1, retention of canary rockfish would continue to be prohibited and the season structure would be the same as in 2014. Anglers will be required to discard all canary rockfish while in pursuit of other fish, increasing time on the water and therefore the chance of encounters with other overfished species. Under No Action, the recreational HG will not be attained.

Under Option 2, anglers would be allowed a sub-bag limit of one canary rockfish within the RCG complex bag limit, with the Preferred Alternative season structure[24] in place (Figure B-50). See Section 4.2.2.9 for a description of season structure analyses.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed		Mar 1 – Dec 31 <20 fm									
Mendocino	Closed		Mar 1 – Dec 31<20 fm									
San Francisco	Closed		Mar 1 – Dec 31 <30 fm									
Central	Closed		Mar 1 – Dec 31<40 fm C									
Southern	Closed		Mar 1 – Dec 31 <60 fm									

Figure B-50. Preliminary Preferred Option season structure in 2015-2016 (Section 4.2.2.9).

Under Option 3, the season length was decreased to keep the projected mortality within the HG (Figure B-51). Because encounters with canary rockfish are highest in the San Francisco and Central Management Areas, reductions to season length in these regions are necessary to keep projected mortality within the HG. Conversely, projected mortality of canary rockfish is sufficiently low in the Northern and Mendocino Management Areas that, compared to No Action, increased season length can be afforded in those areas Encounters with canary rockfish are relatively uncommon south of Point Conception such that a 60 fm depth restriction can be accommodated. Increased mortality due to changes in angler

[24] The Preferred Alternative season structure corresponds to Alternative 1 (Option 1).

behavior is not easily quantifiable; as a result, a buffer was included in modeling to accommodate mortality that may arise from changes in angler behavior.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May 1 – Dec 31 <20 fm							
Mendocino	Closed				May 1 – Dec 31 <20 fm							
San Francisco	Closed				May 1 – Oct 30 <30fm						Closed	
Central	Closed				May 1 – Oct 30 <40fm						Closed	
Southern	Closed		Mar 1 – Dec 31 <60fm									

Figure B-51. Season structure required to accommodate a one fish canary rockfish sub-bag limit within the 10 fish RCG complex bag limit in 2015-2016.

Analysis

Biological Impacts under No Action

Projected Impacts

The projected mortality to canary rockfish would be 16.4 mt under Option 1; Table B-120 summarizes projected mortality to all overfished species. As the canary rockfish stock continues to rebuild some increased encounters (and discarding) would be expected, although the amount cannot be quantified.

Table B-120. Projected mortality to overfished species under No Action

Species	Projected Mortality (mt)
Bocaccio	100.1
Canary Rockfish	16.3
Cowcod	1.0
Yelloweye Rockfish	1.7

Stock Status

The stock was declared overfished in 1999 and harvest has been severely restricted in both the commercial and recreational fisheries since 2000. The latest assessment indicates stock biomass is increasing, and that recent management actions have curtailed removals such that overfishing has not occurred since before 1999 (Wallace and Cope, 2011).

Impacts under Option 1

Projected Impacts

No changes to stock status or rebuilding progress are expected.

RecFIN data from 2011 to 2012 was used to project canary rockfish mortality as a result of establishing a one fish sub-bag limit. Using the RecFIN Hypothetical Bag Limit Analysis tool, estimates of increased mortality of canary rockfish were calculated using A+B1+B2 fish. For the purpose of this analysis, A fish include sampled dead fish, B1 fish includes both fillets and dead discarded fish, while B2 fish includes mainly live discarded fish. As the most conservative estimate, the analysis also assumes that all B2 fish would be available if retention was permitted. All possible bags were set to the hypothetical limit to calculate increased mortality.

Impacts under Option 2

Projected Impacts

Under Option 2, canary rockfish mortality is projected to increase by 62 percent (10.3 mt) compared to Option 1. The HG is expected to be exceeded by 2.4 mt, given the cumulative projected mortality from both increased season length under Preferred Alternative season structure and a one fish sub-bag limit (Table B-121). If angler behavior changes as a result of allowing limited retention, actual mortality may be greater than projected, though the amount cannot be quantified.

Table B-121. Projected mortality (in mt) compared by option and percent of presumptive 2015 harvest guideline.

	Option 1	Option 2
Projected Mortality	16.4	26.7
% HG	67.5%	109.4%

Impacts on Overfished Species

Table B-122 summarizes projected mortality to all overfished species under Option 2. Due to increases in season length, some increased mortality is expected compared to No Action. Increased mortality to other overfished species as a result of the one fish canary sub-bag limit is expected to be minimal; yelloweye rockfish tend to be more solitary and are not known to school with canary rockfish, while bocaccio rockfish and cowcod are primarily distributed south of Point Conception where canary rockfish encounters are comparatively less common.

Table B-122. California recreational projected mortality of overfished species for 2015-2016 under Option 2.

Species	Projected Mortality (mt)
Bocaccio	117.5
Canary Rockfish	26.7
Cowcod	1.2
Yelloweye Rockfish	2.9

Stock status

Under Option 2**,** no changes to stock status or rebuilding progress are expected compared to Option1.

Socioeconomic Impacts

Given uncertainty in angler behavior, inseason action may be necessary to keep within the projected impacts. This may result in area closures, increased depth restrictions or early closure of the recreational fishery. Loss in revenue and opportunity can be expected, although the degree is difficult to quantify. However, some increased opportunity may be realized as a result of allowing limited retention of canary rockfish, it would not compensate for losses (in revenue and opportunity) due to early closures.

Impacts under Option 3

Projected Impacts

Under Option 3, mortality of canary rockfish is projected to increase by 20 percent (3.2 mt) compared to No Action (Table B-123). The HG is not expected to be exceeded, given the buffer to accommodate any changes of angler behavior. Given reductions in season length, attainment of non-overfished species harvest targets may not be realized, resulting in lost opportunity.

Table B-123. Projected mortality (in mt) compared by option and percent of presumptive 2015 harvest guideline.

	Option 1	Option 2	Option 3
Projected Mortality	16.4	26.7	20.7
% HG	67.5%	109.4%	85.2%

Impacts on Overfished Species

Table B-124 summarizes mortality to all overfished species under Option 3. Similar to Option 2, increased mortality to other overfished species as a result of a one canary rockfish sub-bag limit is expected to be minimal. Between the Options, differences in projected mortality of other overfished species are primarily due to the variation in the analyzed season lengths.

Table B-124. California recreational projected mortality of overfished species for 2015-2016 under Option 3.

Species	Projected Mortality (mt)
Bocaccio	117.6
Canary Rockfish	20.7
Cowcod	1.2
Yelloweye Rockfish	1.8

Stock status

Under Option 3**,** no changes to stock status or rebuilding progress are expected.

Socioeconomic Impacts

Under Option 3, reduced season length would result in forgone fishing opportunity with negative effects to the revenues of coastal communities in the central region of the state. While some increased opportunity can be expected as a result of allowing limited retention of canary rockfish, it is difficult to quantify and is not expected to offset the increased opportunity that would have been available given the season lengths that could be afforded with retention remaining prohibited (i.e. Preferred Alternative season structure Option1, Option 1).

B.21 Recreational: 50 fm Recreational RCA

In March 2014, the Council approved new mortality rates for canary and yelloweye rockfish (along with cowcod) for use when descending devices are used to release recreationally caught rockfish. These new mortality rates are the same between 30 and 50 fm, for surface released fish anything deeper than 30 fm had 100 percent mortality applied (Table B-125). Given the new mortality rate out to 50 fm, Oregon and Washington would like to have the management line at 50 fm, defined in regulation at 50 CFR §660.72(a), available for possible use in management.

Table B-125. Surface and descending device mortality rates for canary and yelloweye rockfish by depth bin

Species	Depth (fm)	Surface Mortality Rate	Descending Device Mortality Rate
Canary Rockfish	0-10	21%	21%
	10-20	37%	25%
	20-30	53%	25%
	30-50	100%	48%
	50-100	100%	57%
	>100	100%	100%
Yelloweye Rockfish	0-10	22%	22%
	10-20	39%	26%
	20-30	56%	26%
	30-50	100%	27%
	50-100	100%	57%
	>100	100%	100%

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Agenda Item F.7.a
Attachment 6
June 2014

EXCERPTED PORTIONS OF APPENDIX B OF THE PRELIMINARY DRAFT 2015-2016 GROUNDFISH HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES ENVIRONMENTAL IMPACT STATEMENT RELEVANT TO THE PREFERRED ALTERNATIVE

Appendix B

Proposed Harvest Specifications and Management Measures for the 2015-2016 Pacific Coast Groundfish Fishery and Amendment 24 to the Pacific Coast Groundfish Fishery Management Plan Preliminary Draft Environmental Impact Statement

Prepared by
The Pacific Fishery Management Council
And The National Marine Fisheries Service

June 2014

Contents

Management Measures under the Preferred Alternative

B.1 Changes to Rockfish Conservation Area Coordinates

Need for Action

Rockfish Conservation Areas (RCA) are a type of commercial and recreational fishery management measure used to keep catches within annual catch limits (ACLs). RCAs affect the collective behavior of harvesters by preventing fishing in areas where bycatch of overfished species is particularly high. Their extent varies by area, season and gear type to allow access to target species while minimizing bycatch. The boundaries of RCAs are described by depth contours since a correlation between depth and the distribution (or catch) of overfished species has been demonstrated through an analysis of trawl logbook and survey data. The boundary depth contours defined by waypoints in Federal regulations (at 50 CFR 660.71-660.74) only approximate actual isobaths for two reasons. First, the waypoints defining the lines were defined using available bathymetry data, which have improved over time. Second, for enforcement purposes the lines defined by the waypoints are a more generalized, or simplified, representation of isobaths. Often, changes to the coordinates that define RCA are often recommended during the biennial cycle to more closely align with the latest data on bathymetry.

Other measures more directly constrain catch on an individual vessel level. These are:

- Individual fishing quota (IFQ) management for the shoreside trawl fleet (with cumulative landing
- limits for some non-target, non-overfished management units)
- Co-op allocations to the at-sea whiting fleets (catcher vessels delivering to at-sea processors and
- catcher-processors)
- Permit-based sablefish allocations to vessels in the limited entry fixed gear fleet during the
- primary season
- Daily and cumulative landing limits for the open access fixed gear sectors and limited entry fixed
- gear outside the primary season
- State restricted access permit programs for the non-trawl fixed-gear sectors, such as the nearshore fisheries for Oregon and California

Only catch share management directly controls total catch of most management unit species (including all overfished species) in the trawl sectors with all catch monitored by observers. Daily trip limits and 2-month limits in other sectors only control landings; overfished species total catch (mostly bycatch) must be imputed based on partial observer coverage. RCAs add another layer of precaution by affecting collective behavior and their use is more important in managing those sectors not under catch shares since overfished species bycatch cannot be directly controlled.

Inseason management allows measures to be periodically adjusted during the biennial period based on new information and catch projections. These management measures are described in more detail in Section 2.3 of the EIS.

B.1.1 Oregon: Adjustments to the 200 fm Modified Line

Coordinates for the 200 fathom (fm) RCA line in Oregon were revised beginning January 1, 2013 to better align with depth contours (See 2013-2014 FEIS). However, coordinates for the 200-fm modified RCA, which are modified to provide access to shallower waters where petrale sole concentrations are greater (called petrale cut-outs), were not simultaneously adjusted. The result was areas where the petrale cut-outs on the 200 fm modified line were deeper than the 200 fm RCA (Figure B-1).

Management Options

No Action: The RCA coordinates currently in regulation would remain and in some areas the 200 fm modified line with petrale cut-outs would be deeper than the 200 fm line.

Option 1 (Preferred): Revise coordinates such that the 200 fm modified line is not deeper than the 200 fm line (Table B-1).

Table B-1. Coordinate list for proposed modification to 200 fm-modified RCA coordinates.

ID	Name	Degrees, decimal minutes	Decimal degrees
79	Current waypoint	44°46.87'N, 124°38.20'W	44.781243, -124.636738
1	OR proposed modification	44°48.25'N, 124°40.61'W	44.8041, -124.6769
2	OR proposed modification	44°42.24'N, 124°48.05'W	44.704, -124.8008
3	OR proposed modification	44°41.35'N, 124°48.03'W	44.6892, -124.8005
4	OR proposed modification	44°40.27'N, 124°49.11'W	44.6712, -124.8185
5	OR proposed modification	44°38.52'N, 124°49.11'W	44.642, -124.8185
6	OR proposed modification	44°21.73'N, 124°49.82'W	44.362167, -124.830333
7	OR proposed modification	44°17.57'N, 124°55.04'W	44.292833, -124.917333
80	Current waypoint (Deleted)	44°48.25'N, 124°40.62'W	44.804115, -124.676919
81	Current waypoint (Deleted)	44°41.34'N, 124°49.20'W	44.688998, -124.819945
82	Current waypoint (Deleted)	44°23.30'N, 124°50.17'W	44.388395, -124.8361781
83	Current waypoint	44°13.19'N, 124°58.66'W	44.219879, -124.977606

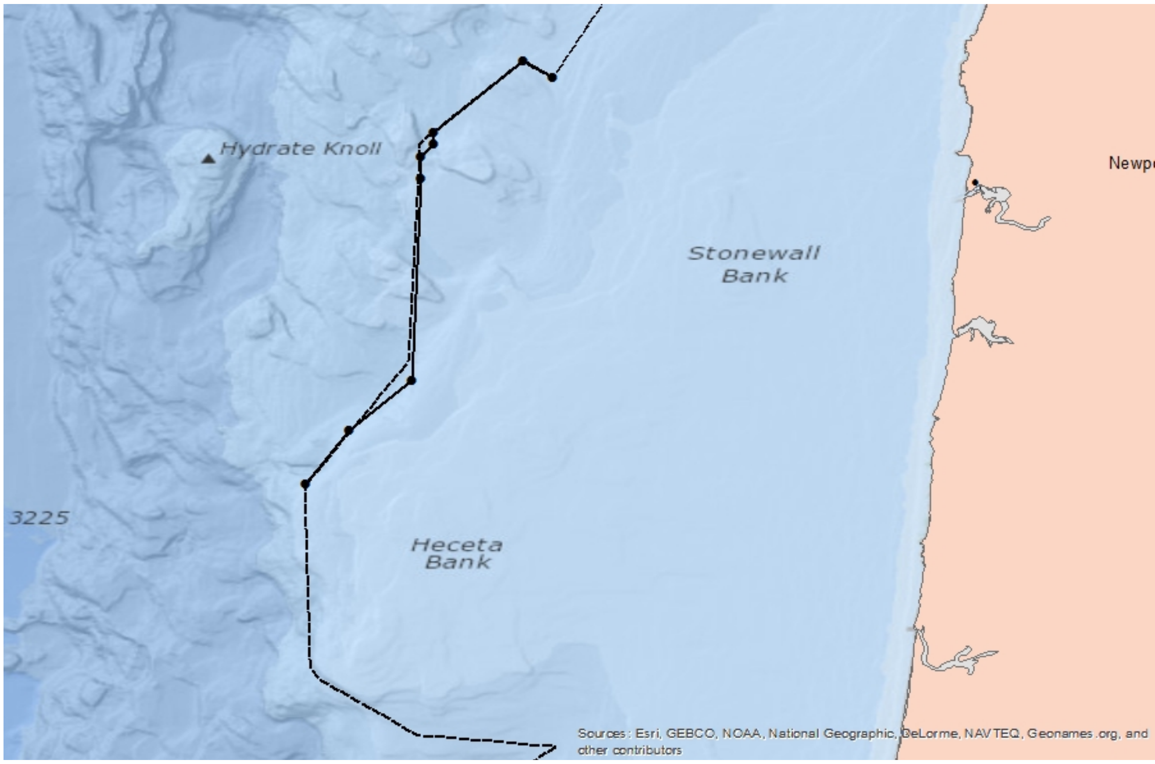

Figure B-1. Modification to the 200 fm "modified" (with petrale cut outs) depth contour. Dashed line represents the original 200 fm petrale line. Solid line represents proposed changes (which mimic the 200 fm line (without petrale cut outs).

B.1.2 Modifications to the Boundaries Defining Rockfish Conservation Areas off California

The following proposed modifications to current RCA boundary waypoints were adopted by the Pacific Fishery Management Council, at its April 2014 meeting, for analysis:

- Adjustments to the 60 fm RCA boundary waypoints off Del Mar and San Diego, California (Agenda Item H.3.b GMT Report, November 2013 and Agenda Item C.9.b GAP Report, April 2014)

An additional analysis is included that addresses a proposal for RCA boundary waypoint adjustments around the northern Channel Islands, California.

B.1.2.1 Modifications of the 60 fm Depth Contour: Two Southern California Bight Proposals

During the 2013-2014 biennial management cycle, the 60 fm depth contour was used as the shoreward boundary of the non-trawl RCA south of 34°27' N. lat. The depth contours defining the boundaries of RCAs are listed in trip limit tables published in Federal regulations and in periodic Public Notices announcing changes to groundfish management measures (see http://tinyurl.com/lty84jx). This boundary is intended to reduce bycatch of overfished species (OFS) such as bocaccio, canary, cowcod, and yelloweye rockfishes while providing access to target species.

Need for Action

The current 60 fm depth contour specified in regulation at 50 CRF 660.72(f) approximates the 60 fm isobath. To allow better access to non-trawl fishing areas for target species while maintaining the intent of the 60 fm line, better alignment of the 60 fm line with the 60 isobath is necessary for waters off California.

Management Options

No Action: Under No Action (described in section 2.4.1 of the 2013-2014 EIS) the 60 fm depth contour created by the waypoints currently listed at 50 CRF 660.72(f) would be retained in 2015-2016 and beyond.

Options: Under the Options, the 60 fm depth contour would more closely align with actual bathymetry in one of the two 60 fm proposals. These changes are based on proposals submitted by industry to modify the 60 fm RCA by modifying existing waypoints and/or adding new waypoints to the existing set(s). One sub-proposal addresses modifications west of Del Mar, California and the second-sub proposal addresses a modification west of San Diego, California.

Del Mar Option

- Modify the 60 fm contour between waypoints #198 and 199 by adding five new waypoints, and
- Modify the 60 fm contour between waypoints #198 and #200 by adjusting waypoint #199

Industry submitted the above proposed adjustments to allow increased access to fishing areas currently closed as a result of the existing RCA shoreward boundary. However, as proposed (see above reference, and Table B-2 and Figure B-2), the proposed boundary adjustments off the Del Mar area would move a section of the shoreward 60 fm RCA shoreward boundary into waters deeper than 75 fm. Additionally, one waypoint that is proposed to be edited (#199) actually moves the 60 fm RCA shoreward boundary to waters less than 50 fm. Given that these are the waypoint coordinates that were submitted as is and analyzed as such, it does not appear that such adjustments should be accommodated. It appears that there is no alternate way to address industry's proposal at this time. In the future, however, industry may wish to re-submit a different set of coordinates for consideration.

For this proposal, had the adjustments been deemed reasonable (at least from the initial analysis standpoint), fishing opportunities would have been increased for those members of the fleet fishing out of the greater San Diego area. Also, there would have been no conflicts with existing MPAs.

San Diego: Option A and Option B

Industry also submitted another proposal to accommodate an adjustment to the 60 fm RCA shoreward boundary west of San Diego that would allow better access to a tip of a reef. This proposal was submitted to consider one of two options.

- Option A: Modify the 60 fm contour between waypoints #205 and #207 by adjusting waypoint #206, or
- Option B: Modify the 60 fm contour between waypoints #206 and #207 by adding a new waypoint

As proposed, Option A requests that the 60 fm waypoint #206 be moved whereas Option B requests that a new waypoint be inserted between waypoint #206 and #207. Moving the existing waypoint #206, as proposed, results in a move of approximately 228 meters (approximately 250 yards).

Table B-2 through Table B-4 show the waypoint adjustments outlined above for both proposals. Figure B-2 and Figure B-3 also show the waypoint adjustments with Figure B-3 restricted to the Option A proposal. At the April 2013 Council meeting, the GAP recommended two Southern California Bight adjustments be analyzed by the Groundfish Management Team (GMT) for consideration by the Council. The Groundfish Advisory Subpanel (GAP) pointed out that with existing lines; it is difficult to fish a particular reef in this area in a prevailing current. The GAP also pointed out that there is some room to the south and west of the reef that would fix this problem if either of the two options were implemented for the San Diego proposal.

Upon review and analysis, an alternate option is presented here. This alternate option better aligns the RCA shoreward boundary to the 60 fm contour and eliminates the proposed access to fishing areas that are much deeper than 60 fm. Under this alternate option proposal, one new waypoint is added (proposed waypoint #5) between existing waypoint # 198 and existing waypoint #199. It removes the addition of new waypoints #1, #2, #3, and #4 and eliminates modifying existing waypoint # 199. The detailed adjustments for this new set of coordinate adjustments are presented in Table B-3 and Figure B-3.

Comparison of the Management Options

Biological Impacts: The non-trawl fixed-gear fisheries do not require logbooks to be completed and as such, it is very difficult to determine the species that may be taken in the proposed area and/or adjacent areas. Reporting of fishing areas is limited to documentation of Fish and Wildlife catch block numbers on the commercial landings receipts. These, however, cover 10x10 mile grids and do not lend themselves to accurate accounting of what species were caught from any specific areas. To the degree that there is not enough precise correlation between recorded catch by species and recorded fishing areas (blocks) under the action alternatives, there could be an increase of OFS, other fish species, and the take of protected species in the opened areas.

Under Option B, the issue of having access to fishing areas much deeper than 60 fm in this area is eliminated. The industry proposed option would have allowed fishing in an area as deep as 195 fm (Figure B-2). This alternate option better aligns the RCA shoreward boundary to the 60 fm contour. Under this alternate option, no biological impacts would be expected.

Socioeconomic Impacts: The changes proposed under the action alternatives may have a marginal socioeconomic benefit for the shoreside non-trawl fixed gear fishery managed under an RCA with a 60 fm contour as its shoreward boundary. Access to this additional small area would be beneficial to the fishing community from the greater San Diego area. The change in management cost, primarily those associated with law enforcement of the RCA boundaries, may be problematic.

Table B-2. Coordinate list for proposed modifications to the 60 fm RCA shoreward boundary off Del Mar, California.

	Boundary Line	Coordinates
ID	Name	Degrees, decimal minutes
198	Current waypoint (keep)	32°57.39' N, 117°18.72' W
--	Proposed modification (add after #198)	32°56.50' N, 117°19.80' W
--	Proposed modification (add after #198)	32°56.50' N, 117°19.72' W
--	Proposed modification (add after #198)	32°56.36' N, 117°19.06' W
--	Proposed modification (add after #198)	32°56.24' N, 117°19.04' W
--	Proposed modification (add after #198)	32°56.00' N, 117°19.16' W
199	Proposed modification (modify #199)	32°55.64' N, 117°18.46' W
200	Current waypoint (keep)	32°52.81' N, 117°17.09' W

Table B-3. Alternate option for the Del Mar proposal that modifies the 60 fm RCA shoreward boundary off Del Mar, California.

	Boundary Line	Coordinates
ID	Name	Degrees, decimal minutes
198	Current waypoint (keep)	32°57.39' N, 117°18.72' W
--	Proposed modification (add between waypoints #198 and #199)	32°56.00' N, 117°19.16' W
199	Current waypoint (keep)	32°55.64' N, 117°18.46' W

Table B-4. Coordinate list for proposed modifications to the 60 fm RCA shoreward boundary south of Del Mar, west of San Diego, California. This proposal is made under two Options: Option A would adjust waypoint #206 and Option B proposes to add a waypoint between waypoints #206 and #207.

	Boundary Line	**Coordinates**
ID	**Name**	**Degrees, decimal minutes**
Option A		
205	Current waypoint (keep)	32°45.58' N, 117°22.38' W
206	Proposed modification (modify #206)	32°44.89' N, 117°21.89' W
207	Current waypoint (keep)	32°43.52' N, 117°19.32' W
Option B		
206	Current waypoint (keep)	32°44.98' N, 117°22.87' W
--	Proposed modification (add between #206 and #207	32°44.89' N, 117°21.89' W
207	Current waypoint (keep)	32°43.42' N, 117°19.32' W

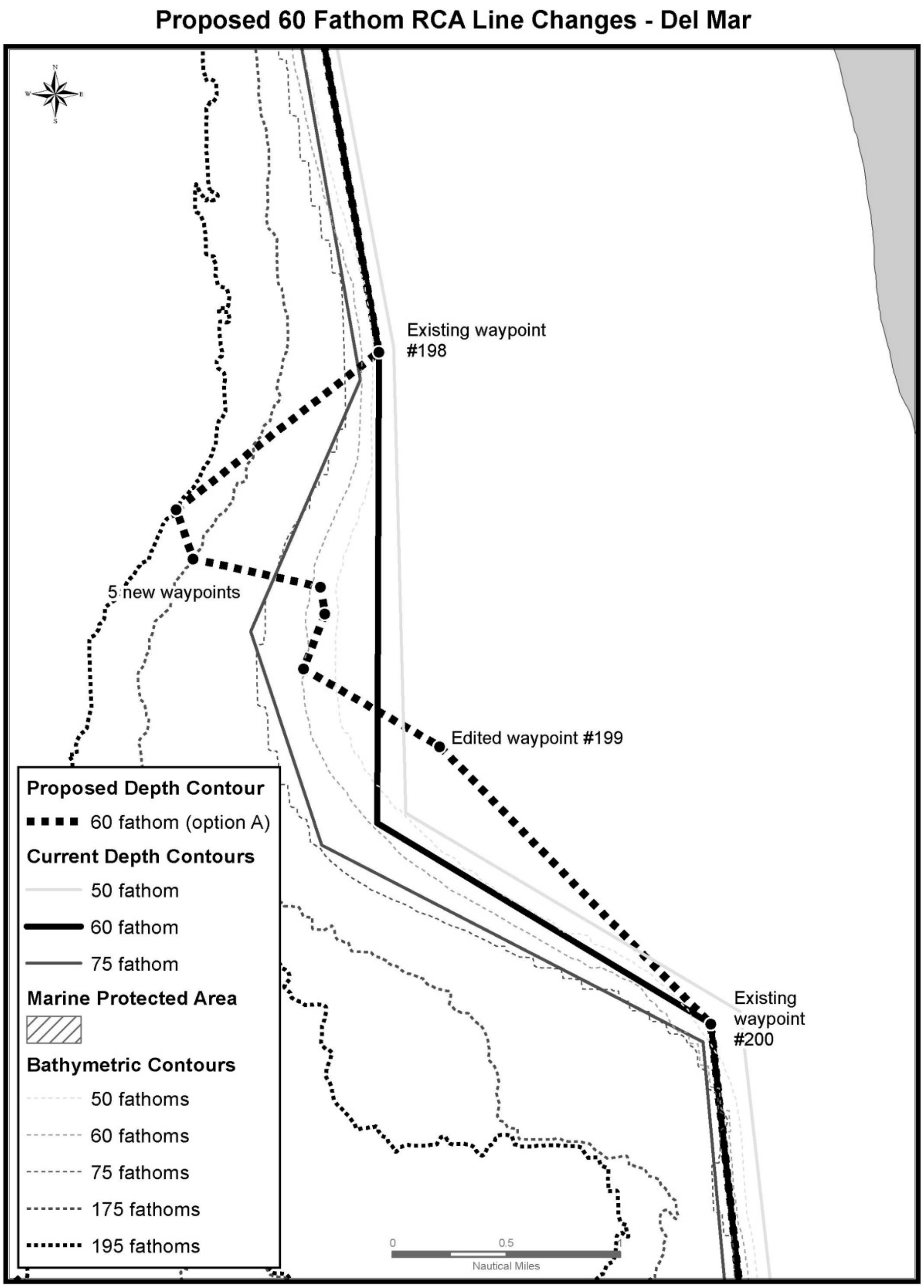

Figure B-2. Modification to the 60 fm contour off Del Mar, California, proposed by industry. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

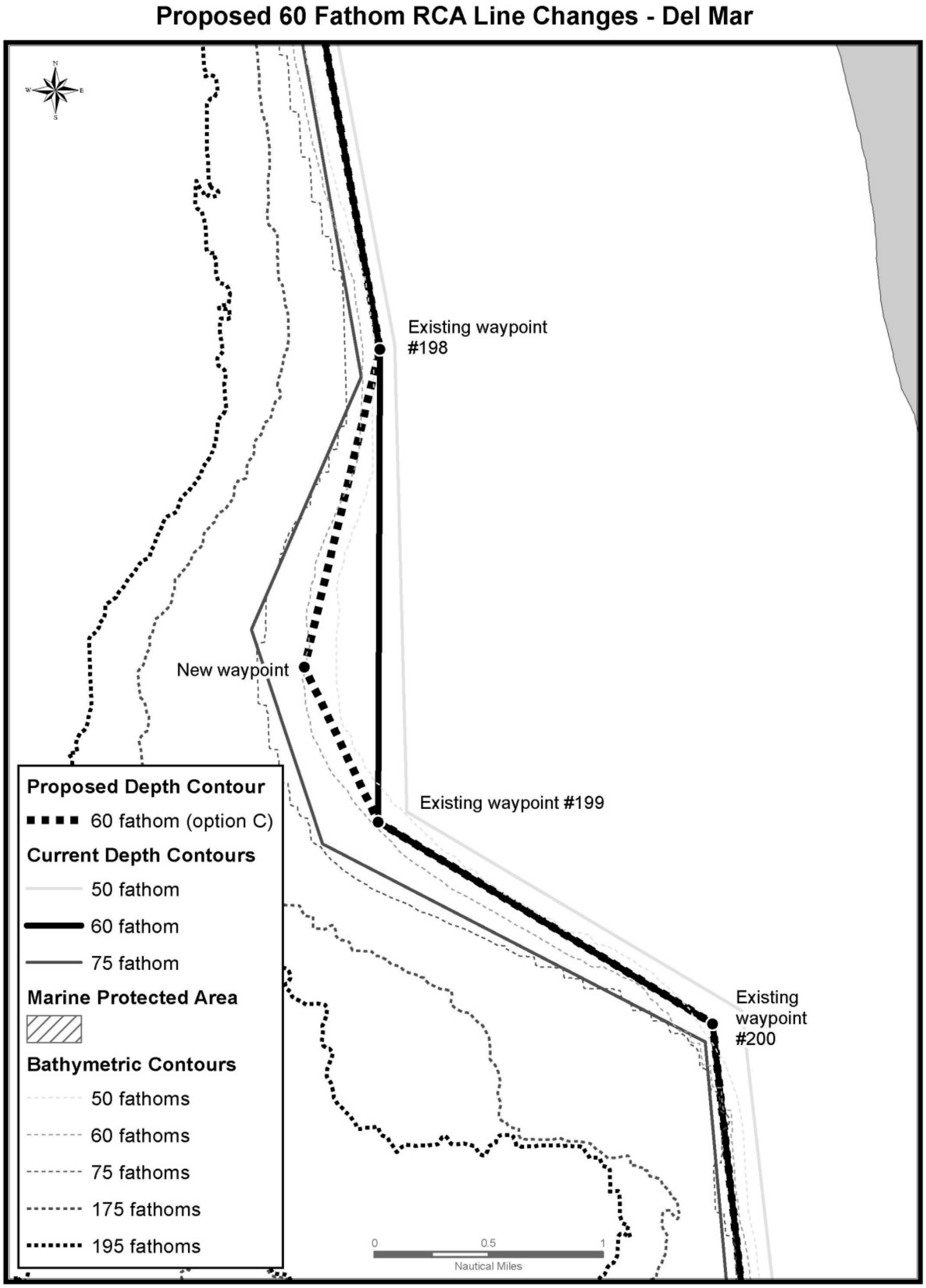

Figure B-3. Modification to the 60 fm contour off Del Mar, California, proposed by CDFW. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

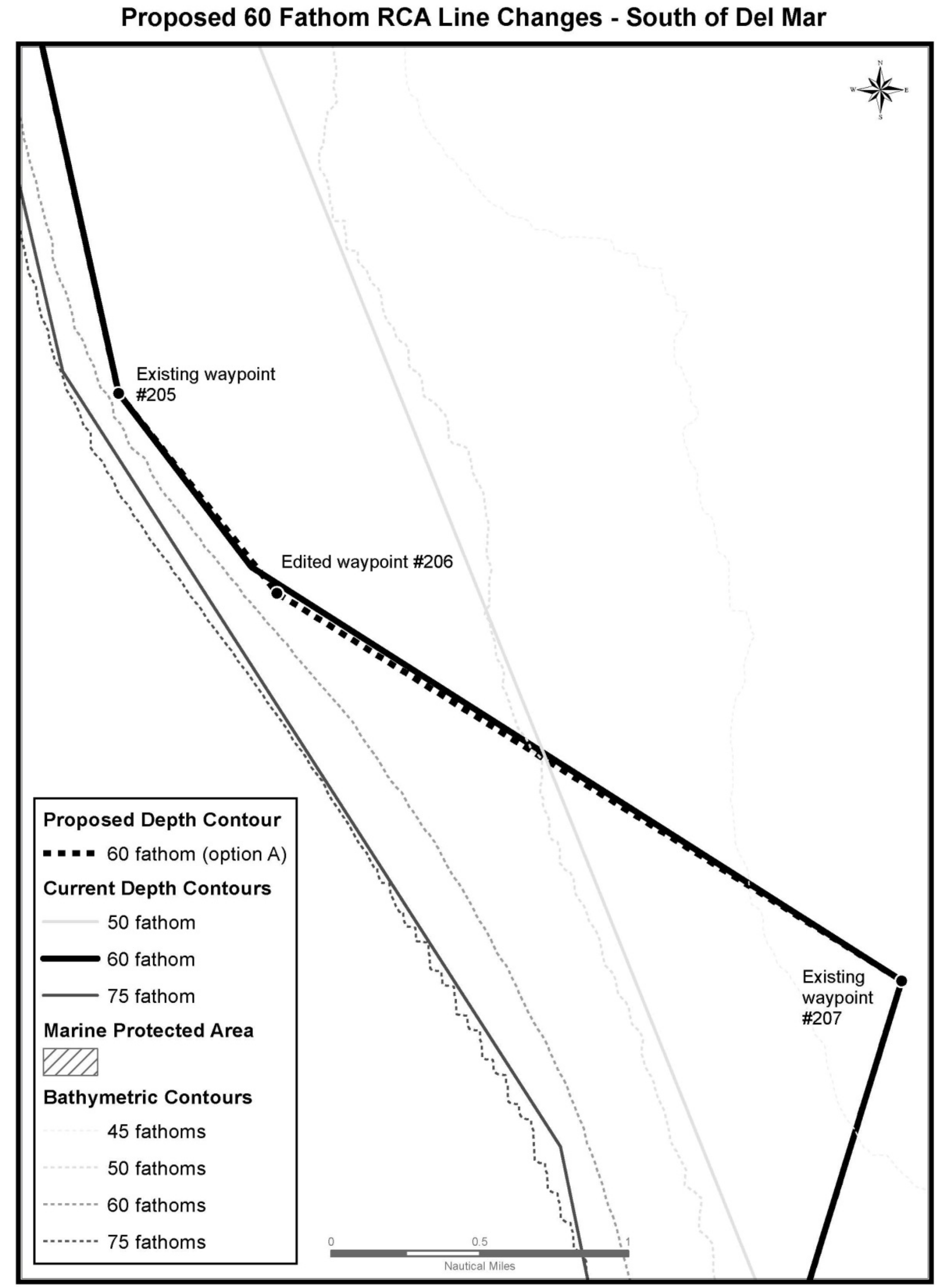

Figure B-4. Modification to the 60 fm contour south of Del Mar, west of San Diego, California, proposed by industry. This version shows waypoint #206 as an edited adjustment (Option A). Option B would be to add this waypoint between waypoints #206 and #207. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

B.1.2.2 Modifications of the 50 fm Depth Contour: Northern Channel Islands Proposal

During the 2013-2014 biennial management cycle, the 50 fm depth contour was used as the shoreward boundary of the recreational RCA (660.360). This boundary is intended to reduce bycatch of overfished species (OFS) such as bocaccio, canary, cowcod, and yelloweye rockfishes.

Need for Action

The current 50 fm depth contour specified in regulation at 50 CRF 660.72(c) approximates the 50 fm isobath around the north Channel Islands – San Miguel, Santa Rosa, and Santa Cruz. To allow better access to non-trawl fishing areas for non-OFS species while maintaining the intent of the 50 fm line, better alignment of the 50 fm line with the 50 isobath is necessary for waters off California.

Management Options

No Action: Under No Action (described in section 2.4.1 of the 2013-2014 EIS) the 50 fm depth contour created by the waypoints currently listed at 50 CRF 660.72(c) would be retained in 2015-2016 and beyond.

Options: Under the Options the 50 fm depth contour would more closely align with actual bathymetry in one of the two 50 fm proposals. These changes are based on proposals submitted by industry to modify the 50 fm RCA by modifying existing waypoints and adding new waypoints to the existing set(s).

- Modify the 50 fm depth contour between waypoints #2 and #4 by adjusting waypoint #3 with a new set of coordinates,
- Modify the 50 fm depth contour between waypoints #4 and #5 by adding five new waypoints,
- Modify the 50 fm depth contour between waypoints #20 and #21 by adding a new waypoint,
- Modify the 50 fm depth contour between waypoints #21 and #23 by adjusting waypoint #22,
- Modify the 50 fm depth contour between waypoints #23 and #25 by adjusting waypoint #24, and
- Modify the 50 fm depth contour between waypoints #25 and #26 by adding a new waypoint.

One problem to note is that the new point inserted between waypoint 25 and 26 causes the modified 50 fm line to cross over the 60 fm line.

Table B-5 shows the revised coordinates for the proposed changes as outlined above. Figure B-4 also shows the waypoint adjustments.

Upon review and analysis, an alternate option is presented here. For the Northern Channel Islands, this new alternate proposed option would better align the RCA shoreward boundary to the 50 fm contour around the Northern Channel Islands. In doing so, it would also provide more fishing areas. This proposal would adjust existing waypoint #3 and add a new waypoint between the existing waypoint #2 and the adjusted waypoint #3. All the other proposed industry adjustments are left as proposed. The details of this alternate option are given in Table B-6 and Figure B-6.

Northern Channel Islands
Industry submitted a proposal to make a number of waypoint adjustments around the northern Channel Islands, California, to accommodate increased fishing opportunities. This proposal was not part of the April 2014 Council meeting motion, but is included in this analysis to address an additional proposal that was received late. The GMT did note in their November 2013 statement (Agenda Item H.3.b GMT Report, November 2013) that it did not have the time (at that time) to determine if there were other

waypoints that should be added to the list (the Del Mar and San Diego proposals). This Channel Islands proposal should be considered in reference to that comment.

The proposed waypoint adjustments do overlap with some existing MPAs around the Channel Islands. Also, Essential Fish Habitat (EFH) areas need to be considered, although none were specifically cross-referenced for this analysis. Specific coordinates of EFH area may be found in Federal Regulations 50 CFR 660.75-79. Aside from concerns regarding MPAs and EFHs, access to these areas would be beneficial to the fishing community from the greater Santa Barbara area.

Comparison of the Management Options

Biological Impacts: Increased opportunity for the recreational sector would be accommodated by these changes. The likelihood that increased encounters with overfished species may also occur, would probably be minimal. However, no quantitative evaluations have been made to explore this possibility. When the 50 fm contour was implemented, it eliminated some confusion about fishing the 14 mile bank and 60 mile bank for rockfish (as these seamounts are both between 50 and 60 fm deep).

Under the alternate option, more fishing area would be allowed, without an expected increase in overfished species encounters. This is surmised because the increased area does not extend into appreciably deeper habitat where increased encounters of overfished species could potentially occur.

Socioeconomic Impacts: The changes proposed under the action alternatives may have a marginal socioeconomic benefit for the recreational fishery managed under an RCA with a 50 fm contour as its shoreward boundary. Access to this additional small area would be beneficial to the fishing community from the greater Santa Barbara area, but to what degree it is unknown. The change in management cost, primarily those associated with law enforcement of the RCA boundaries, may be problematic.

Table B-5. Coordinate list for proposed modifications to the 50 fm boundary around the northern Channel Islands, California.

	Boundary Line	Coordinates
ID	Name	Degrees, decimal minutes
2	Current waypoint (keep)	34°07.80' N, 120°30.99' W
3	Proposed modification (modify #3)	34°08.770' N, 120°25.740' W
4	Current waypoint (keep)	34°05.85' N, 120°17.13' W
--	Proposed modification (add after #4)	34°05.73' N, 120°05.93' W
--	Proposed modification (add after #4)	34°06.140' N, 120°04.860' W
--	Proposed modification (add after #4)	34°05.700' N, 120°03.170' W
--	Proposed modification (add after #4)	34°05.670' N, 119°58.980' W
--	Proposed modification (add after #4)	34°06.340' N, 119°56.780' W
5	Current waypoint (keep)	34°05.57' N, 119°51.34' W
20	Current waypoint (keep)	33°50.97' N, 119°57.03' W
--	Proposed modification (add between #20 and #21)	33°50.250' N, 120°00.00' W
21	Current waypoint (keep)	33°50.03' N, 120°03.00' W
22	Proposed modification (modify #22)	33°51.060' N, 120°03.730' W
23	Current waypoint (keep)	33°54.49' N, 120°12.85' W
24	Proposed modification (modify #24)	33°58.900' N, 120°20.150' W
25	Current waypoint (keep)	34°00.71' N, 120°28.21' W
--	Proposed modification (add between #25 and #26)	34°02.200' N, 120°30.370' W
26	Current waypoint (keep)	34°03.60' N, 120°30.60' W

Table B-6. Coordinate list for alternate option modifications to the 50 fm boundary around the northern Channel Islands, California.

	Boundary Line	Coordinates
ID	Name	Degrees, decimal minutes
2	Current waypoint (keep)	34°07.80' N, 120°30.99' W
--	Proposed modification (add after # #2)	34°08.42' N, 120°27.92' W
3	Proposed modification	34°09.31' N, 120°27.81' W
4	Current waypoint (keep)	34°05.85' N, 120°17.13' W
--	Proposed modification (add after #4)	34°05.73' N, 120°05.93' W
--	Proposed modification (add after #4)	34°06.140' N, 120°04.860' W
--	Proposed modification (add after #4)	34°05.700' N, 120°03.170' W
--	Proposed modification (add after #4)	34°05.670' N, 119°58.980' W
--	Proposed modification (add after #4)	34°06.340' N, 119°56.780' W
5	Current waypoint (keep)	34°05.57' N, 119°51.34' W
20	Current waypoint (keep)	33°50.97' N, 119°57.03' W
--	Proposed modification (add between #20 and #21)	33°50.250' N, 120°00.00' W
21	Current waypoint (keep)	33°50.03' N, 120°03.00' W
22	Proposed modification (modify #22)	33°51.060' N, 120°03.730' W
23	Current waypoint (keep)	33°54.49' N, 120°12.85' W
24	Proposed modification (modify #24)	33°58.900' N, 120°20.150' W
25	Current waypoint (keep)	34°00.71' N, 120°28.21' W
--	Proposed modification (add between #25 and #26)	34°02.200' N, 120°30.370' W
26	Current waypoint (keep)	34°03.60' N, 120°30.60' W

Proposed 50 Fathom RCA Line Changes - Northern Channel Islands

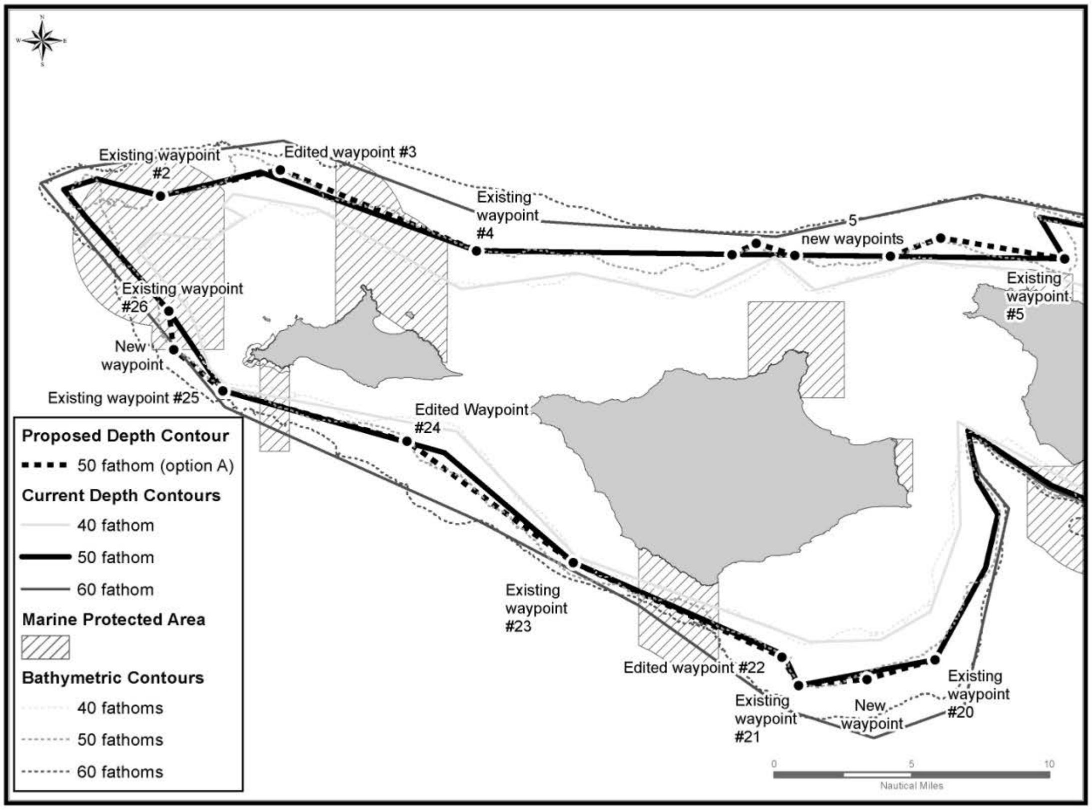

Figure B-5. Modifications to the 50 fm contour around the northern Channel Islands of San Miguel, Santa Rosa, and Santa Cruz Islands, California, proposed by industry. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May 4, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

Proposed 50 Fathom RCA Line Changes - Northern Channel Islands

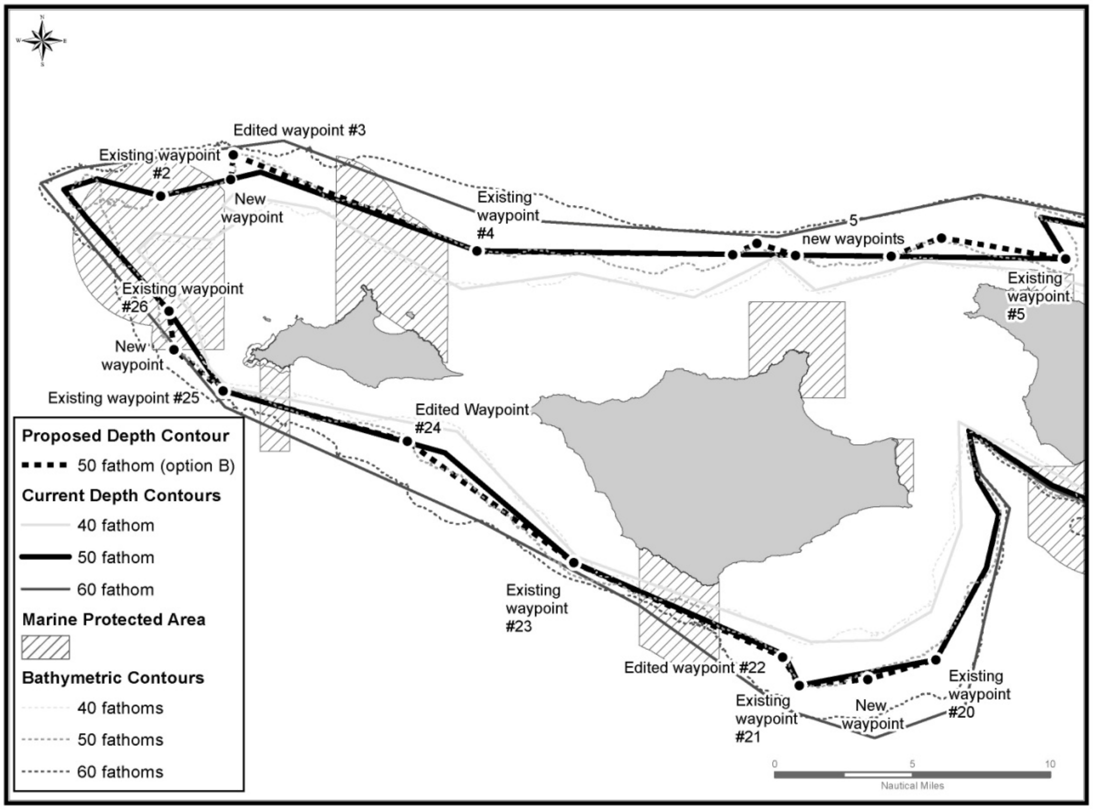

Figure B-6. Modification to the 50 fm contour around the northern Channel Islands of San Miguel, Santa Rosa, and Santa Cruz Islands, California, proposed by CDFW. ***Bathymetry based on NOAA National Geophysical Data Center, U.S. Coastal Relief Model, Retrieved May, 2014, http://www.ngdc.noaa.gov/mgg/coastal/crm.html.***

B.2 Establish New Rockfish Conservation Area Coordinates – 300 and 350 fm

Need for Action

The Pacific Fishery Management Council (the Council) requested that the Groundfish Management Team (GMT) propose coordinates for and analyze possible 300 and 350 fm Rockfish Conservation Areas (RCAs) north of 40°10' N. latitude. These RCAs were proposed as possible management measures to aid in reducing catch of rougheye and blackspotted rockfish during the 2015-16 biennium and could potentially be applied to all sectors through routine or inseason action. The GMT intends to provide analysis of these areas by sector for the June 2014 Council meeting. Other analysis regarding RCA changes can be found in the Final Environmental Assessment for Trawl RCA Boundary Modifications, completed by the National Marine Fisheries Service (NMFS) in February 2014.

Management Options

No Action: The deepest RCA boundaries available in regulation would be 250 fm.

Options: At this time, the following latitude and longitude coordinates (i.e., waypoints) are provided as a starting point for the discussion that is needed to refine and identify possible 300 and 350 fm lines (Table B-7 and Table B-8). These waypoints were developed using geographic information system (GIS) software (ArcGIS 10.1) and are based on 300 and 350 fm bathymetry contours.[1] More information, such as the files used to create these lines, will be available for the public at the following FTP site: ftp://ftp.pcouncil.org/pub/GMT/Proposed_300_350_RCAs/. Given other workload, the GMT was not able to produce an analysis of impacts resulting from these lines for the June Briefing Book. The GMT aims to produce a supplemental report at the June Council meeting focused on logbook and observer data to characterize how catch of target species and bycatch of rougheye and other species would be altered by the RCA boundary lines. The proposed waypoints are provided now to get feedback from the fishing industry regarding how these lines may affect their operations and how the lines might be improved to achieve objectives (e.g., reduce rougheye rockfish catch while retaining productive fishing grounds for other species).

Figure B-7 provides an example of issues that emerged when developing these proposed waypoints. First, the 300 and 350 fm bathymetry contours are very detailed and creating RCA lines directly following these contours would not be practical. Therefore, these contours were approximated and straightened using several tools available in ArcGIS.[2] Second, there were several areas where the existing 250 fm RCA line (unmodified for petrale, defined in regulation at §660.74) touched or overlapped the 300 and 350 fm bathymetry contours.[3] When this occurred, the GMT analyst visually and manually adjusted these lines to pull them outside of the 250 fm RCA (Figure B-8 provides an example). More information about where these manual adjustments were made can be provided in June if requested.

Given the availability and resolution of the data and the complexity of certain features like undersea canyons, matching RCA boundary lines to actual bathymetry is difficult. The original and current purpose of boundary lines is not to match the bathymetry perfectly, but to create regulatory lines that

[1] Source of bathymetry contours: NOAA National Geophysical Data Center, http://www.ngdc.noaa.gov/mgg/bathymetry/relief.html (accessed 5/19/14).
[2] The following ArcGIS 10.1 tools were used to develop, simplify, and straighten the 300 fm and 350 fm bathymetry contour lines: "Neighborhood Selection (Geostatistical Analyst)", "Simplify Line (Cartography)", and the "Edit Vertices" tools.
[3] The coordinates of existing RCA boundary lines, including the 250 fm line, can be downloaded from the NMFS West Coast Region's website: http://www.westcoast.fisheries.noaa.gov/fisheries/management/groundfish_closures/rockfish_areas.html

approximate depth contours, would be enforceable, and would be effective at lowering bycatch to the desired degree. To overcome this difficultly when the currently existing RCAs were first developed, RCA lines such as the 250 fm line were manually adjusted after feedback from the fishing industry, enforcement, and the GMT (i.e., RCAs were designed to approximate bathymetry contours).

The 300 and 350 fm RCA lines and waypoints shown in this document could be viewed as the first of many steps. Adjusting these lines could be the next step of the process. Various methods can be used to adjust these lines to approximate the depth contours while at the same time being enforceable, understandable, logical, and be effective at lowering bycatch. One approach that may be used to adjust these base lines is the traditional approach that was used when RCAs were first created (i.e., through consultations with NMFS, States, Tribes, GAP, GMT, EC, etc.). Various analytical tools can be applied to help this process and ensure that existing RCA lines that are shallower (e.g., 250 fm line) do not cross the new "deeper" RCA lines (i.e., the 300 and 350 fm lines). One approach that can be applied to ensure that lines do not cross is to set the RCAs equal at those locations. That is, when the 300 or 350 fm line crosses the 250 fm line, the 300 or 350 fm line would simply follow the 250 fm line. This approach is often used now to correct RCA lines that cross. An example of this approach is shown in Figure B-9. Other approaches could also be applied. For example, one could simply extend the existing 250 fm line in increments (e.g., by 0.5 nm, 1 nm, 3 nm, etc.) to create new RCAs that do not necessarily approximate depth contours but instead, follow the pattern of shallower RCA lines that currently exist. An example of this novel approach is shown in Figure B-10.

Table B-7. Proposed waypoints (decimal degrees) for the proposed 300 fm RCA line.

	latitude	longitude		latitude	longitude		latitude	longitude		latitude	longitude
1	48.23805	-125.722	40	46.53289	-124.586	79	44.22716	-125.008	118	40.62666	-124.653
2	48.2233	-125.684	41	46.52164	-124.55	80	43.95658	-124.98	119	40.56284	-124.714
3	48.15031	-125.764	42	46.47564	-124.544	81	43.89512	-124.934	120	40.51873	-124.696
4	48.09913	-125.794	43	46.30289	-124.676	82	43.815	-124.916	121	40.4207	-124.621
5	48.07393	-125.696	44	46.29164	-124.667	83	43.78082	-124.794	122	40.37395	-124.546
6	47.89843	-125.635	45	46.2417	-124.566	84	43.65907	-124.729	123	40.28916	-124.542
7	47.89191	-125.586	46	46.22092	-124.648	85	43.49788	-124.739	124	40.31489	-124.854
8	47.89583	-125.548	47	46.17638	-124.703	86	43.43511	-124.862	125	40.29333	-124.838
9	47.91317	-125.49	48	46.10217	-124.768	87	43.38396	-124.752	126	40.26391	-124.753
10	47.96345	-125.41	49	46.08716	-124.831	88	43.33254	-124.778	127	40.24733	-124.651
11	48.02782	-125.363	50	46.05116	-124.842	89	43.33052	-124.888			
12	47.84189	-125.331	51	46.00373	-124.835	90	43.02533	-124.909			
13	47.76836	-125.132	52	45.93873	-124.77	91	42.94672	-124.942			
14	47.71967	-125.127	53	45.79726	-124.77	92	42.81248	-124.93			
15	47.5583	-125.164	54	45.7633	-124.788	93	42.7113	-124.868			
16	47.5248	-125.036	55	45.74414	-124.778	94	42.72986	-124.835			
17	47.45409	-124.97	56	45.56331	-124.768	95	42.71373	-124.769			
18	47.47689	-124.915	57	45.39798	-124.713	96	42.63573	-124.738			
19	47.46197	-124.876	58	45.39849	-124.743	97	42.53415	-124.829			
20	47.40913	-124.82	59	45.27022	-124.778	98	42.5064	-124.777			
21	47.33607	-124.813	60	45.13998	-124.658	99	42.48499	-124.855			
22	47.33427	-124.855	61	45.13577	-124.702	100	42.33332	-124.744			
23	47.30371	-124.91	62	45.17175	-124.748	101	42.30082	-124.808			
24	47.23329	-124.918	63	45.10914	-124.782	102	42.20673	-124.696			
25	47.25581	-125.027	64	45.03192	-124.772	103	41.92915	-124.628			
26	47.09323	-125.027	65	44.96264	-124.714	104	41.79916	-124.558			
27	47.05663	-124.969	66	44.94028	-124.755	105	41.55749	-124.538			
28	46.99229	-125.022	67	44.95702	-124.818	106	41.51464	-124.556			
29	46.91509	-125.038	68	44.92048	-124.846	107	41.46701	-124.528			
30	46.858	-125.006	69	44.90414	-124.942	108	41.33499	-124.511			
31	46.84235	-124.95	70	44.84668	-124.906	109	41.1206	-124.426			
32	46.8258	-124.958	71	44.79168	-124.953	110	40.92916	-124.562			
33	46.67913	-124.861	72	44.62085	-124.888	111	40.80083	-124.561			
34	46.6369	-124.861	73	44.54914	-124.932	112	40.81164	-124.615			
35	46.61414	-124.819	74	44.47665	-124.945	113	40.74833	-124.553			
36	46.63994	-124.734	75	44.36959	-124.933	114	40.69422	-124.559			
37	46.56586	-124.639	76	44.36968	-124.885	115	40.68908	-124.641			
38	46.5224	-124.713	77	44.32161	-124.911	116	40.67205	-124.643			
39	46.49695	-124.677	78	44.25498	-125	117	40.66271	-124.593			

Table B-8. Proposed waypoints (decimal degrees) for the proposed 350 fm RCA line.

	latitude	longitude		latitude	longitude		latitude	longitude		latitude	longitude
1	48.20789	-125.821	40	46.80554	-125.088	79	44.77745	-124.983	118	41.99173	-124.696
2	48.20766	-125.791	41	46.80914	-124.972	80	44.69275	-124.921	119	41.55916	-124.553
3	48.23371	-125.727	42	46.67414	-124.889	81	44.60287	-124.908	120	41.51402	-124.566
4	48.20757	-125.714	43	46.64865	-124.909	82	44.52987	-124.952	121	41.45619	-124.54
5	48.12996	-125.794	44	46.6096	-124.87	83	44.47795	-124.967	122	41.32876	-124.524
6	48.09757	-125.798	45	46.60958	-124.82	84	44.30117	-124.965	123	41.16406	-124.447
7	48.06944	-125.708	46	46.62941	-124.726	85	44.2578	-125.003	124	41.11057	-124.456
8	47.96539	-125.669	47	46.57146	-124.652	86	44.22915	-125.014	125	41.04448	-124.505
9	47.93788	-125.703	48	46.56145	-124.685	87	43.92831	-125.002	126	40.96423	-124.637
10	47.92745	-125.702	49	46.5183	-124.737	88	43.90044	-124.947	127	40.85553	-124.64
11	47.89265	-125.642	50	46.48883	-124.683	89	43.78876	-124.922	128	40.82421	-124.656
12	47.8835	-125.587	51	46.51937	-124.613	90	43.75253	-124.828	129	40.73507	-124.567
13	47.89996	-125.5	52	46.51381	-124.554	91	43.59856	-124.755	130	40.73426	-124.567
14	47.98708	-125.361	53	46.47654	-124.55	92	43.57113	-124.774	131	40.69786	-124.566
15	47.86287	-125.342	54	46.31247	-124.679	93	43.61883	-124.832	132	40.69509	-124.649
16	47.82184	-125.368	55	46.31978	-124.741	94	43.60081	-124.851	133	40.66907	-124.65
17	47.76433	-125.14	56	46.28832	-124.745	95	43.5546	-124.792	134	40.66434	-124.617
18	47.7158	-125.133	57	46.25437	-124.618	96	43.50623	-124.815	135	40.56374	-124.718
19	47.62014	-125.174	58	46.11664	-124.777	97	43.49837	-124.858	136	40.52059	-124.702
20	47.60496	-125.213	59	46.0912	-124.835	98	43.41441	-124.898	137	40.42083	-124.626
21	47.48363	-125.21	60	46.05164	-124.852	99	43.37613	-124.848	138	40.36875	-124.55
22	47.46343	-125.167	61	45.96473	-124.837	100	43.29472	-124.928	139	40.29397	-124.566
23	47.52303	-125.037	62	45.92786	-124.798	101	43.04086	-124.916	140	40.32119	-124.868
24	47.4408	-124.965	63	45.80497	-124.779	102	42.939	-124.952	141	40.28373	-124.851
25	47.46202	-124.942	64	45.78564	-124.828	103	42.81507	-124.95	142	40.24422	-124.775
26	47.45998	-124.88	65	45.76029	-124.808	104	42.68156	-124.88	143	40.24391	-124.682
27	47.40857	-124.823	66	45.72083	-124.842	105	42.6686	-124.848			
28	47.34138	-124.821	67	45.6871	-124.825	106	42.70941	-124.847			
29	47.33828	-124.859	68	45.69054	-124.779	107	42.71691	-124.833			
30	47.29996	-124.921	69	45.48589	-124.8	108	42.68499	-124.786			
31	47.24007	-124.933	70	45.40154	-124.748	109	42.63387	-124.757			
32	47.26666	-125.047	71	45.3675	-124.79	110	42.53112	-124.846			
33	47.09044	-125.036	72	45.26751	-124.781	111	42.51059	-124.797			
34	47.05555	-124.973	73	45.22428	-124.766	112	42.48839	-124.865			
35	47.01889	-125.007	74	45.05831	-124.828	113	42.43829	-124.833			
36	46.98667	-125.029	75	44.98262	-124.792	114	42.33006	-124.776			
37	46.91473	-125.044	76	44.95035	-124.951	115	42.30914	-124.861			
38	46.85661	-125.013	77	44.9005	-124.966	116	42.11665	-124.753			
39	46.85164	-125.081	78	44.84664	-124.933	117	42.0409	-124.779			

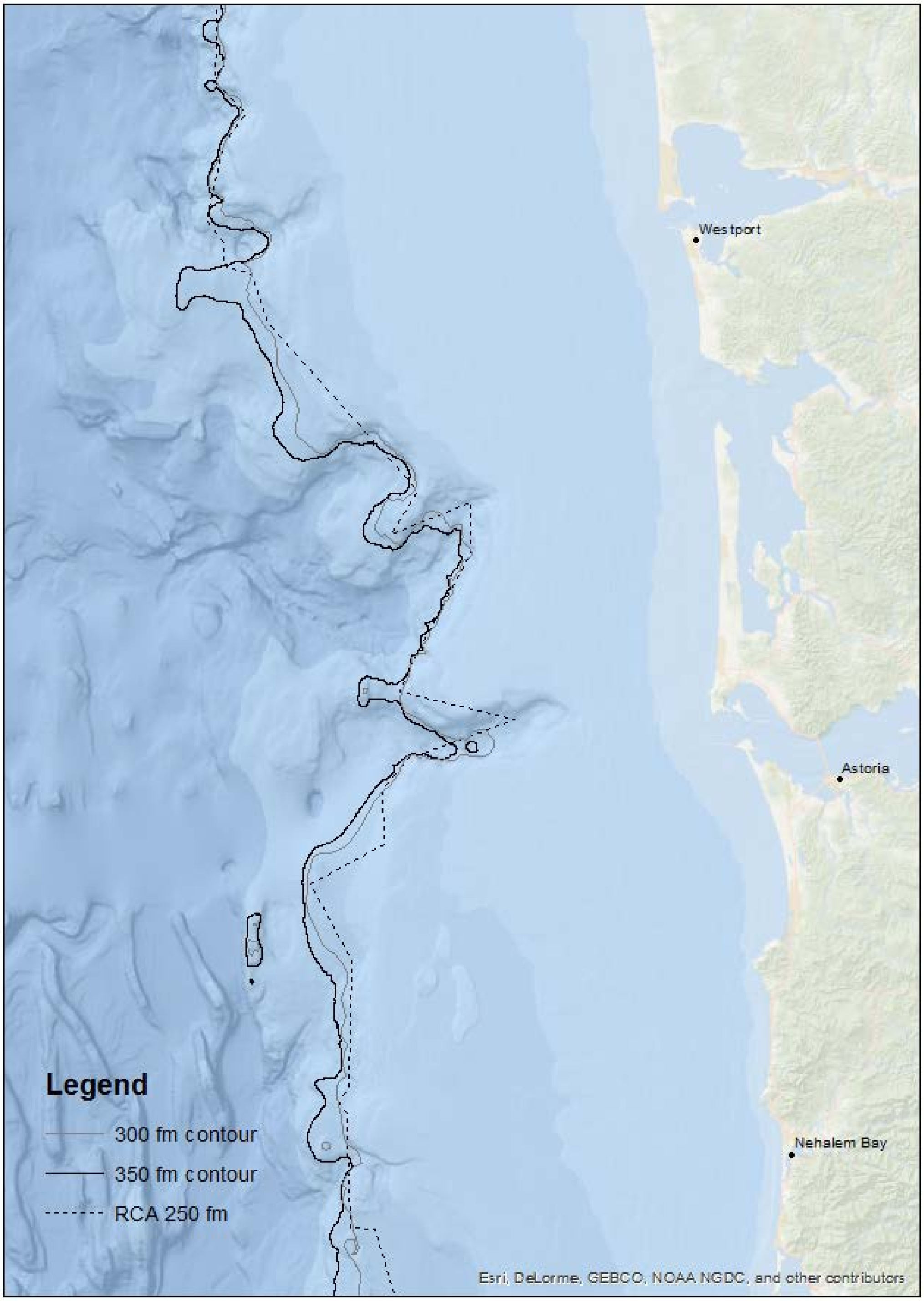

Figure B-7. An example of where the existing 250 fm Trawl RCA (unmodified for petrale sole) overlaps with the 300 and 350 fm bathymetry contours

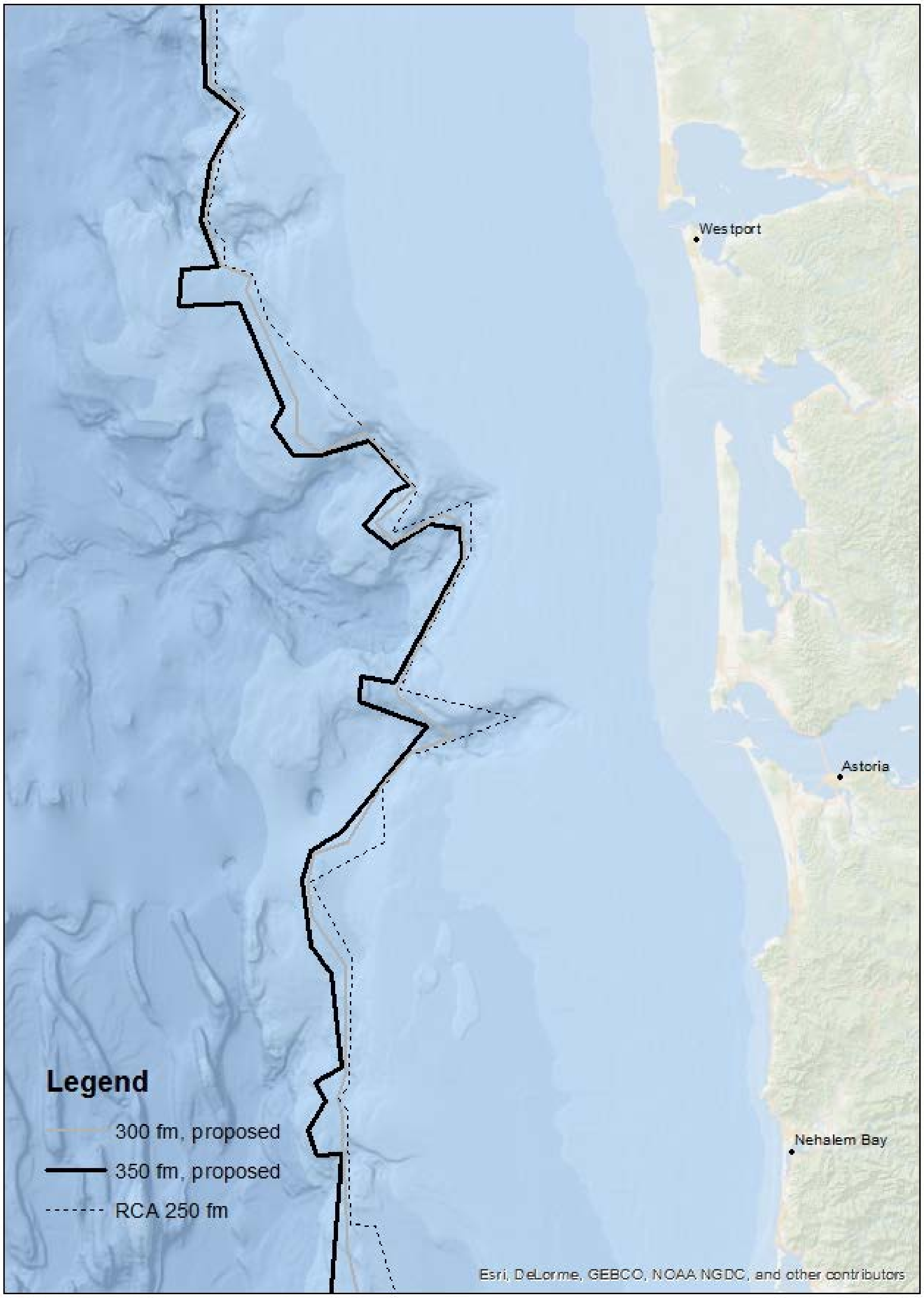

Figure B-8. An example of manual adjustments to the proposed 300 and 350 fm lines where they overlap with the existing 250 fm RCA line (unmodified for petrale sole).

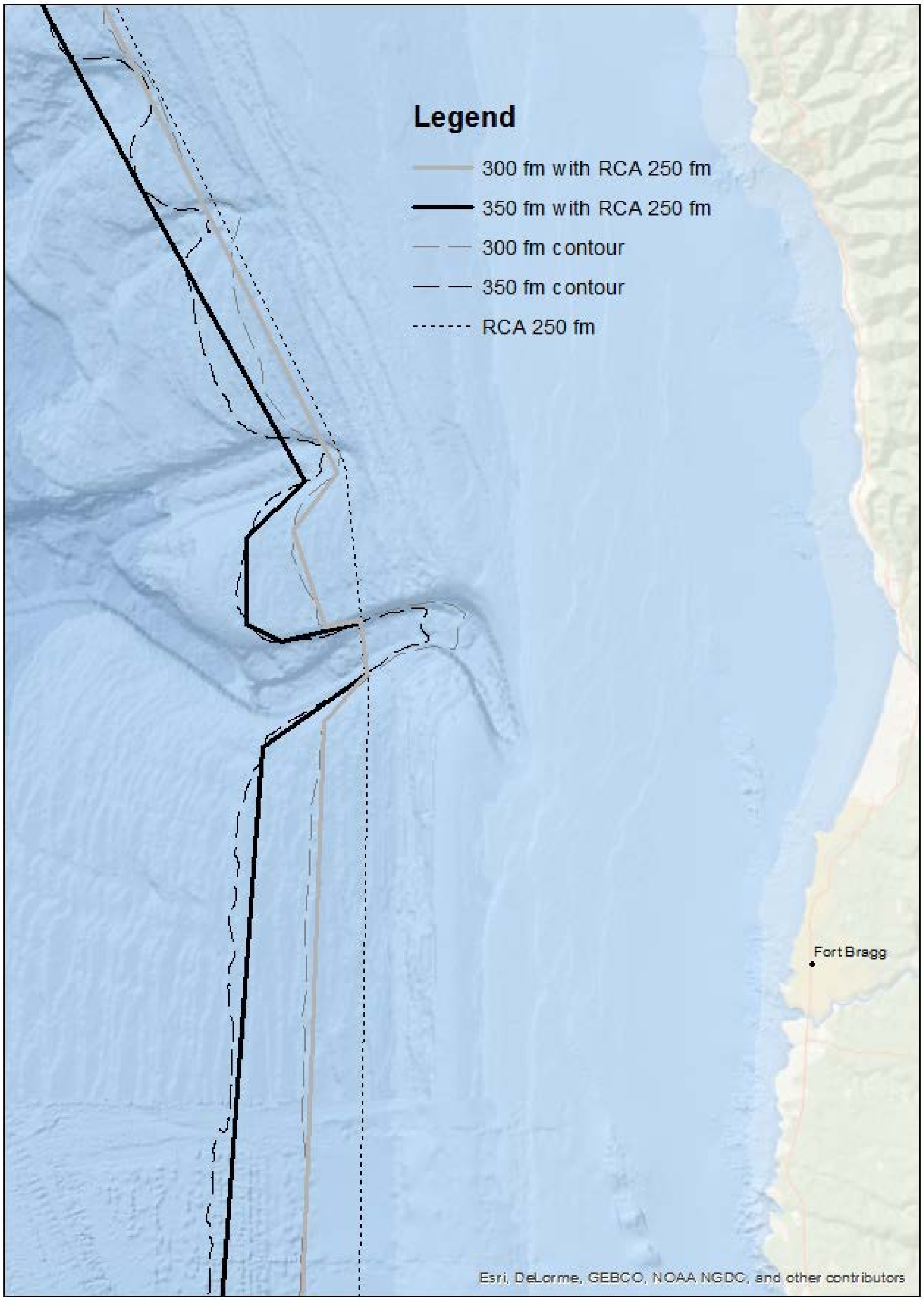

Figure B-9. An example of an approach to deal with areas where new RCA lines, based on 300 and 350 fm bathymetry contours, cross an existing RCA line (e.g., 250 fm line). In these areas, the new RCA lines could follow the existing RCA line.

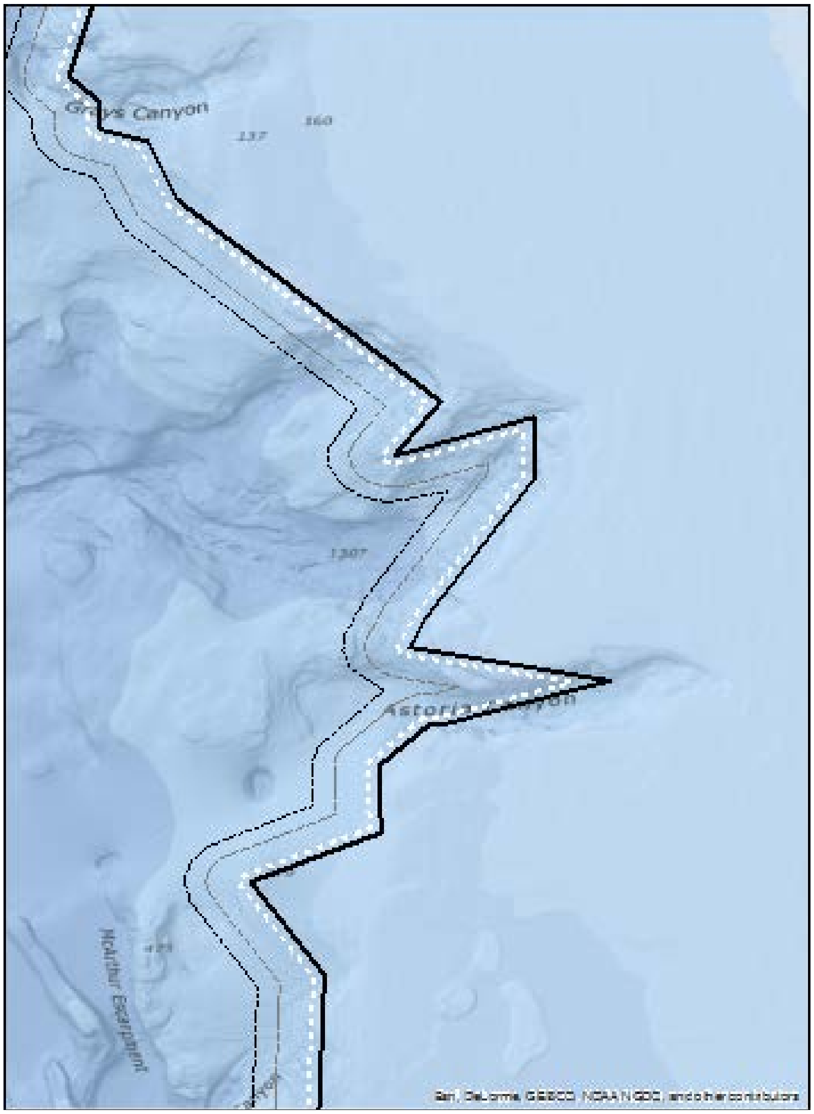

Figure B-10. An example of an approach to create new RCA lines by extending an existing 250 fm line in increments (e.g., by 0.5 nm, 1.5 nm, and 3 nm). These lines would follow the pattern of the existing RCA line which does not approximate bathymetry contours in all areas.

B.3 Trawl: Set-asides to cover carryover if trawl allocation exceeded

Analysis of this management measure was not received by the Advanced Briefing Book deadline; it is expected to be delivered as a Supplemental GMT Report.

B.4 Within Non-Trawl: Two-Year Yelloweye Sharing - Evaluating uncertainty of yelloweye catches in the nearshore and non-nearshore commercial fixed gear sectors

Need for Action

The Council is considering transferring 0.6 mt of the yelloweye rockfish non-trawl allocation fishery harvest guideline (HG) from the non-nearshore sector to the nearshore sector. Nearshore sector landings are often constrained due to amount of yelloweye rockfish provided to the nearshore sector. Further, shoreward adjustments of the non-trawl RCA (e.g., changing from 30 to 20 fm) are implemented when the yelloweye rockfish nearshore share or the non-trawl HG is projected to be exceeded. The Council considers the two-year allocations for yelloweye rockfish every biennial cycle based on the projected impacts, i.e., forecasts of total fishing mortality, provided by the GMT and other factors. The nearshore and non-nearshore sectors are assigned a "share" of the non-trawl allocation. The sectors' shares and projected impacts (i.e., total fishing mortality) for yelloweye are shown in Table B-9.

Table B-9. The sector shares and project impacts of yelloweye rockfish with and without the transfer of 0.6 mt.

		Without transfer		With transfer	
		2015	2016	2015	2016
non-nearshore	share	1.1	1.2	0.5	0.6
	projection	0.5	0.5	0.5	0.5
	difference	0.6	0.7	0.0	0.1
nearshore	share	1.2	1.3	1.8	1.9
	projection	1.1	1.1	1.1	1.1
	difference	0.1	0.2	0.7	0.8

The projected impacts and projection methods of yelloweye catch for 2015-2016 are more fully discussed in section 4.2.2.5 and Appendix A of the DEIS. The nearshore projected impacts are under discussion as well and may be subject to change depending on the Council's recommendations on the harvest guideline for the nearshore rockfish stock complex and related management measures.

The GMT has advised the Council, most recently in April that the catch estimates and model projections are subject to considerable uncertainty that the team has yet to fully evaluate.[4] This analysis uses a Monte Carlo simulation approach based on West Coast Groundfish Observer Program (WCGOP) sampling rates and observed patterns of yelloweye catch in these sectors to gauge the relative level of uncertainty surrounding yelloweye catches. This uncertainty is relevant here because, as shown in Table B-9, the 0.6 mt transfer would completely remove the buffer between the projected catch and the sector share in the non-nearshore sector and increase the buffer in the nearshore sector. And as it stands now, there is only a 0.1 to 0.2 mt buffer between the nearshore sectors' share and projected catch.

Background and Context

The GMT has been focused on the uncertainty in two separate but related estimates: (1) the retrospective annual estimates of total mortality produced by the Northwest Fisheries Science Center (NWFSC); and (2) the GMT's forecasts/projected impacts. The simulations used here focus primarily on evaluating the first. The uncertainty seen in the simulation results can then be related to the projected impacts and aid with interpretation of how confident we can be in those forecasts.

[4] PFMC Briefing Book April 2014, Agenda Item C.8.b, Supplemental GMT Report.

For highly discarded species like yelloweye, catch is not known with certainty because not all catch is observed. Annual mortality estimates are produced with statistical sampling and estimation methods that are inherently uncertain. The purpose of the GMT's catch projections is to inform the Council on what the annual catch estimates might be under a given management measure scenario. Like most all forecasts, they involve uncertainty as well. With the non-nearshore and nearshore projection models, the GMT provides the Council with point estimates of catch without any quantitative measure of uncertainty around those estimates. The Council, recognizing that the forecasts are uncertain, has often taken a precautionary approach in establishing sector shares and more formal sector allocations. The level of precaution or tolerable risk is a key policy decision. With increased access to and additional years of data from WCGOP, the GMT has begun attempts at better quantifying the uncertainty and informing the Council of the risks.

As brief background, uncertainty in measurements and estimation can be thought of in terms of accuracy and precision. These two terms are used differently among technical disciplines, but here we think of accuracy in terms of bias.[5] An unbiased estimate will accurately reflect the true value yet do so subject to some level of precision. Absent perfect precision, repeated estimates/measurements will vary from one another with the degree of variability proportional to the precision of the estimate/measurement. Highly imprecise estimates will vary widely, but if repeated and unbiased, the average of the estimates will reflect the true value accurately. In contrasting circumstances, it would be possible to have highly precise but inaccurate estimates/measurements. In such cases, repeated estimates/measurements would vary little but vary around something other than the true value.

WCGOP sampling and catch estimation methods are designed to produce unbiased, accurate estimates. There is little that can be done easily to evaluate if the accuracy is being achieved (the observer effect/bias where fishing vessels operate differently when an observer is aboard making the observations non-representative). Here we assume that are indeed accurate and that precision is the main source of uncertainty.

The precision of an estimate will vary largely based on two main variables: (1) the sampling rate/coverage level, and; (2) the variability and frequency of the event being measured. In general, precision will be greater with higher sampling coverage and regular, frequent catch events. In contrast, for a given level of sampling coverage, precision will be lower to the degree that the event is rare and variable.

Lastly, sampling uncertainty from limited precision would exist even if the unit being measured is fixed or static (e.g. the circumference of the Earth). The event we are focused on here is the yelloweye catch over a year, which is not likely to be fixed. Catch is expected to vary from year to year depending on fishing effort, the areas fished, changes in management regulations, etc. Moreover, the expectations for a rebuilding stock like yelloweye is that the catch rate will increase as the stock increases in abundance and expands its distribution, increases in density, or both. Imprecision in estimates makes upward trends difficult to detect. Increases in catch from one year to the next might be signal or could just be sampling noise. The same is true for downward trends where the encounter rate may have truly decreased. Making predictions about future catch with noisy historical data makes the forecasting challenge even more so.

Patterns of Yelloweye Catch and Observer Coverage in the Nearshore and Non-nearshore Sectors
As shown in Table B-10, annual estimates of yelloweye catch have shown a high degree of variability in both the nearshore and non-nearshore fixed gear sectors. As highlighted above, sampling error is likely a major component of the variability. Consistent with the latter, variability has been higher in the nearshore sector where sampling coverage levels have been lower (Table B-11 and Table B-12).

[5] For example, see Box 1.2 in National Research Council. Review of Recreational Fisheries Survey Methods. Washington, DC: The National Academies Press, 2006.

Variability can be described in absolute terms (i.e., in the unit of measurement), which in this case is catch weight expressed as metric tons (mt), or in relative terms (e.g. the coefficient of variation, which expresses the variability relative to the average value). Considering variability in absolute terms is important because the Council considers and recommends allocations and less formal apportionments of catch in terms of metric tons. Table B-10(c) displays the variability seen in metric tons by comparing the annual estimates against the grand mean (i.e., the average across all available annual estimates).

Relative measures of variability are also useful, especially for comparing variability between the sectors. For example, an estimate that is truly more imprecise than another may appear more precise when viewed in absolute terms simply because its average value is smaller. Table B-10 (b) shows one form of relative variability by comparing the annual estimates in each sector to the estimates made in the previous years. In the nearshore sector, estimates have dropped by 80 percent and increased by more than 800 percent. The non-nearshore sector has experience less variability in this measure, yet has seen a 75 percent drop and a 50 percent gain. Table B-10 (d) shows the percent difference of the annual estimates compared to the average over the timeframe ("grand mean"). This measure is of interest because such grand means of bycatch ratios currently serve as the foundation for the GMT's projection models for these sectors. Both sectors show wide variability on this measure as well further underscoring the challenge of forecasting yelloweye catches.

Table B-10. Variability of total mortality estimates for yelloweye rockfish in the nearshore and non-nearshore commercial fixed gear sectors, 2003-2012.

(a) NWFSC Total Mortality Estimate (source: GMMultiYr_DataProduct Dec. 23, 2013)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	0.3	1.1	0.9	0.8	1.9	2.5	0.5	0.1	0.8	1.8
Non-nearshore	1.6	1.1	0.6	0.7	0.7	0.8	1.2	0.3	0.3	0.3

(b) Annual estimate relative to estimate of previous year

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	--	3.67	0.82	0.89	2.38	1.32	0.20	0.20	8.00	2.25
Non-nearshore	--	0.69	0.55	1.17	1.00	1.14	1.50	0.25	1.00	1.00

(c) Difference (mt) between annual estimate and 2003-2012 average in each sector (nearshore = 1.1 mt, non-nearshore = 0.8 mt)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	-0.8	0.0	-0.2	-0.3	0.8	1.4	-0.6	-1.0	-0.3	0.7
Non-nearshore	0.8	0.3	-0.2	-0.1	-0.1	0.0	0.4	-0.5	-0.5	-0.5

(d) Difference between annual estimate and 2003-2012 average relative to average (i.e., the values reported in (c) divided by the average).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	0.27	1.00	0.82	0.73	1.73	2.27	0.45	0.09	0.73	1.64
Non-nearshore	2.00	1.38	0.75	0.88	0.88	1.00	1.50	0.38	0.38	0.38

Overview of the Data Used and Aim of the Simulation Methods
WCGOP provided the observer data sets matched to the data used for the GMT's nearshore and non-nearshore projection models. These datasets are considered confidential and therefore are available only to a subset of the team that have confidentiality agreements in place with WCGOP.

The basic observer coverage statistics for the non-nearshore and nearshore sectors are shown in Table B-11 and Table B-12. The WCGOP coverage rates reported in those tables were taken from a table downloadable from their Sector Data Products webpage.[6] For the non-nearshore sector, we are focused on the area north of 36° N. latitude and the observer coverage levels reported in Table B-11 combine the Limited Entry Sablefish Endorsed, Non-Sablefish-Endorsed Fixed Gear, and Open Access vessels that are classified as part of this sector.

By design, WCGOP focuses on observing a certain percentage of landings as opposed to certain percentage of trips. Likewise the bycatch ratios WCGOP uses to expand observed discard to the total fleet are expressed in terms of landed catch. However, for simplicity of modeling the simulations presented here use trip as the main unit of analysis.

If trips contributed the same level of overall landings per year, the two would be equivalent. Yet this is not the case and some trips contribute a higher portion of the landings in both the nearshore and non-nearshore sectors. If coverage levels were reported in terms of the trips observed per year, then the coverage would be lower in both sectors. Nonetheless, we do not expect our choice to focus the simulation on trips instead of landings to affect the usefulness of the simulation results. If WCGOP maintains the same sampling plan and general levels of observer coverage, then the relationship between observer coverage and landings per trip would be expected to hold. And if so, the simulations should provide means to evaluate the general patterns we should expect to continue into the future.

The frequency with which yelloweye have been encountered by trip is one of the main variables in the simulations. Figure B-11 and Figure B-12 report the total number of trips with yelloweye catch observed ("non-zero" trips) divided by total observed trips for the nearshore and non-nearshore sectors. As those shown, the per trip frequency of yelloweye catch in the nearshore sectors has been over double of that seen in the non-nearshore sectors. The per trip frequency has varied in both over the time series.

The other main variable of interest is the magnitude of catch on non-zero trips. Whereas the frequency of yelloweye catch on a trip in the non-nearshore sectors is half of that in the nearshore sectors, the magnitude of catch on non-zero trips is over twice, on average, of the catches in the nearshore sectors (Figure B-13 and Figure B-14). The distribution of non-zero catches across all years of the non-nearshore and nearshore data are further displayed in Figure B-15 thru Figure B-18.

[6] http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm

Table B-11. Summary of nearshore sector WCGOP observations used to establishing the frequency with which yelloweye are encountered on a trip and the level at which the sector is observed each year. The "*" in 2003 indicates that the statistic could not be displayed because of confidentiality.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Trips Observed	--	108	367	308	341	303	225	239	253	349	386
Trips w/ yelloweye	--	*	34	16	25	45	29	17	11	38	65
% of observed trips with yelloweye	--	*	9%	5%	7%	15%	13%	7%	4%	11%	17%
WCGOP coverage %	--	2%	7%	5%	7%	6%	4%	4%	5%	6%	8%

Table B-12. Summary of non-nearshore sector WCGOP observations used to establishing the frequency with which yelloweye are encountered on a trip and the level at which the sector is observed each year.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2013
Trips Observed	102	269	256	251	275	358	335	304	512	443	304
Trips w/ yelloweye	21	25	13	18	13	10	10	8	4	7	9
% of observed trips with yelloweye	21%	9%	5%	7%	5%	3%	3%	3%	1%	2%	3%
WCGOP coverage %	18%	17%	12%	27%	17%	22%	29%	7%	22%	22%	22%

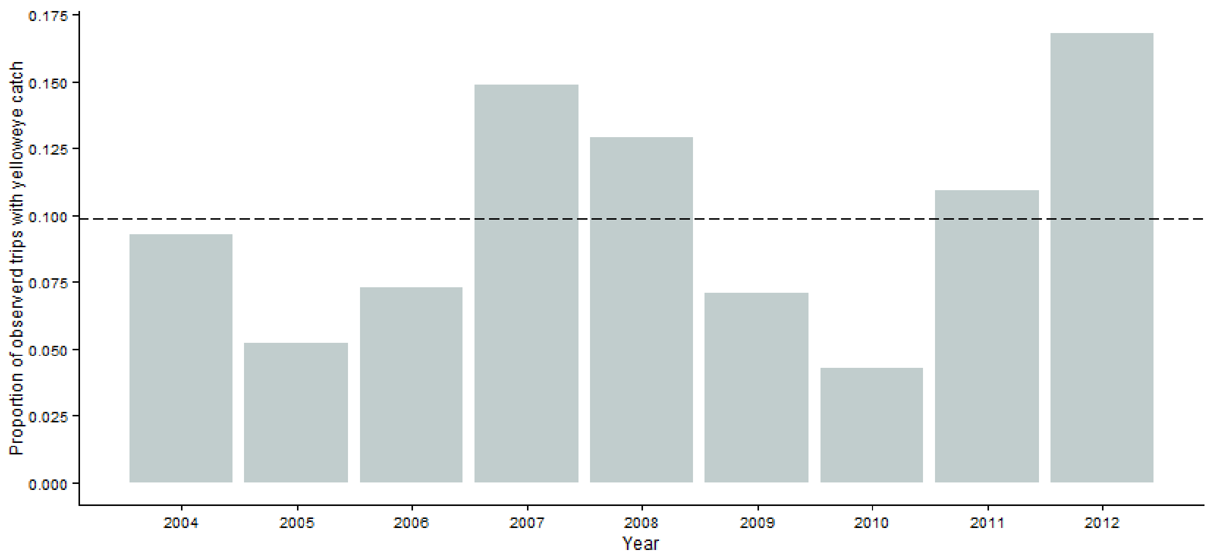

Figure B-11. Annual proportion of observed trips in the nearshore commercial fixed gear sectors where yelloweye were encountered. The 2004-2012 average is displayed by the dashed line (2003 was excluded because of confidentiality).

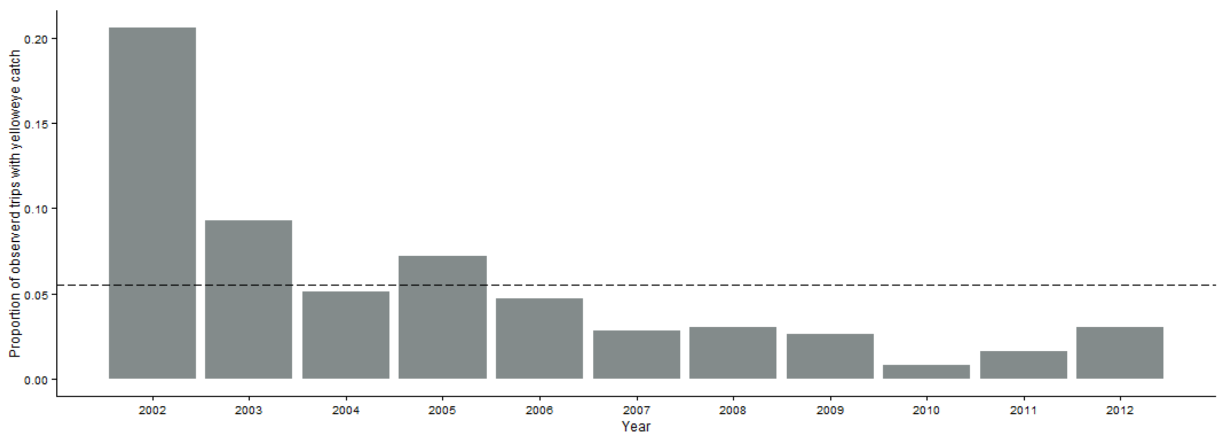

Figure B-12. Annual proportion of observed trips in the non-nearshore commercial fixed gear sectors where yelloweye were encountered. The 2002-2012 average displayed by the dashed line.

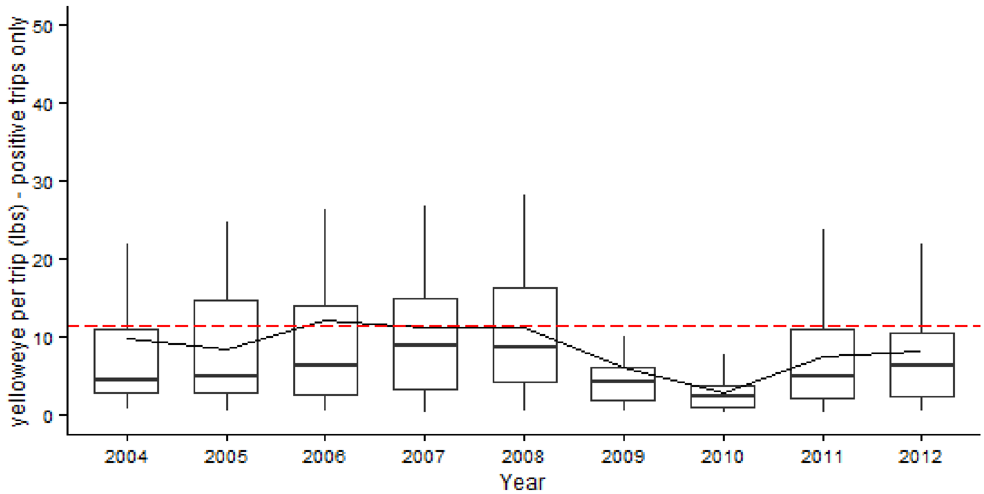

Figure B-13. Boxplots of yelloweye catches (zeros excluded) by trip and year in the nearshore commercial fixed gear sectors. Outer edges of the boxes show the 25th and 75th percentile levels with the middle line representing the median value. The solid line connects the average value for each year. In all but 2010, the averages are noticeably larger than the median because of large catch events. The dashed line shows the 2004-2012 average ("grand mean"). Outliers are not displayed because of confidentiality. A y-axis extending to 200 would display all outliers with room to spare. To give some sense of the range of the outliers, the average of the top 5 percent of all trips, across all years is 68 lb.

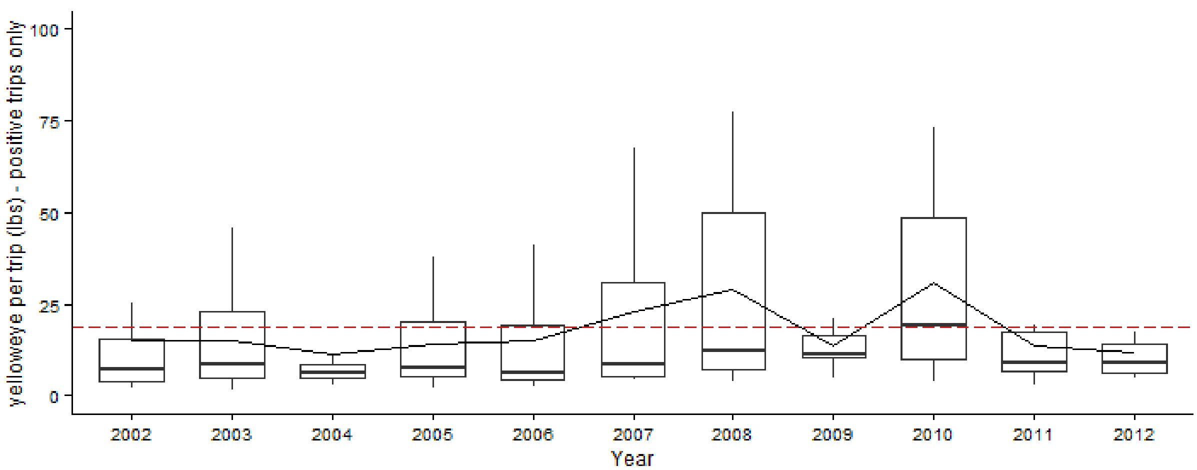

Figure B-14. Boxplots of yelloweye catches (zeros excluded) by trip and year in the non-nearshore commercial fixed gear sectors. See Figure B-13 for explanation of boxplots and lines. Outliers are not displayed because of confidentiality. A y-axis extending to 175 would display all outliers with room to spare. To give some sense of the range of the outliers, the average of the top 5 percent of all trips, across all years is 103 lb.

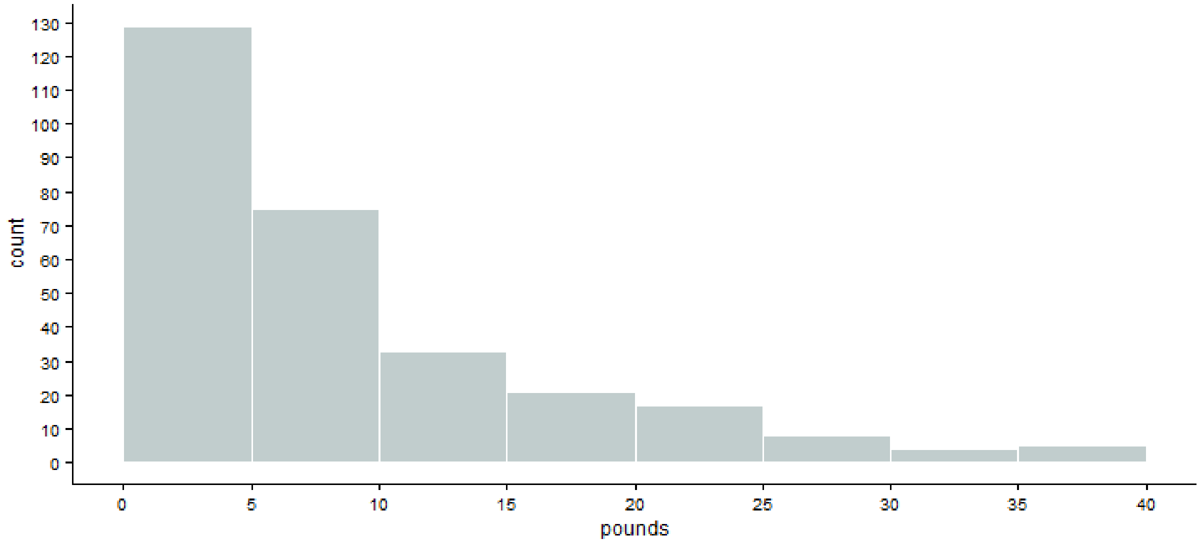

Figure B-15. Histogram showing nearshore catches of yelloweye rockfish over 2002-2012 on observed non-zero trips for catches less than 40 lb (lb) (bins are in increments of 5 lb).

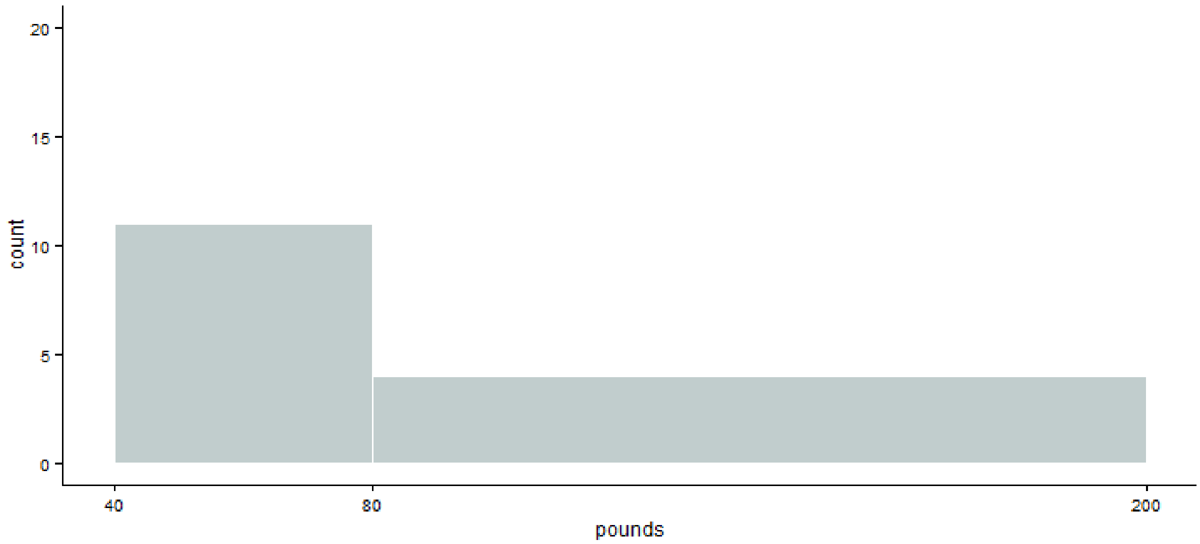

Figure B-16. Histogram showing nearshore catches of yelloweye rockfish 2002-2012 on observed non-zero trips for catches greater than 40 lb over (irregular bins of 40-80 lb and 80-200 lb were chosen to preserve confidentiality).

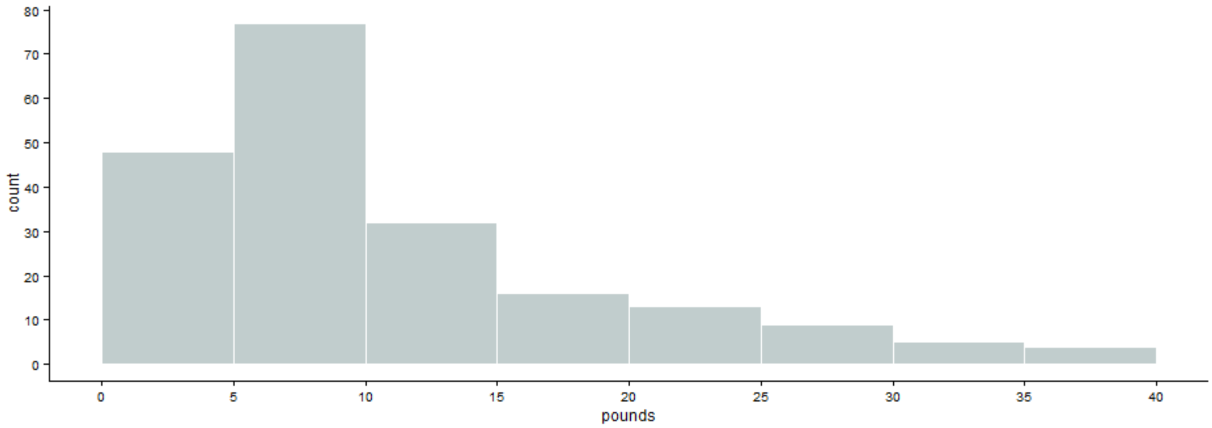

Figure B-17. Histogram showing non-nearshore catches of yelloweye rockfish over 2002-2012 on observed non-zero trips for catches less than 40 lb (bins are in increments of 5 lb).

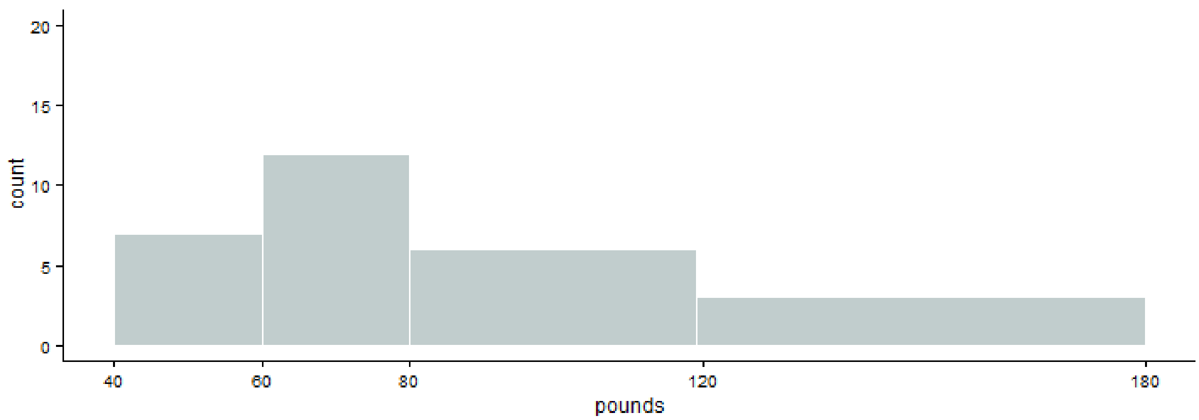

Figure B-18. Histogram showing non-nearshore catches of yelloweye rockfish 2002-2012 on observed non-zero trips for catches greater than 40 lb over (irregular bins of 40-60 lb, 60-80 lb, 80-120 lb, 120-180 lb were chosen to preserve confidentiality).

The Simulation Steps

There are two main parts to the simulations. The first constructs a universe of 100,000 fishing trips where the yelloweye catch per trip is the main variable of interest. The second involves randomly sampling from this set of trips. Each involves several steps described in the following list. The simulation was conducted in the program R.

1. Simulate the universe of 100,000 trips and yelloweye catch per trip for each sector based on the pattern of non-zero trips and the magnitude of catches observed on those trips:
   - Generate 100,000 binomial runs representing whether the trip caught yelloweye or not (i.e., 1 = yelloweye caught, 0 = no yelloweye caught). The binomial probability of a non-zero trip was itself randomly drawn from a random normal distribution based on the mean and standard deviation observed over the relevant time periods in each sector. The draws were truncated to prevent negative numbers using the "truncnorm" package.
   - The magnitude of catch per trip was drawn from a random lognormal distribution generated from the mean and standard deviation of actual trip level catches observed by WCGOP over the full data series of non-zero yelloweye trips.
   - The simulated catch per trip was produced by multiplying the catch per trip by the 1 or 0 drawn from the binomial random draws.
   - The simulated trip catch was capped at twice the observed maximum catch because the lognormal random distribution with a large number of draws produces a few implausibly large catches.

2. Sample from the universe of simulated trips based on varying coverage levels and produce a simulated "true" and estimated annual catch for 10,000 runs:
   - The total number of trips and observer coverage level per simulation run were randomly drawn from normal distributions based on the means and standard deviations from the actual WCGOP data.
   - The total number of trips drawn then set the sample size for the run (i.e., if the total number of trips was 100, 100 samples would be drawn from the set of 100,000 trips). The "true" annual catch was then calculated by summing the catches from all the selected trips.
   - This draw of the total trips per run was then sampled with the sample size set to the number of observed trips (the total trips multiplied by the coverage percentage drawn for the run). The simulated estimated annual catch was the calculated by summing the catch from these trips divided by the coverage level.

The simulated samples were all taken using R's sample function. All samples were taken without replacement. The input parameters for the random draws and years of data used for each are identified in Table B-13. In the nearshore sectors, observer coverage was low in 2003 and therefor data from that year was excluded. All years of data were used for the non-nearshore sectors except for the binomial probability of non-zero yelloweye trips. As can be seen in Figure B-12, there appears to be a downward trend in the number of trips encountering yelloweye in those sectors, and so based on this apparent trend, we chose to use data from only 2004-2012.

Table B-13. Input values for the simulations.

		Nonearshore	Nearshore
binomial probability of non-zero trip (normal)	*mean*	3.6%	9.0%
	s.d.	2.0%	5.0%
	truncated	0% - 20%	0% - 25%
	years used	2004-2012	2004-2012
non-zero catch events (lognormal)	*mean/mean.log*	27.4 / 2.77	11.6 / 1.78
	s.d./s.d.log	31.6 / 1.03	17.7 / 1.18
	years used	2002-2012	2004-2012
total trips per run (normal)	*mean*	1,776	4,995
	s.d.	923	1,533
	truncated	500-5000	500-10,000
	years used	2002-2012	2004-2012
observer coverage per run (normal)	*mean*	19.5%	5.8%
	s.d.	6.3%	1.3%
	truncated	5% - 30%	2%-20%
	years used	2002-2012	2004-2012

Table B-14. The first ten of the 100,000 simulated trips from the nearshore simulation provided to show the basic structure of the simulations. The second step of the simulation involved drawing random samples of varying sizes from the "Lb. Caught" column.

Trip	Encounter?	Lb. if Yes	Lb. Caught
1	1	16.5	16.5
2	0	31.3	0.0
3	0	17.1	0.0
4	0	2.6	0.0
5	0	6.3	0.0
6	0	4.8	0.0
7	1	1.3	1.3
8	0	3.0	0.0
9	0	7.6	0.0
10	0	4.3	0.0

Simulation Metrics and Results

The metrics produced by the simulations focus on the relative degree of precision and variability that we should expect with the annual catch estimates of yelloweye. The metrics reported here, each calculated as a ratio, include:

- *Variability in the "true" catch* (*"True" Variability*): this metric reports how the simulated "true" catch in each run differed from the average across all runs. It is calculated as the simulated true catch in each run divided by the average.
- *Annual fluctuation* (*"True" Ann. Fluctuation and Estimated Ann. Fluctuation*): this metric was calculated by dividing the simulated true catch and catch estimate in a run by

the same in the prior run. This metric allows some evaluation of the year to year variation we might expect in actual catch rates and in the catch estimates.

- *Sampling error* (*Estimated Error*): represents the ratio of the simulated estimate of catch and the simulated true catch in each run (i.e., a value over 1 indicates an overestimate and under 1 is an underestimate).
- *Annual Estimate relative to the 10 Year Average* (Estimated to 10 Year Avg.): this ratio expresses how far the simulated catches in each run differed from a 10 year average. The 10 year average was calculated by dividing the 10,000 runs into increments of 10. This metric is meant to tbe comparable to the long-term average catch ratios t serves as the basis for the GMT's current catch projection models.

We do not report metrics of the simulated catches in absolute terms, i.e., pounds or metric tons, because we did not attempt to reproduce WCGOP's actual sampling design and catch estimation methods in the simulations. WCGOP uses a more complicated multi-stage, stratified sampling design and employs catch estimation methods intended to support the areas and sector of interest to the Council. In addition, in the nearshore sectors yelloweye that are released with certain fishing gears are assumed to survive depending on depth. The simulations do not attempt to model the depth or gear of catch. For this and other reasons, the simulated catch amounts are therefore not expected to precisely match the real catch estimates.

The simulated estimates of annual catch are, however, close in terms of general magnitude to the estimates produced over 2003-2012. The metrics of relative variability should therefore provide useful insight into the relative precision of the existing WCGOP catch estimates and the GMT's projection model outputs.

At the same, sampling theory holds that WCGOP's stratified sampling design should produce more precise estimates than the simple random sampling we use in the simulation. We view the metrics of relative precision as rough measures of the degree of variability we might expect under the range of observer coverage and patterns of yelloweye experienced to date. Understanding how these factors influence the general magnitude of uncertainty and variability is our primary aim. We did not attempt to precisely quantify the statistical variance in the data and the simulations may overstate the variability to some degree. Yet as seen below, the results are not inconsistent with the level of variability actually seen in the sectors over 2003-2012 (Table B-10).

The results are shown in Table B-15 and Table B-16. We report multiple statistics for each metric, including the mean and median and the 10th and 90th percentile values. We also provide information about a number of other percentile levels constructed as intervals. For example, the 50 percent interval is bounded by the 25th and 75th percentiles and the 90 percent interval is bounded by the 5th and 95th percentile. To contrast the way the values can be read: the 90th percentile reports a "one-sided" look and indicates that 90 percent of all runs fell below that value, and in turn, that only 10 percent fell above it. The 90 percent interval, on the other hand, provides a "two-sided" look and indicates that 90 percent of the runs fell within that interval, and in turn, that only 10 percent of the runs were either higher or lower than the values on each end of the interval. Likewise, the intervals could be viewed in a "one-sided" manner by looking to only one end (e.g., the upper end of the 50 percent interval is the 75th percentile, therefore only 25 percent of the runs came in larger than the value it reports).

Table B-15. Results from the nearshore simulation. See the bulleted list in the text for the definition of the metrics.

	"True"				**Estimated**					
	Variability		Ann. Flucuation		Error		Ann. Fluctuation		to 10 Year Avg.	
Median	1.000		1.000		0.950		0.995		0.950	
Mean	1.000		1.160		0.997		1.430		1.000	
10th percentile	0.600		0.541		0.570		0.381		0.440	
90th percentile	1.400		1.873		1.490		2.633		1.620	
Intervals	**"True"**				**Estimated**					
	Variability		Ann. Flucuation		Error		Ann. Fluctuation		to 10 Year Avg.	
50% (*25th - 75th*)	0.79	1.21	0.74	1.36	0.73	1.19	0.62	1.61	0.67	1.27
75% (*12.5th - 87.5th*)	0.65	1.36	0.58	1.73	0.60	1.41	0.43	2.37	0.49	1.54
90% (*5th - 95th*)	0.46	1.51	0.42	2.34	0.47	1.71	0.28	3.72	0.32	1.85

Table B-16. Results from the non-nearshore simulation. See the bulleted list in text for the definition of the metrics.

	"True"				**Estimated**					
	Variability		Ann. Flucuation		Error		Ann. Fluctuation		to 10 Year Avg.	
Median	0.960		0.993		0.960		0.991		0.917	
Mean	1.000		1.294		1.002		1.880		1.000	
10th percentile	0.440		0.409		0.490		0.285		0.323	
90th percentile	1.590		2.484		1.550		3.478		1.602	
Intervals	**"True"**				**Estimated**					
	Variability		Ann. Flucuation		Error		Ann. Fluctuation		to 10 Year Avg.	
50% (*25th - 75th*)	0.66	1.29	0.63	1.57	0.71	1.23	0.54	1.88	0.58	1.34
75% (*12.5th - 87.5th*)	0.49	1.52	0.46	2.25	0.54	1.48	0.33	3.03	0.37	1.70
90% (*5th - 95th*)	0.35	1.80	0.31	3.33	0.37	1.79	0.19	5.36	0.22	2.07

Discussion

We only give brief discussion of the results here so as to aid the reader and illustrate how we envisioned the simulation metrics could be used. The full GMT will review and comment on this analysis at the June meeting and provide the Council with additional interpretations relevant to the decision on the potential 0.6 mt transfer. The GMT will also provide information on the potential management measure changes (e.g., trip limits and changes to RCA boundaries) that the transfer might involve.

As to the results here, we begin by noting that the average sampling error metric shows a high degree of accuracy in both sectors, as is expected with random sampling. Across all runs, the catch estimate was 1.002 times the true estimate in the non-nearshore and 0.997 in the nearshore (i.e., 0.2 percent and 0.3 percent off).

At the same time, the catch estimates showed variability across individual runs. Under the conditions run in the simulations , we would expect catch estimates to be within ~30 percent of the true catch half of the time in the non-nearshore sectors, and ~20 percent in the nearshore sectors. Looking more toward the extremes, 10 percent of the runs in the non-nearshore simulations fell higher or lower than 0.37 and 1.86 times the true value (i.e., 63 percent lower and 86 percent higher). That same interval for the nearshore simulations is 0.47 to 1.71. Somewhat counter intuitively, the nearshore simulation shows more precision than the non-nearshore simulation despite having lower coverage levels. It may be that the lower frequency of non-zero trips in the non-nearshore counteracts the expected effect of higher observer coverage.

While the sampling error is an important consideration, in reality the "true" catch is never known and the Council can only respond to the estimates of the true catch. So understanding the expected year to year variability in the catch estimates is of most interest here.

Considering the degree of year to year fluctuation in the estimates, the results show that on average the estimates were 1.43 times the previous' years estimate in the nearshore and 1.88 times in the non-nearshore. The use of ratios and the influence of large outliers may make the mean values of limited value here. The intervals provide a fuller picture. Looking at the 50 percent interval, we see that half of the runs fluctuated between 0.62 and 1.61 over the previous year in the nearshore and 0.54 and 1.88 in the non-nearshore. The 8 fold increase seen in the nearshore catch estimate between 2010 and 2011 (Table B-10(b)) would have fallen within the upper 1 percent of the nearshore simulation runs (not shown in Table B-15).

With the 10 year average metric, we see half the runs in the non-nearshore coming in 0.58 to 1.34 times the size of their respective 10 year averages and 0.67 to 1.27 times in the nearshore simulation runs. Considering only the situation where the 10 year average to underestimate the catch estimate, the catch was double the average around 5 percent of the non-nearshore runs. Not reported in the table, yet the average of the upper 5th percentile values was 2.44. In the nearshore simulations, the variation was lower with the upper 5th percentile populated by values greater than 1.85 times their respective 10 year average with an average value of 2.15.

Lastly, as can been seen in the metrics reported for the simulated true catches, the simulated true catches showed considerable variation as well. The variability in the probability of encountering yelloweye on trip and variability in the size of the catch when encountered created a range of simulated annual catches. This variable signal in the annual catches drives a lot of the noise seen in the simulated catch estimates.

B.5 Within Non-Trawl: Consideration of State-Specific Nearshore Rockfish Harvest Guidelines North of 40°10' N. latitude

Need for Action

In April 2014, the Council requested analysis of options for allocation of the Nearshore Rockfish complex north of 40°10' N. latitude to keep morality at or within the ACL including 1) No Action, 2) utilizing the miles of coastline north of 40°10' N. Lat., 3) the recent recreational and commercial historical catch from 2004-2012 (Agenda Item C.4.b, Supplemental GMT Report 2), and 4) a hybrid allocation method which uses miles of coastline for copper, China and quillback rockfishes and historical catch from 2004-2012 for the remaining species. In options 1 and 2, blue rockfish apportionment was initially based on stock assessment lines (California vs. Washington-Oregon assessment), with subsequent allocation between Oregon and Washington based on recreational and commercial historical catch from 2004-2012. Miles of coastline was not used to apportion blue rockfish between Oregon and Washington because of the large disparity in historical catch (Agenda Item C.4.b, Supplemental GMT Report 2, Tables 2 and 3) which indicated a decline in relative abundance along the coast not reflected when allocation is conducted using miles of coastline.

Catch data used to apportion the coastwide annual catch limit (ACL) under the two harvest guideline (HG) options using historical catch have been updated since the April meeting. Prior RecFIN queries for recreational catch data included inland areas in Washington not managed by the Pacific Fishery Management Council. The updates resulted in changes to the Nearshore Rockfish complex harvest guideline options (i.e., proportions of the ACL distributed among states), primarily to the historical catch option, but still reflect the range of HG Options recommended for analysis by the Council in April.

This analysis provides information on the implications of state-specific Nearshore Rockfish complex HG for the area north of 40°10' N. Lat. Options for the state-specific HGs are based on historical catch and miles of coastline in California, Oregon and Washington, as described above. Management under HGs from alternate allocation options are compared to the No Action alternative of status quo management for the Nearshore Rockfish complex with an ACL north of 40°10′ N. Lat.. The management measures needed to prevent mortality from exceeding complex level HGs and the implication for stock status and fishery participants are analyzed for each option.

Background

Under No Action, the Nearshore Rockfish complex overfishing limit (OFL) consists of contributions of the component stocks to the entire complex, stratified at 40°10′ N. Lat. Under status quo management, a complex level ACL is assigned to each region north and south of that management boundary (see the draft environmental impact statement; DEIS). This analysis provides the implications for the nearshore fisheries from instituting a HG in each state (Table B-17). Note that Nearshore Rockfish complex mortality from the tribal fishery is negligible and the tribes will notify the Council if this is expected to change in the future.

We evaluate three options for implementing HGs, in addition to No Action, for each state north of 40°10′ N. Lat. The first is stratified on the basis of miles of coastline, using the length of the three nautical mile boundary line delineating state and federal waters as a proxy for coastline length in each state (see Appendix 1). The second method is based on average historical catch for all sectors between 2004 and 2012. The third is based on a hybrid method applying miles of coastline to stocks that are ubiquitously distributed along the coast (i.e., China, quillback and copper rockfish), while the historical catch method is applied to those remaining species that show a cline in abundance also noted in scientific literature, including blue rockfish allocated by assessed areas north and south of the California-Oregon border and allocated between Oregon and Washington using historical catch. This analysis is intended to help better understand the needs of the fishing community relative to the constraints from management under state-specific harvest guidelines.

Ideally, allocating catch would involve a measure of relative abundance along the coast, but no such index is currently available for nearshore rockfish. In the absence of these data, two proxy methods of allocating have been presented; historical catch from 1916-2012 and the miles of coastline within the assessed area (Agenda Item C.4.b, GMT Report 2, April 2014; Agenda Item C.9.b, GMT Report 2, April 2014). The three options analyzed herein were developed after considerations were made regarding these original allocation methods. There are implications of these decisions for the commercial nearshore and recreational sectors in each state that make this a contentious issue. There are, however, scientific principles that can help inform sound decisions in the selection of allocations resulting in harvest guidelines. Examples of considerations for the three options analyzed in this paper are described below.

Considerations for Allocation Options

Considerations for Option 2: Miles of Coastline

Allocation using miles of coastline within each assessed area may prevent potential over-allocation to over-harvested areas that can result when historical catch is used. This method provided an alternative to catch based allocation alternatives. The primary assumption of this method is that the relative abundance is consistent along the coast. This assumption may not be valid for species that decline in abundance toward the ends of their range, or if habitat is not proportional to coastline distance or if stocks have been overharvested in a given sub-region. Although, for species such as China, quillback, copper and blue rockfishes that are relatively common throughout the assessed range, the distribution of habitat is unlikely to be perfectly uniform between states. Hence, this method may over-allocate or under-allocate, depending on which assumptions are violated. In instances where regulations and mortality for ubiquitously distributed species varies greatly among states, and a declining trend in catch per unit effort (CPUE) or assessments results in a portion of the species range, the historical catch method may be preferred over miles of coastline to prevent over allocation of fish at the edge of their range. Thus the assumption of uniform distribution is likely violated when miles of coastline is applied to species such as blue, olive, brown, gopher, black and yellow and grass rockfish, as indicated by the distribution of catch in PacFIN and RecFIN, and in published literature showing the range of each species indicating that they are less common or absent to the north (Love et al. 2002).

Considerations for Option 3: Average Historical Catch

When historical catch is employed to allocate among states, there is potential for over-allocation to states that harvested the most fish. Table B-17 contains commercial mortality (the average landings (mt) in the commercial fishery from PacFIN plus discard mortality estimated from the nearshore projection model) and recreational mortality (mt) (RecFIN) of nearshore rockfish stocks north of 40°10′ N. Lat. from 2004-2012. The Scientific and Statistical Committee (SSC) advised that “historical catches of nearshore species by state may not reflect biomass by state because of major differences in the management among states” (Agenda Item D.5.b., SSC Report, March 2014). Allocation using historical catch assumes that catch is proportional to abundance, which may not be the case due to differences in management among states. The annual catch by sector (Figure B-19) and annual, average, and range of catches by sector from 2004-2012 (Table B-17) reflect a combination of regulations, permitting systems, participation, constraints from overfished species and relative abundance of each species.

Overfished species constraints affected regulations on target stocks (e.g., seasons, depth restrictions and trip limits), limiting harvest to varying degrees among states from 2004 to 2012. A description of how regulations have varied over this period in each state and sector is provided in Appendix 2. Notable changes in regulations to reduce yelloweye rockfish mortality include a shallower depth restriction in the California and southern Oregon nearshore commercial fisheries starting in 2009 when the shoreward rockfish conservation area (RCA) boundary was moved from 30 fm to 20 fm to reduce yelloweye rockfish mortality. This adversely affected the ability of the fishery participants in California and Oregon to access deeper nearshore species. Depth restrictions and season lengths in the California recreational fishery have been severely limited by yelloweye rockfish mortality since 2008 after overages in 2007 necessitated inseason action to reduce season lengths and shallower depth restrictions to 20 fm (Appendix 2), which has continued in order to minimize yelloweye rockfish mortality. In addition, the Oregon recreational fishery was limited to shallower depth restriction of 20 fm from 40 fm part of the year starting in 2007, shifting effort onto Nearshore Rockfish habitat. The Washington recreational fishery has had consistent regulations since 2005, when depth restrictions of 20 fm and 30 fm went into place during part of the year shifting effort onto shallower depths.

Differential management among states shown above may differentially affect catch among states. It should be noted that other factors may also affect catch (e.g., environment, markets, distribution, and abundance). Figure B-19 provides annual catch patterns for the various sectors among states. For example, Nearshore Rockfish mortality in the California recreational and commercial fisheries declined abruptly in the years after their respective 20 fm depth restrictions were implemented. The Washington recreational catch has remained relatively steady over the 9-year period shown Figure B-19, as it was shown above that regulations have remained somewhat constant since 2005 (see Appendix 2). Interestingly, Oregon commercial and recreational Nearshore Rockfish catches have shown increases since many restrictions shown in Appendix 2 were put in place. It should be pointed out that much of this Oregon Nearshore Rockfish increase may be attributed to blue rockfish catch.

The differential management among states, along with differing degrees of participation in each sector among states, affects historical catch and thus allocation, which may cause it to deviate from representation of relative abundance along the coast. For example, Washington prohibited their commercial nearshore fishery and reduced their bag limit to ten fish in 1995 as a precautionary measure to preserve recreational fishing opportunities for the future, which might have been subject to further restrictions if allocation were shared with a commercial fishery. The participation in angler trips between Washington, Oregon and California are expected to vary affecting mortality due to season lengths, perceived opportunity (bag limits, depth restrictions) and angler population size in each state. In addition, Oregon and California have differing commercial permitting systems for their fisheries. These factors, and those shown in previous paragraphs, may cause allocations based on historical catch to deviate from relative abundance. Those areas with more liberal regulations or higher participation are likely to have disproportionately high nearshore rockfish mortality compared to the actual relative abundance along the coast.

For species with strong clines in abundance along the coast, the historical catch based method may capture the trend and allocate accordingly, where allocation by miles of coastline would not due to the assumption of uniform distribution. The aforementioned changes and differences in management should be considered when evaluating the true needs of the fishing communities and potential bias in allocation in each region and provide an impetus for weighing the assumptions regarding miles of coastline as an alternative method depending on the distribution of the species among other circumstances.

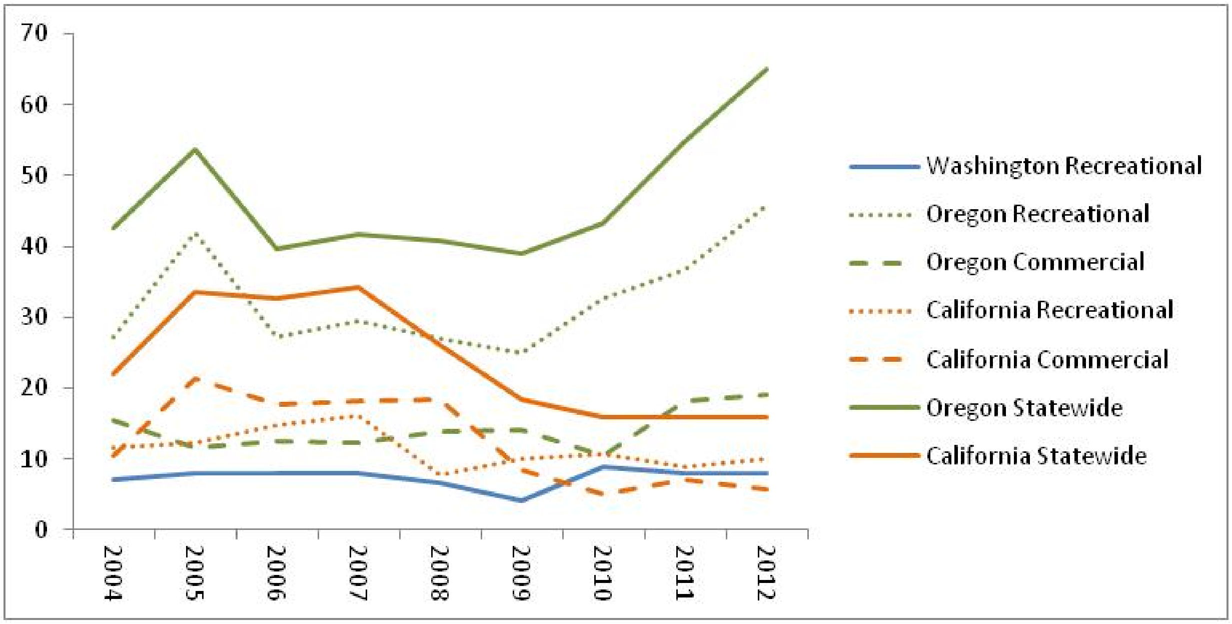

Figure B-19. Nearshore Rockfish Complex mortality estimates (mt) by state and sector in each year from 2004-2012.

Table B-17. Nearshore Rockfish Complex mortality estimates (mt) by state and sector in each year from 2004-2012 as well as the average and range of mortality from periods with less constraint (2004-2007) and greater constraint (2008-2012) from yelloweye rockfish. Recreational data were from RecFIN for Washington (ocean boat only), Oregon (ocean boat only), and California (ocean boat, shore, and estuary).

Year	Washington Recreational	Oregon Recreational	California Recreational	Oregon Commercial	California Commercial N. 40°10′ N. Lat.	Total
2004	7.06	27.18	11.61	15.40	10.46	71.71
2005	7.96	41.90	12.21	11.74	21.28	95.09
2006	8.00	27.20	14.84	12.47	17.85	80.36
2007	7.95	29.42	16.14	12.41	18.23	84.15
2008	6.72	26.91	7.69	13.84	18.38	73.54
2009	4.26	24.88	10.01	14.15	8.39	61.69
2010	8.99	32.78	10.82	10.57	5.16	68.32
2011	8.10	36.66	8.84	18.28	7.02	78.9
2012	7.93	45.88	10.10	19.06	5.84	88.81
2013	6.23	38.1	9.3	NA\1	NA\1	NA
Average 2004-2007	7.74	31.43	13.70	13.01	16.96	82.83
Range 2004-2007	7.06-8.00	27.18 - 41.90	11.61 - 16.14	11.74 - 15.40	10.46 - 21.38	71.71 – 95.09
Average 2008-2012	7.20	33.42	9.49	15.18	8.96	74.25
Range 2008-2012	4.26-8.99	24.88 - 45.88	7.69 - 10.82	10.57 - 19.06	5.16 - 18.38	61.69 – 88.81
Average 2004-2012	7.44	32.53	11.36	14.21	12.51	78.06
Range 2004-2012	4.26-8.99	24.88 - 45.88	7.69 -16.14	10.57 - 19.06	5.16 -21.28	61.69 – 95.09

Considerations for Option 4: Hybrid Method

While either method may deviate from the true relative abundance along the coast, which is unknown, consideration of which assumptions are violated for a given species may be helpful in deciding which method is more appropriate. Allocation by historical catch may be preferred in instances where a strong natural decline in abundance from the center of a species range occurs, in which case use of miles of coastline alone would cause an over-allocation to areas at the edge of their range where they are less common. This is the case for some of the nearshore rockfish species for which abundance may naturally decline or become non-existent north or south of 40°10′ N. Lat. (e.g., gopher, olive, black and yellow, brown, kelp and grass rockfish; Table B-17). Miles of coastline may be more appropriate for those species that are more uniformly distributed within the entire region over which allocations are being made (e.g., copper, China, and quillback rockfishes). Blue rockfish may be allocated according the stratifications of assessments at 42° N. latitude since two stocks have been identified and are predominantly distributed on either side with further allocation using appropriate methods discussed above depending on the trends in abundance in the region in question.

The Groundfish Management Team (GMT) provides some considerations to allow the Council an alternate way to evaluate the allocation options in a way that extends beyond the needs of the fishery. These methods attempt to approximate the relative abundance of component species given the assumptions implicit in their application to provide a logical basis for allocation. Where the range appears to reach its edge within the management area, average catch may be a more reasoned approach and where large differences in catch occur along the range of an otherwise ubiquitously distributed species in the region, miles of coastline may be preferable, to avoid violation of assumptions implicit in each method. Future off-year scientific research designed to quantify catch and abundance relative to available habitat would greatly improve allocation methods.

Pros and Cons of Each Option in Light of Considerations Presented

The pros and cons of each method given considerations regarding allocation with each are described in Table B-18.

Table B-18. Comparison of the pros and cons of each Nearshore Rockfish complex allocation option.

Allocation Option	Pro	Con
Miles of Coastline	Less potential for over allocation to depleted areas than historical catch if harvest is more reflective of management policies than fish abundance. Provides an alternative to catch based allocation methods	Some species are far less common at the edge of their range and would be over-allocated to some areas since the method assumes abundance is proportional to miles of coastline.
Historical Catch (2004-2012)	Reflects the recent historical pattern of commercial and recreational fisheries. Accounts varying trends in abundance with latitude at the edge of a species range.	Potential for over-allocation to areas that are more depleted. Overfished species constraints limited harvest to varying degrees between states affecting allocations. Doesn't address areas where commercial fisheries are prohibited.
Hybrid Option	Minimizes allocation biases presented by application of historical catch to areas with higher removals/depletion and miles of coastline for species at the edge of their range.	Still does not reflect differences in reef habitat and relative abundance across states, but neither do the other options. Still subject to the biases of each method, but attempts to minimize the degree of bias given apparent trends in abundance and distribution of component stocks.

Comparison of Historical Mortality and Projected Mortality under the Preferred Alternative and No Action to Nearshore Harvest Guideline Allocation Alternatives

The projected mortality in each state and sector under the No Action Option, Preferred Alternative Alternative 4, the average mortality between 2004 and 2012, and the range of catch during this period are presented in Table B-19. There are no nearshore rockfish mortality projection models for the trawl and non-nearshore fishery, but based on historical data, mortality in the trawl and non-nearshore fisheries is expected to be trace (Agenda Item C.4.a, Attachment 3, Table 4-13). Mortality in 2013 is not yet available for the nearshore fixed gear fishery, but this information is available for the recreational fishery, which demonstrates that mortality in the most recent year of the recreational fishery was 6.2 mt for Washington, 38.1 mt for Oregon and 9.3 mt for California.

Projections for nearshore rockfish for all coastwide sectors north of 40°10′ N. Lat. total 76.7 mt under no action. The average catch for 2004-2012 is 81.6 mt for all sectors combined; results for each state are also provided for comparison under each alternative. The projected mortality under the Preferred Alternative is 80.0 mt without harvest guidelines or interstate coordination of catch tracking and inseason response, making it difficult to reduce mortality to prevent overages against the shared aggregate ACL. The average catch as well as projected mortality under the SQ and Preferred Alternative (Table B-19) will exceed the 2015-2016 ACL of 69 mt, indicating that management measures will likely be needed to reduce aggregate mortality. Decisions on the part of the Council relative to allocations will involve tradeoffs potentially affecting fishing opportunity in each state.

The methods used to project mortality for 2015-2016 with methods approved by the SSC in each recreational and commercial fishery are described below:

Nearshore Fixed Gear: The commercial nearshore model projects mortality of overfished species and targeted nearshore species based on the expected (e.g., landings of nearshore rockfish, black rockfish, kelp greenling, cabezon, lingcod, and California scorpionfish (S of 40°10'N Lat.). The nearshore model applies past discard rates (from the West Coast Groundfish Observer Program; WCGOP) to expected landings by depth, along with depth-specific discard mortality rates, to estimate total mortality of discarded and landed nearshore species. The GMT notes that the nearshore commercial bycatch projection model estimates discard of nearshore species based on expected landings coupled with discard rates provided by WCGOP; however, discard rates are based on past management measures. If trip limits (and expected landings) are reduced dramatically, the model may grossly underestimate discard.

Washington Recreational: The Washington recreational model uses historical catch to project total mortality of overfished and nearshore rockfish species. Nearshore rockfish projected impacts for this analysis used the historical high catch by species from the 2009 through 2013 time period as the projected impacts under the No Action Alternative. Washington does not have a nearshore commercial fishery so projections of nearshore rockfish have not been needed to ensure that catch stays within sector specific allocations. This analysis includes nearshore rockfish caught in all recreational fisheries including those targeting salmon and halibut and any restrictions to nearshore rockfish retention would be applied to all fisheries. Recreational fishing effort in salmon and halibut fisheries can vary annually contributing to variable encounter rates with nearshore rockfish. Using the 2009-2013 high catch to model projected impacts results in more conservative management measures, that are expected to keep catch of nearshore rockfish within the range of HG options for the Washington recreational fishery. Catch by month and management area during this time period was used to estimate projected impacts for the WA Nearshore Rockfish complex HG Options. The proportion of nearshore rockfish caught by depth and month for each management area was used with current surface release mortality rates to estimate discard mortality by month.

Oregon Recreational: The Oregon recreational catch projection model uses the last 3 years of data in producing projections of nearshore rockfish mortality. Table B-19 displays the results of the Oregon recreational model projections of nearshore rockfish mortality under Alternative 3.

California Recreational: The California recreational catch projection model used mortality in 2011 and 2012 as the base data for projections. Three options are available for the season structure for the California recreational fishery and the projected mortality of 15.6 mt, 15.4 mt and 6.7 mt, respectively, with the season with the highest projected mortality of Nearshore Rockfish complex displayed in Table B-17.

Table B-19. Projected Nearshore Rockfish complex mortality under the No Action Alternative, the Preferred Alternative, average mortality from 2004-2012 and, allocation under each HG alternative by state and sector (in mt).

Sector	No Action Mortality	Projected Mortality under Preferred Alt	Average Mortality and Range 2004-2012	HG Miles of Coastline	HG Historical Catch	HG Hybrid Approach
Washington Total	**10.5**	**10.5**	**7.44** (4.26 -8.99)	**15.68**	**5.05**	**7.66**
--Recreational Groundfish	*10.5*	*10.5*	*7.44 (4.26 - 8.99)*			
--Directed OA: Nearshore	*NA*[1/]	*NA*[1/]	*NA*[1/]			
Oregon Total	**45.6**	**48.9**	**46.74 (39.03-64.94)**	**29.93**	**37.94**	**36.29**
--Recreational Groundfish	*30.5*	*30.5*	*32.53 (24.88 - 45.88)*			
--Directed OA: Nearshore[2/]	*15.1*	*18.4*	*14.21 (10.57 - 19.06)*			
California Total	**20.6**	**24.5**	**23.87 (15.86 - 34.37)**	**23.15**	**25.76**	**24.80**
--Recreational Groundfish	*11.7*	*15.6*	*11.36 (7.69 -16.14)*			
--Directed OA: Nearshore [3/]	*8.9*	*8.9*	*12.51 (5.16 -21.28)*			
Total All Sectors	**76.7**	**80.0**	**78.06 (61.69 – 95.09)**	**68.75**	**68.75**	**68.75**

1/The state of Washington has not had a commercial nearshore fishery since 1995.
2/For Oregon, projected landings and additional discard mortality for each column are: No Action (15.0 mt + 0.1 mt), Preferred Alternative (18.3 + 0.1 mt), 2004-2012 average (14.21 + .08 mt), Option 1 (9.6 + 0.05 mt), Option 2 (10.7 + 0.06 mt), and Option 3 (10.4 + 0.06 mt).
3/The California commercial blue rockfish mortality estimate for 2008 from PacFIN reflected expansion of a single sample to a value of 21.6 mt, which is not representative of expected mortality from landing receipts from CFIS totaling 7.8 mt. The projected impacts and average mortality from the PacFIN estimate is provided in brackets.

Management Options

Option 1: No Action: Continue to manage the Nearshore Rockfish complex, holding impacts to the complex level ACL in each region.

Option 2: Miles of Coastline: Manage the Nearshore Rockfish complex according to state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the miles of coastline in each state.

Option 3: Historical Catch: Manage the Nearshore Rockfish complex according to state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the historical recreational and commercial catch between 2004 and 2012.

Option 4: Hybrid Method: Manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and the historical recreational and commercial catch between 2004 and 2012 for the remaining species.

Data and Examples of Available Management Measures

Washington

Recreational: The Washington recreational fishery was modeled for season structure alternatives necessary to keep total mortality of overfished species within state specific HGs in the draft DEIS. Projected moralities for nearshore rockfish were not included in that analysis. Additional management measures needed to keep nearshore rockfish catch under the WA HG alternative are explored here. For the most part, nearshore rockfish are not targeted in Washington's recreational fisheries and retention is incidental while anglers target other groundfish, salmon and halibut. The primary tool analyzed to reduce total mortality of nearshore rockfish is non-retention. Projected mortality for nearshore rockfish was analyzed based on the season structure under the Preferred Alterantive for the Washington recreational fishery. Note that mortality estimates, allocations and projections do not include mortality from the Puget Sound or Strait of Juan de Fuca since they are not managed with the Council process. In addition, mortality from shore based modes are not accounted for in estimates, projections or allocations.

Commercial: Washington has prohibited a commercial nearshore fishery since 1995.

Oregon

Recreational: The Oregon recreational fishery was modeled for various season structure scenarios to keep impacts to overfished species within the sector-specific HGs (canary and yelloweye rockfish) in the DEIS. Mortalities of key non-overfished species, given those season structures, were also projected in the DEIS. Further management measures, such as sub-bag limit or non-retention, will likely be needed to reduce impacts to the nearshore rockfish complex. Oregon intends to develop the within-Oregon commercial-recreational split through state processes. Determining which management measures are necessary to stay within that split will also occur through state processes. Note that mortality estimates, allocations and projections do not include mortality from the shore based modes as they have not been sampled in recent years. The mortality in these modes continues, though it is not reflected in estimates or allocations. Since they are excluded from allocations and estimates, it is assumed that the results are consistent with the outcome had they been included in both, though further analysis by the GMT is warranted. Discussion of their inclusion in future estimates or retrospectively for this analysis is a point of consideration for the Council and the GMT in June.

Commercial: The Oregon commercial nearshore fishery was modeled assuming the shoreward RCA at 30 fm for all options. The input for this model is estimated landings of Other Nearshore Rockfish. Discard rates were applied to these estimated landings to project discard of Nearshore Rockfish (based on WCGOP data). Depth-specific mortality rates were then applied to the discarded portion of the catch to estimate discard mortality. Total mortality may then be estimated by summing the landings and estimated discard mortality.

Management measures will likely have to be implemented to reduce mortality of Nearshore Rockfish (including blue rockfish) for each of the harvest guideline options. Under the Preferred Alternative and No Action, state trip limits for vessels with nearshore endorsed black rockfish and blue rockfish permits (i.e., nearshore permitted vessels) would remain at approximately 700 lb per 2-month period for Nearshore Rockfish (not including blue rockfish). Vessels with black rockfish and blue rockfish permits would also be allowed to retain 1,000 to 1,700 lb per period of black rockfish and blue rockfish (combined) under the Preferred Alternative. See the DEIS for more information regarding state permit system.

Landings are monitored closely during the season (i.e., near-real time), which provide the opportunity to implement and evaluate impacts of reduced (or increased) trip limits. Trip limit options may include (a) trip limit reductions to allow for year-around deliveries of Nearshore Rockfish or (b) less severe trip limits during part of the year but at some point, impose no retention (i.e., all Nearshore Rockfish encountered would be discarded). Note that separate blue rockfish trip limits may be considered, because blue rockfish and black rockfish are currently managed under a combined trip limit. It is uncertain at this point (a) when trip limits may be imposed and (b) what the trip limit levels should be under the harvest guideline options.

California

Recreational: The current California recreational catch projection model (RecFISH) was used to project mortality with a given season and depth restriction under each of the Options. These data and analytical methods allowed mortality to be projected from combinations of season lengths and bag limit that keep nearshore rockfish mortality within respective harvest guideline under each of the Options. California recreational catch estimates and projections account for mortality in all modes including shore and boat based angling and saltwater areas including bays and estuaries.

Commercial: PacFIN data were used for overall minor nearshore rockfish complex landings summaries whereby a simple five-year average (2008-2012) was used as a proxy for mortality estimates. Because PacFIN data were used, PacFIN estimates do not include discard mortality amounts. However, estimated discard mortality for nearshore rockfish have been included by using those generated by the nearshore bycatch model. California's Commercial Fishery Information System (CFIS) data were used for nearshore permit license summaries. Lastly, the GMT's nearshore bycatch projection model was used to estimate overfished species (OFS) mortality in the commercial nearshore fixed gear fishery.

Management measures for the northern California nearshore rockfish fishery, currently in place, include a shoreward RCA boundary of 20 fm, trip limits for both black rockfish and the minor nearshore rockfishes as a sub-trip limit of the overall nearshore rockfish complex, a state nearshore permit system, and a gear restriction that limits the number of hooks one may use within one mile of shore. The most obvious management measure change that may need to be considered to achieve necessary mortality reductions would be a reduction in the black rockfish/other minor nearshore rockfish trip limit structure. Under No Action, the current trip limit is set at 8,500 lb per vessel per bi-monthly period for all six periods. Of that bi-monthly amount, no more than 1,200 lb may be species other than black rockfish. It is this part that needs to be more closely examined as a possible source for a management measure change. A trip limit reduction in this sub-trip limit amount could also partially address concerns regarding the mortality of overfished species. Another trip limit option would be to design trip limits specific to each period rather than have an "across-the-boards" single amount for all six periods. Lastly, a management measure option could be to have one or possibly two periods closed to fishing. A sub-option to this seasonal closure approach may be to close the fishery for one month in one or more periods.

B.5.1 Comparison of Options under the Preferred ACL Alternative (P 0.45)*

B.5.1.1 Option 1: No Action

Continue to manage the Nearshore Rockfish complex, holding impacts to the complex level ACL in each region. Under the No Action Option (Option 1), the Nearshore Rockfish complex would be subject to the ACL for all sectors and states combined. The Nearshore Rockfish complex is stratified at 40°10′ N. Lat. with an ACL of 69 mt to the north and 1,049 mt to the south in 2015 with a P* of 0.45 under the preferred specifications.

Fishing Activity under Option 1 (No Action)

Washington

Recreational: Under the No Action Alternative, the Washington recreational fishery would be open year-round for groundfish, except lingcod. Washington would continue to prohibit the retention of canary and yelloweye rockfish in all areas. Washington has a 12 fish daily bag limit with sub bag limits of 10 rockfish, 2 lingcod and 1 (northern management area) or 2 (southern management areas) cabezon. Depth restrictions are the primary tool used to keep overfished species impacts below state HGs. Depth restrictions are more sever in the area north of the Queets River (Marine Area 3 and 4) where encounters with yelloweye and canary rockfish are the greatest. Management measures under the Preferred Alternative differ only slightly from the No Action Alternative. Under the Preferred Alternative, the depth closure in the North Coast (Marine Areas 3 and 4) would be in place from May 9th through Labor Day rather than from May 1 through September 30. In the South Coast (Marine Area 2), the prohibition on lingcod retention seaward of 30 fm in the area south of 46°58 N. latitude on Fridays and Saturdays from July to August 31 would be removed and in the Columbia River Area (Marine Area 1), the southern boundary for the year round lingcod closure would be moved three miles north.

Commercial: Closed

Oregon

Recreational: Currently the recreational fishery has a 10-fish marine bag limit in federal regulations. State regulations have reduced that bag limit to 7 fish. The fishery is open to all depth January-March and October-December and restricted to inside of 40 fm (30 fm in state rule) April-September. Blue rockfish has a state-specified landing cap and is tracked separately from the other nearshore rockfish. Other nearshore rockfish also have a state-specified landing cap (13.6 mt), in place since 2002, and are tracked inseason. When the landing cap of either are approached the state takes inseason action, usually going to non-retention of that species or group, while the remainder of the fishery season structure and regulations remain unchanged.

Commercial: As of 2014, state-specified landing caps for the commercial nearshore fishery are 14.2 mt (Other Nearshore Rockfish excluding blue rockfish) and 137.9 mt (black rockfish and blue rockfish combined). The number of limited entry permits currently issued is 51 for black and blue rockfish without the nearshore endorsement and 70 for black and blue rockfish with the nearshore endorsement.

Management measures for the Oregon commercial fishery under No Action would be similar to those described for the Preferred Alternative (see the DEIS). The RCA may remain at 30 fm because impacts to overfished species are projected to fall below the Oregon share for yelloweye rockfish and canary rockfish. Trip limits will remain low for non-permitted vessels (see DEIS) to cover incidental catch of certain nearshore species (e.g., 15 lb per trip of black rockfish, blue rockfish, other nearshore rockfish, and other nearshore species for vessels using legal commercial nearshore fishing gear; other trip limits are available for incidental catch in salmon troll fisheries and in trawl fisheries). State-regulated trip limits for permitted vessels would likely remain at current levels (i.e., 700 lb per period of Nearshore rockfish complex, excluding blue rockfish, and 1,000 lb to 1,700 lb per period for black rockfish and blue rockfish combined (Table B-20). These limits are lower than those shown in Federal regulation.

Table B-20. Oregon commercial nearshore trip limits (No Action) for permitted vessels during 2014. Limits for vessels without black rockfish and blue rockfish permits, and those without a nearshore endorsement, are much lower than shown below to accommodate incidental catch (see DEIS). These trip limits are more conservative than those shown in Federal regulation.

Oregon Commercial Nearshore Trip Limits (lb; 2014)	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Black rockfish + blue rockfish	1,000	1,200	1,700	1,600	1,200	1,000
Other nearshore rockfish (excluding blue rockfish)	700	700	700	700	700	700

California

Recreational: Currently the recreational fishery is subject to a 10 fish Rockfish Cabezon and Greenling bag limit with restricted seasons and depths in each of 5 management areas to limit mortality on overfished and target stocks. The season length in the California recreational fishery under the status quo ACL Alternative in the Northern Management Area is May 15th to October 31st with a depth restriction of 20 fm to keep mortality of yelloweye rockfish below the HG for the recreational fishery. Under the Preferred ACL Alternative, California recreational season and depth restriction Option 1 would allow a March 1 to December 31 season and 20 fm depth restrictions given harvest limits/guidelines on overfished and target stocks in 2015-2016, without limitations from a state Nearshore Rockfish complex HG.

Commercial: At present, the Nearshore Rockfish complex is managed in four regions: the North Coast Region is from 42° N. Lat. (the Oregon-California border) to 40°10' N. Lat. (near Cape Mendocino). Current trip limits and open and closed periods in each region are provided in Table B-21 below. Depth restrictions vary by region with a 20 fm depth restriction to the north of 40°10′ N. Lat., 30 fm south to Point Conception at 34°27′ N. Lat. and 60 fm south of 34°27′ N. Lat.. Currently gear restrictions restrict fishery participants to 15 hooks per line with no more than 150 hooks in use to take nearshore fish stocks within one mile of shore within certain Fish and Wildlife Districts. In addition, the fishery is a subject to a state restricted access permit system for the shallow nearshore fishery. To enter this shallow nearshore fishery, two existing permits must be purchased and transferred to a new participant within the same management region; one of those permits must then be surrendered back to the Department. The intent of this method is to achieve capacity goals for the fishery and reduce participation relative to historical levels to help prevent overharvest. There are no transferable permits for the deeper nearshore rockfish fishery, preventing new entry at the present.

Most fish are sold live for a premium relative to dead fish. This creates an impetus to fish in shallower depths where mortality is lower compared to deeper depths, thus discards are subject to a relatively low mortality compared to depths greater than 30 fm where discards are deemed 100 percent dead.

Notwithstanding the options presented in this analysis, a major factor that influenced fishing activity in California's northern management region was the change of the RCA shoreward boundary from 30 fm to 20 fm to avoid yelloweye rockfish encounters, beginning in 2009. The effects of this boundary change are apparent when examining the commercial landings over the past decade (Figure B-17). California's northern commercial fishery experienced a 55 percent decrease in harvest from 2008 to 2009 and a 39 percent decrease from 2009 compared to 2010.

Table B-21. California commercial federal cumulative two-month trip limits (No Action) for 2014 that apply to the vessel and to the permit holder for the shallow and deeper nearshore rockfish sectors. Trip limits per two-month period (reported in lb) are the same for both the federal limited entry and open access entry sectors used by the state's restricted access nearshore rockfish fishery program.

NORTH Between 42° and 40°10' N. Lat.	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Black rockfish + minor nearshore rockfishes. No more than 1,200 lb of which may be species other than black rockfish (applies to all periods)	8,500	8,500	8,500	8,500	8,500	8,500

Note: For the shallow nearshore fishery, permit holders may catch and land the two-month trip limit only in the region in which their permit is issued. Holders of a deeper nearshore rockfish permit may catch and land deeper nearshore rockfish anywhere in the state where and when fishing is permitted.

Biological Impacts under Option 1 (No Action)

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 1 are summarized in Table B-22. Further description of the mortality in each state and sector is provided in the text below.

Table B-22. Projected Nearshore Rockfish mortality (mt) north of 40°10′ N. Lat. from each state and sector under Option 1 (No Action).

	Washington		Oregon		California		Grand Total
	Rec	Com	Rec	Com	Rec	Com	
	10.5	Closed	30.5	15.1	11.7	8.9	76.7
State Total	10.5		45.6		20.6		

Washington

Recreational: Projected mortality of the Nearshore Rockfish complex under the No Action Option and Preferred Alternative is 10.5 mt. Season length and structure are the same for both alternatives.

Commercial: Closed

Oregon

Recreational: The projected landings under the No Action Option for blue rockfish is 17.5 mt, for other nearshore rockfish 13.0 mt, for total nearshore rockfish mortality of 30.5 mt.

Commercial: The projected landings of Nearshore Rockfish under the No Action Option is 15.0 mt in aggregate, and consists of blue rockfish (4.6 mt) and the remaining species of Nearshore Rockfish (10.4 mt). The nearshore projection model provides an additional estimate of discard mortality at 0.07 mt (blue rockfish and other nearshore rockfish combined), resulting in a total mortality of 15.07 mt for Nearshore Rockfish complex in the Oregon nearshore commercial fishery. This is lower than shown under the Preferred Alternative (see the DEIS), where projected landings are 18.3 mt for Nearshore Rockfish (and additional discard mortality projected at 0.1 mt).

California

Recreational: The aggregate mortality of Nearshore Rockfish complex in the Northern Management Area under the No Action Option would be 11.7 mt of which 2.5 mt would be blue rockfish. Under the Preferred Alternative ACL a season length as long as March 1 – December 31 could be accommodated, which would result in an aggregate mortality of Nearshore Rockfish complex of 15.6 mt of which 3.3 mt would be blue rockfish.

Commercial: The aggregate mortality in the Minor Nearshore Rockfish complex under the No Action Option is projected to be 8.9 mt. This aggregate does not include black rockfish. In the north, blue rockfish take is expected to be 4.9 mt out of the 8.9 mt aggregate total.

Projected Overfished Species Mortality under Option 1 (No Action)

Washington

Recreational: The projected overfished species mortality under the No Action Option and the season structure under the Washington recreational Preferred Alternative is 2.83 mt of yelloweye rockfish and 0.75 mt of canary rockfish which are below the WA recreational HG.

Commercial: Closed

Oregon

Recreational: The projected overfished species mortality under the No Action Option is 2.2 mt of yelloweye rockfish and 3.2 mt of canary rockfish, the same as under the Preferred Alternative. These projections are below the sector-specific HG.

Commercial: The projected overfished species mortality under No Action Option is 0.8 mt of yelloweye rockfish and 0.9 mt of canary rockfish. These projections are slightly different than shown under Preferred Alternative, where yelloweye rockfish mortality was projected at 0.9 mt and canary rockfish mortality was projected at 1.1 mt. These projections are equal to or less than the Oregon catch share.

California

Recreational: The overfished species mortality projected to accrue under the No Action Option are 1.7 mt of yelloweye rockfish, 16.3 mt of canary rockfish, 100.1 mt of bocaccio and 1.0 mt of cowcod. Under the Preferred Alternative overfished species mortality projected to accrue are 2.9 mt of yelloweye rockfish, 19.8 mt of canary rockfish, 117.6 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: The overfished species mortality projected to accrue under the No Action Alternative for north of 40°10' N. Lat. are 0.3 mt of yelloweye rockfish, 0.7 mt of canary rockfish, 0.4 mt of bocaccio and 0.0 mt of cowcod. Under the Preferred Alternative, overfished species mortality projected to accrue are 0.2 mt of yelloweye rockfish, 0.5 mt of canary rockfish, 0.4 mt of bocaccio and 0.0 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Stock Status

Nearshore Rockfish

None of the stocks of nearshore species are currently deemed overfished. Recent aggregate mortality for all sectors has perennially exceeded the 2015-2016 ACL of 69 mt in all but two of nine years between 2004 and 2012 (Table B-17). Steps to reduce mortality should be taken to prevent further overharvest relative to 2015-2016 ACLs and reduce the potential for stocks to be harvested down to overfished status.

Overfished Species

The mortality of overfished species is projected to remain below their respective harvest limits/guidelines. Thus the stock status and rebuilding plans for overfished species are not expected to be adversely affected under No Action Option 1.

Socioeconomic Impacts under Option 1 (No Action)

Washington

Recreational: Under the No Action Option, and the season structure under the Washington recreational Preferred Alternative, management measures necessary to keep recreational harvest of yelloweye rockfish within harvest guidelines require closure or significant restriction of the groundfish fishery in areas deeper than 20 and 30 fm along a substantial portion of the Washington coast, restrictions on groundfish retention during peak recreational fishing periods, and closed areas. While these restrictions have been effective at keeping recreational catch of overfished species under specified harvest guidelines in the past, they are limiting to recreational fishing opportunity. Under the No Action Alternative, angler trips are expected to be similar to what was seen in 2013 and 2014.

Commercial: Closed

Oregon

Recreational: Under the No Action Option, the season structure, bag limits, and most other management measures will remain the same as in 2013 and 2014. Therefore, angler trips and associated expenditures are expected to remain similar to what was seen in 2013 and 2014.

Commercial: Under the No Action Option, landing caps, trip limits, and RCA boundaries are expected to remain the same as in 2013 and 2014. Therefore, trips, expenditures, landings, and revenues are expected to remain similar to that seen in 2013 and 2014. Note that even though management measures would remain similar between Preferred Alternative and No Action, landings of Nearshore Rockfish under Preferred Alternative (18.3 mt) may be higher than that shown under No Action (15.0 mt).

California

Recreational: Under the No Action Option the season and depth restrictions will remain the same as in 2014, but 4.5 months of additional fishing opportunity (4,379 angler trips) would be forgone in the Northern Management Area relative to what could be afforded given the harvest specifications and allocations of overfished and target stocks in 2015-2016 under the Preferred Alternative ACL.

Commercial: Under the No Action Option the state restricted access permit system, federal trip limits, season and depth restrictions will remain the same as in 2014. However, routine inseason adjustments could be recommended by the Council if any of the fishery sectors displayed harvest behavior that deviate substantially from the expected amounts. As a result, no adversely affected changes to the socio-economic interests of coastal communities would be anticipated.

B.5.1.2 Option 2: Miles of Coastline

Option 2 is to manage the Nearshore Rockfish complex according to state-specific harvest guidelines stratified north and south of 40°10′ N. Lat., with apportionment north based on the miles of coastline in each state as reflected in Table B-23. The 3 nm state boundary was measured as the proxy for miles of coastline.

Table B-23. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 2 derived using miles of coastline in each state.

Species	**Contribution**	**WA%**	**OR%**	**CA%**	**WA mt**	**OR mt**	**CA mt**
Black-and-yellow	*0.01*	0.26	0.49	0.25	0.00	0.01	0.00
Blue (CA)	*17.00*	0.00	0.00	1.00	0.00	0.00	17.00
Blue (OR & WA)	*26.94*	0.34	0.66	0.00	9.26	17.68	0.00
Brown	*1.75*	0.26	0.49	0.25	0.45	0.86	0.43
Calico	*0.00*	0.26	0.49	0.25	0.00	0.00	0.00
China	*6.20*	0.26	0.49	0.25	1.60	3.06	1.54
Copper	*9.71*	0.26	0.49	0.25	2.51	4.79	2.41
Gopher	*0.00*	0.26	0.49	0.25	0.00	0.00	0.00
Grass	*0.55*	0.26	0.49	0.25	0.14	0.27	0.14
Kelp	*0.01*	0.26	0.49	0.25	0.00	0.00	0.00
Olive	*0.26*	0.26	0.49	0.25	0.07	0.13	0.07
Quillback	*6.15*	0.26	0.49	0.25	1.59	3.04	1.52
Treefish	*0.18*	0.26	0.49	0.25	0.05	0.09	0.04
Total	68.76				15.68	29.93	23.15

Fishing Activity under Option 2 Compared to Option 1 (No Action)

Washington

Recreational: The Washington HG under Option 2 is 15.68 mt which is higher than the project impacts Under No Action (Option 1). Therefore, the Washington recreational fishery would operate under the season structure described under the Preferred Alternative with no additional management measures needed to keep the catch of nearshore rockfish under the WA HG for this HG Option.

Commercial: Closed

Oregon

Under Option 2, the Oregon Nearshore Rockfish complex harvest guideline is lower than the current combined commercial and recreational state-specified landing caps and average annual catches. We showed above that expected Nearshore Rockfish mortality for Oregon fisheries combined is 45.6 mt for No Action and 48.9 mt for Preferred Alternative. The Oregon harvest guideline under this option is 29.9 mt (Table B-23), or 34 percent lower than expected mortality under No Action and 39 percent lower than expected under Preferred Alternative. State landing caps for both commercial and recreational fisheries will have to be reduced dramatically to accommodate this lower target. It is the GMT's understanding that Oregon intends to develop the commercial-recreational split of the Oregon HG through subsequent state processes.

Recreational: Once the state determines the sector-specific allocation, management measures will need to be examined, then implemented through state rules. A preliminary examination of possible management measures has begun. A bag limit analysis revealed that the majority of anglers encounter less than one nearshore rockfish per trip. Therefore changes in bag limit will likely not be a viable option. The likely measure will be non-retention for some months of the fishing season, incorporating discard mortality for the non-retention months into the impact projections. Since most anglers encounter less than one nearshore rockfish per angler trip and they are generally not targeted, prohibiting retention during certain months, is not expected to influence the number of angler trips, how often, when or where anglers go fishing. It may require anglers to be on the water longer to fill their daily bag limit, however since the majority of anglers do not fill their entire bag each day, this is anticipated to have minimal impacts.

Commercial: Under Option 2, the RCA depth restriction of 30 fm would remain in place because projected catch of overfished species would remain at or below the Oregon catch share. Measures other than depth management will have to be implemented to reduce the mortality of Nearshore Rockfish (including blue rockfish) under this option. For example, under No Action, the commercial fishery was projected to land 15 mt of Nearshore Rockfish (including blue rockfish), resulting in total mortality of 15.1 mt, including discard. Using proportions of current landing caps and average landings between Oregon recreational and commercial fisheries (see Preferred Alternative in the DEIS), the Oregon commercial fishery would receive 9.6 mt of Nearshore Rockfish (including blue rockfish), or a reduction of 36 percent relative to No Action and a 48 percent reduction relative to Preferred Alternative. These reductions may require lower trip limits, periods of non-retention, or some combination of the two. In addition, a new and separate landing cap and trip limit for blue rockfish may be required to remain within the harvest guideline under Option 2 (currently, blue rockfish is managed using landing caps and trip limits in combination with black rockfish).

It should be pointed out that trip limit reductions may not equate to a 1:1 reduction in total landings. In other words, if it were required to reduce landings by 36 percent, then it may be necessary to reduce trip limits by much more than 36 percent relative to No Action. In most fisheries, relatively few individuals or vessels reach trip limits. Most vessels land somewhat less than trip limit levels. As such, if trip limits were solely used to reduce landings, and if the Oregon recreational to commercial ratio (split) remained the same as under No Action, then trip limit reductions would likely have to be much more than 36 percent (i.e., trip limits for this fishery would need to be much lower than 700 lb x 0.64 = 448 lb per period under Option 1). There are other considerations that industry and ODFW staff must discuss and analyze before effective trip limits can be identified. For example, impacts of trip limits vary with the season in which they are applied. Finally, trip limits can be applied along with periods of non-retention, which will alter the level of the trip limit needed. Preferences by the Oregon nearshore fleet need to be identified and additional modeling is required before more specificity can be provided.

California

Recreational: Under Option 2, 23.15 mt would be allocated to California, of which, the recreational catch share is 12.9 mt, accommodating a May 1 to October 31 season with a 20 fm depth restriction in the Northern Management Area. While this would provide an additional half month of fishing opportunity relative to the status quo, the recreational fishing season would have to be reduced by four months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Under Option 2 the RCA depth restriction of 20 fm would remain in place as well as the trip limit structure. Because the minor nearshore rockfish complex harvest has been at or below the ACLs in recent years (see Figure (cite the correct figure)), it is not anticipated that Option 2 will have an adverse effect on the northern nearshore rockfish fishery; thus fishing activity is expected not to change. However, trip limit reductions could be implemented should the need arise, with possible decreases that may be as much as 30 percent less than the current trip limit amount. Another possibility to be considered is to have period closures. Additionally, California's northern management region is somewhat isolated from the adjacent region(s). Because of this, northern region participants tend not to fish in other management regions (for those holding a deeper nearshore rockfish permit), nor would they be likely to because the trip limits for the northern region are higher than any of the other regions. Also, it is not expected that holders of a deeper nearshore rockfish permit, who may also hold a shallow permit in any of the other southerly regions, would travel to the northern management region to fish because they would only be allowed to catch and land the deeper nearshore rockfishes – their shallow nearshore permit would not be valid north of 40°10' N. Lat.. In effect, it would probably not be economically justifiable for them to fish north of 40°10' N. latitude.

Biological Impacts Under Option 2 Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 2 are summarized in Table B-24. Further description of the mortality in each state and sector is provided in the text below.

Table B-24. Projected Nearshore Rockfish mortality (mt) north of 40°10′ N. Lat. from each state and sector under Option 2 (miles of coastline). Sector-specific allocations within states are provided as an example and are based on No Action. These intra-state allocations are subject to change.

	Washington		Oregon		California		Total
	Rec	Com	Rec	Com	Rec	Com	
Mortality	10.5	Closed	20.3	9.6	12.6	10.3	63.3
State Total	10.5		29.9		22.9		
Allocation	15.68		29.93		23.15		69
Projected Percent Attainment	66.9%		100%		98.9%		91.7%

Washington

Recreational: Under Option 1 the projected Washington recreational catch falls below the WA HG of 15.68 mt with catch projected to be 10.5 mt. No negative biological impacts are expected.

Commercial: Closed

Oregon

Recreational: Under this option impacts to nearshore rockfish will need to be reduced. Oregon intends to allocate between the commercial and recreational sectors, and take management measures to stay within those allocations, through subsequent state processes. The most likely management measure will be non-retention of nearshore rockfish for some months of the fishing season. Table B-25 below shows the projected landings under the preferred season structure and the projected discard mortality from non-retention by month of the other nearshore rockfish and blue rockfish. Both are calculated on a month by month basis, as that is the smallest time unit currently available in the Oregon recreational model. To project total impacts, and determine which months might need to have non-retention, the landings for months open are added to the release mortality for non-retention months.

Table B-25. Oregon recreational fishery impacts (in mt) by month under preferred season structure and non-retention for the nearshore rockfish.

Projections	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Other Nearshore Rockfish												
Landings under SQ regulations	0.19	0.24	0.58	0.90	1.64	2.13	2.59	2.91	1.22	0.43	0.10	0.06
Non-retention release mortality	0.08	0.10	0.23	0.33	0.61	0.79	0.96	1.08	0.45	0.17	0.04	0.03
Blue Rockfish												
Landings under SQ regulations	0.27	0.34	0.82	1.25	2.24	2.90	3.54	3.98	1.66	0.61	0.14	0.09
Non-retention release mortality	0.27	0.11	0.27	0.39	0.70	0.91	1.10	1.24	0.52	0.21	0.05	0.03

As one example, non-retention in the months of July and August would reduce impacts of other nearshore rockfish species (not including blue rockfish) from 13 mt to 9.5 mt, or a 27 percent reduction. It is the GMT's understanding that Oregon intends to go through their public process to get angler input on which months to have non-retention.

Commercial: Under this option, commercial management measures will be applied to reduce Nearshore Rockfish mortality to 9.6 mt (including blue rockfish), or a 36 percent reduction relative to No Action (and 48 percent reduction relative to Preferred Alternative). This value may change depending on decisions regarding the Oregon recreational-commercial split. Regardless of the management measure applied (e.g., trip limits and/or non-retention), mortality will be reduced. Therefore, no negative biological impacts are expected under this option.

California

Recreational: The projected mortality on nearshore rockfish under Option 2 with a May 1 to October 31 season in the Northern Management Area with a 20 fm depth restriction is 12.6 mt of which 2.8 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 12.9 mt under this option.

Commercial: No anticipated negative biological impacts are expected for this option compared to Option 1. Because this option (as well as Options 3 and 4) could require reductions in harvest, biological impacts could actually be reduced to a small degree depending upon the amount of the reduction. Since California's northern fishery has taken less than 10 mt per year on average during the past five years, resultant decreases would be small.

Projected Overfished Species Mortality

Washington

Recreational: Projected overfished species impacts under this Option are the same as for the season structure under the Washington recreational Preferred Alternative.

Commercial: Closed

Oregon

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 0.01 percent increase in canary and yelloweye rockfish impacts, assuming no other changes to angler behavior.

Commercial: Under Option 2, if fishermen behavior remains the same as under No Action regarding fishing locations and fishing methods, but increased discarding of Nearshore Rockfish becomes necessary, then mortality of overfished species will remain unchanged relative to No Action. If, on the other hand, selection of fishing locations changes dramatically because of changes in trip limits or required non-retention of Nearshore Rockfish, then overfished species impacts may increase or decrease, depending on geographic locations selected. The direction or level of this potential change in catch of overfished species cannot be predicted in this analysis.

California

Recreational: Assuming season lengths under Option 1 of the Preferred Alternative in Management Areas south of $40^{o}10'$ N. Lat. and the May 1 to October 31 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 2 are 2.7 mt of yelloweye rockfish, 21.4 mt of canary rockfish, 118.3 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Mortality of canary and yelloweye rockfish has been near the respective allocation amounts for these two species. As such, under Option 2 (as well as Options 3 and 4), projected mortality may have to be reduced. Using the nearshore bycatch model as a predictor, decreases in the black rockfish component may need to be considered as a means to achieve the necessary projected mortality decreases for these two overfished species so as to not exceed their allocations.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 2.

Overfished Species

Under Option 2 (miles of coastline), the overfished species mortality is expected to be below the harvest limits/guidelines. Thus stock status and rebuilding plans would not be adversely affected by management measures under Option 2.

Socio-economic Impacts compared to Option 1

Washington

Recreational: The socio-economic impacts would be the same under this Option compared to the No Action Option. Socio-economic impacts would continue to be driven by management measures necessary to keep the Washington recreational fishery within the WA HG for yelloweye and canary rockfish. Recreational fishing effort is expected to be the same under Option 2 as under the management measures and season structure for the Washington recreational Preferred Alternative.

Commercial: Closed

Oregon

Recreational: Since most anglers encounter less than one nearshore rockfish per angler trip and they are generally not targeted, management measures necessary to reduce mortality of nearshore rockfish species is not expected to impact angler behavior, angler trips, nor any other socio-economic indicators. However, additional outreach and education on species identification will likely be necessary to help anglers stay within retention/non-retention regulations. It is impossible to predict how the additive impact of adding this regulation to others already in place might impact anglers' decisions on fishing activities.

Commercial: It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may be reduced from 15.0 mt (No Action) to between 9.6 mt (maximum, if reduced trip limits resulted in avoiding Nearshore Rockfish altogether resulting in no discards, which is unlikely) to 7.2 mt (if encounters were similar to No Action and discarding was necessary, some of which will not survive. The 2013 price per pound for Other Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenarios shown here, lost ex-vessel revenue may range from $45,238 to $65,344 relative to No Action (the loss is higher relative to Preferred Alternative). Additional impacts may be incurred by vessels and crew if the decision is made to fish in less productive areas to avoid Other Nearshore Rockfish, for example. If such of a choice is made, then it may require extra time and fuel to catch other targeted species relative to No Action.

California

Recreational: Under Option 2, the season length would increase by a half month (205 angler trips) relative to the status quo fishery in the Northern Management Area, but the season would be reduced by four months (4,175 angler trips) relative to the longest proposed season with the Preferred Alternative ACLs (Option 1) resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: The northern commercial fishery is still recovering from the 2011 tsunami event and the loss of buyers during the past year or two. Currently, there is only one major active buyer in Crescent City. The economic structure of the northern area (essentially only Crescent City) is in a rebuilding phase with no expected time frame, at the present, that predicts when a return to status quo would be reestablished. This, however, is not a result of the options themselves, but an artifact of unavoidable events that have impacted this area. (See also the comments in the Change in Fishing Activity section, above.)

B.5.1.3 Option 3 Historical Catch

Option 3 is to manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting apportionment based on the recreational and commercial historical catch between 2004 and 2012 reflected in Table B-26.

Table B-26. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 3 (historical catch) derived using the historical recreational and commercial catch between 2004 and 2012.

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black-and- yellow	0.01	0	0.21	0.79	0	0	0.01
Blue (CA)	17	NA	NA	1	0	0	17
Blue (OR & WA)	26.94	0.06	0.94	NA	1.67	25.27	0
Brown	1.75	0	0.08	0.92	0	0.14	1.61
Calico	0	NA	NA	NA	0	0	0
China	6.2	0.18	0.68	0.14	1.13	4.21	0.86
Copper	9.71	0.13	0.53	0.34	1.24	5.14	3.34
Gopher	0	0	0.29	0.71	0	0	0
Grass	0.55	0	0.49	0.51	0	0.27	0.28
Kelp	0.01	NA	NA	NA	0	0	0
Olive	0.26	0	0.03	0.97	0	0.01	0.25
Quillback	6.15	0.16	0.47	0.36	1.01	2.91	2.23
Treefish	0.18	0	0	1	0	0	0.18
Total					5.05	37.94	25.76

Fishing Activity under Option 3 Compared to Option 1

Washington

Recreational: The Washington recreational fishery would operate under season structure and management measures described under the Preferred Alternative. However because the WA HG under Option 3 is lower than the historical catch, additional management measures would be needed to keep nearshore rockfish catch under the WA HG for this option. To keep total mortality under the WA HG, retention of nearshore rockfish would not be permitted for a portion of the year. Attainment of the WA HG under this alternative is projected to occur by June 1 with retention of nearshore rockfish prohibited for the remaining 7 months of the year. Alternate combinations of months when nearshore rockfish would be prohibited may be explored.

Commercial: Closed

Oregon

Under Option 3, the Oregon Nearshore Rockfish complex harvest guideline is lower than the current combined commercial and recreational state-specified landing caps and average annual catches, but higher than Option 2. We showed under No Action for Nearshore Rockfish that the expected mortality for recreational and commercial fisheries combined is 45.6 mt (the expected mortality under Preferred

Alternative is 48.9 mt). The Oregon harvest guideline under this option is 37.9 mt (Table B-26), 17 percent lower than expected mortality under No Action, and 22 percent lower than expected mortality under Preferred Alternative. State landing caps for both commercial and recreational fisheries will have to be reduced to accommodate this lower target. As noted under Option 2, Oregon intends to develop or modify the commercial-recreational split of the Oregon HG through state processes.

Recreational: Similar to Option 2, a combination of months of retention and months of non-retention will likely be required to keep impacts within the Oregon recreational HG.

Commercial: Similar to No Action, the RCA depth restriction of 30 fm would remain in place. However, as shown for Option 2, trip limits and/or no-retention may be needed to reduce mortality relative to No Action or Preferred Alternative. Trip limit reductions will be less severe than shown under Option 2. For example, using proportions of current landing caps and average landings between Oregon recreational and commercial fisheries (see Preferred Alternative in the DEIS), the Oregon commercial fishery would receive 11.2 mt of Nearshore Rockfish (including blue rockfish), or a reduction of 25 percent relative to No Action and a reduction of 39 percent relative to Preferred Alternative. This reduction may require either lower trip limits, periods of non-retention, or some combination for Nearshore Rockfish (excluding blue rockfish), along with a separate landing cap and separate trip limit for blue rockfish (see Option 2 for more details).

As shown for Option 2, trip limit reductions may not equate to a 1:1 reduction in total landings. In other words, if it were required to reduce landings by 25 percent, then it may be necessary to reduce trip limits by more than 25 percent. If trip limits (and/or non-retention) were solely used to reduce landings, and if the Oregon recreational-commercial allocation remained the same as under No Action, then trip limit reductions would likely have to be much lower than 700 lb x 0.75 = 525 lb per period. How much lower is uncertain. ODFW staff will meet with industry to identify most preferred management measures, and subsequent trip limit modeling will be performed based on options selected. See Option 2 for more details.

California

Recreational: Under Option 3, 25.3 mt would be allocated to California, of which the recreational catch share is 14.07 mt, accommodating a April 15 to December 31 season with a 20 fm depth restriction in the Northern Management Area. While this would provide an additional three months of fishing opportunity relative to the status quo, the recreational fishing season would have to be reduced by one and a half months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Same as Option 2.

Biological Impacts Under Option 2 Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 3 are summarized in Table B-27. Further description of the mortality in each state and sector is provided in the text below.

Table B-27. Projected Nearshore Rockfish mortality (mt) north of 40°10′ N. Lat. from each state and sector under Option 3 (historical catch). Sector-specific allocations within states are provided as an example and are based on No Action. These intra-state allocations are subject to change.

	Washington		**Oregon**		**California**		**Total**
	Rec	Com	Rec	Com	Rec	Com	
Mortality	5.1	Closed	26.8	11.2	14.2	11.45	68.7
State Total	5.1		37.9		25.7		
Allocation	5.05		37.94		25.76		68.75
Projected Percent Attainment	100%		100%		99.7%		99.9%

Washington

Recreational: Under Option 3, additional management measures will be implemented to reduce nearshore rockfish mortality in the Washington recreational fishery by approximately 52 percent compared to Option 1 (No Action).

Commercial: Closed

Oregon

Recreational: Under Option 3, similar to Option 2, non-retention will likely be required to keep impacts within the Oregon recreational HG. Table B-25 has the projections by month for the nearshore rockfish complex minus blue rockfish for retention and non-retention.

Commercial: Under this option, commercial management measures will be applied to reduce Nearshore Rockfish mortality to 11.2 mt, or a 25 percent reduction relative to No Action and 39 percent reduction relative to Preferred Alternative. This value may change depending on decisions regarding the Oregon recreational-commercial spit. Regardless of the management measure applied (e.g., trip limits are non-retention), mortality will be reduced. Therefore, no negative biological impacts are expected under this option.

California

Recreational: The projected mortality on nearshore rockfish under Option 3 with an April 15 to December 31 season with a 20 fm depth restriction in the Northern Management Area is 14.2 mt, of which 3.0 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 14.35 mt under this option.

Commercial: The projected mortality on nearshore rockfish under Option 3 is estimated to be 5.6 mt with no other management changes implemented.

Projected Overfished Species Mortality

Washington

Recreational: No additional overfished species mortality is projected compared to the No Action alternative.

Commercial: Closed

Oregon

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 0.01 percent increase in canary and yelloweye rockfish impacts. This assumes no other changes to angler behavior.

Commercial: Same as Option 2.

California

Recreational: Assuming season lengths under Option 1 of the Preferred Alternative in Management Areas south of 40°10′ N. Lat. and the April 15 to December 31 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 3 are 2.8 mt of yelloweye rockfish, 21.4 mt of canary rockfish, 118.3 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Same as Option 2.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 3.

Overfished Species

The projected mortalities of overfished species under Option 3 are the same as No Action (Option 1), which are below the respective harvest limits/guidelines. No adverse effects on stock status or rebuilding progress are expected under Option 3.

Socio-economic Impacts Under Option 3 compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 3, recreational fishing opportunity would be further reduced. Prohibiting retention of nearshore rockfish for a portion of the season on top of other management measures already in place to protect overfished species may discourage angler participation in recreational fisheries. While it's difficult to predict angler behavior, any reduction in angler fishing effort will have negative socioeconomic impacts.

Commercial: Closed

Oregon

Recreational: Same as under Option 2 and Option 1 (No Action).

Commercial: It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see Option 2 above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may be reduced from 15.0 mt (No Action) to between 11.2 mt (maximum, if reduced trip limits result in avoiding Nearshore Rockfish altogether causing no discards, which is unlikely) to approximately 9.5 mt (if encounters were similar to No Action and discarding was necessary, some of which will not survive). The 2013 price per pound for

Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenarios shown here, lost ex-vessel revenue may range from approximately $31,834 to $46,076 relative to No Action (the loss is higher relative to Preferred Alternative). Additional impacts may be incurred by vessels and crew if the decision is made to fish in less productive areas to avoid Nearshore Rockfish, for example. If such of a choice is made, then it may require extra time and fuel to catch other targeted species relative to No Action.

California

Recreational: Under Option 4, the season length would increase by three months (1,825 angler trips) relative to the status quo fishery in the Northern Management Area, but the season would be reduced by one and a half months (2,555 angler trips) relative to the longest season afforded under the Preferred Alternative ACLs (Option 1), resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.

Commercial: Same as Option 2.

B.5.1.4 Option 4 Hybrid Method

Option 4 is to manage the Nearshore Rockfish complex according to a state specific harvest guidelines stratified at 40°10′ N. Lat. reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and the historical catch between 2004 and 2012 for the remaining species reflected in Table B-28.

Table B-28. Allocations of Nearshore Rockfish north of 40°10′ N. Lat. under Option 4 derived using miles of coastline for China, quillback and copper rockfish and the historical recreational and commercial catch between 2004 and 2012 for the remaining species.

Species	Contribution	WA%	OR%	CA%	WA mt	OR mt	CA mt
Black-and-yellow	0.01	0	0.21	0.79	0	0	0.01
Blue (CA)	17	NA	NA	1	0	0	17
Blue (OR & WA)	26.94	0.06	0.94	NA	1.67	24.27	0
Brown	1.75	0	0.08	0.92	0	0.14	1.61
Calico	0	NA	NA	NA	0	0	0
China	6.2	0.26	0.49	0.25	1.6	3.06	1.54
Copper	9.71	0.26	0.49	0.25	2.51	4.79	2.41
Gopher	0	0	0.29	0.71	0	0	0
Grass	0.55	0	0.49	0.51	0	0.27	0.28
Kelp	0.01	NA	NA	NA	0	0	0
Olive	0.26	0	0.03	0.97	0	0.01	0.25
Quillback	6.15	0.26	0.49	0.25	1.59	3.04	1.52
Treefish	0.18	0	0	1	0	0	0.18
Total					7.37	36.58	24.8

Fishing Activity under Option 4 Compared to Option 1

Washington

Recreational: The Washington recreational fishery would operate under season structure and management measures described under the Preferred Alternative. However because the WA HG under Option 4 is lower than the historical nearshore rockfish catch, additional management measures would be needed to keep nearshore rockfish catch under the WA HG. To keep total mortality under the WA HG, retention of nearshore rockfish would be prohibited for a portion of the year. The WA HG under Option 4 is higher than Option 3 and so the time period when retention of nearshore rockfish would be prohibited would be slightly shorter. Attainment of the WA HG under this alternative is projected to occur in mid-July with retention of nearshore rockfish prohibited for the remaining 5.5 months of the year. Alternate combinations of months when nearshore rockfish would be prohibited may be explored.

Commercial: Closed

Oregon

Under Option 4, the Oregon harvest guideline is similar to that shown under Option 3; Option 4 provides a harvest guideline of 36.6 mt and Option 3 shows a harvest guideline of 37.9 mt. As such, overall impacts will be similar between Option 4 and Option 3. See Option 3 for more details.

Recreational: Similar to Options 2 and 3 above, non-retention will likely be required for some months to keep impacts within the Oregon recreational HG.

Commercial: Similar to Option 3, with slightly more restrictive management measures. If the recreational-commercial split remains the same as shown under No Action, then commercial Nearshore Rockfish mortality is expected to be 10.5 mt under Option 4 (whereas expected mortality under Option 3 is 11.2 mt). This represents a reduction of 30 percent to No Action and 43 percent relative to Preferred Alternative.

California

Recreational: Under Option 4, 24.8 mt would be allocated to California, of which, the recreational catch share is 13.79 mt, accommodating a May 1 to November 30 season with a 20 fm depth restriction in the Northern Management Area. While this would provide an additional two and month and a half of fishing opportunity relative to the status quo, the recreational fishing season would have to be reduced by three months relative to the longest season under the Preferred Alternative of March 1 to December 31st. Other alternatives to address overages relative to the catch share include a reduced bag limit or non-retention of Nearshore Rockfish species during part of the season.

Commercial: Same as Option 2.

Biological Impacts Under Option 4 Compared to Option 1

Projected Nearshore Rockfish Mortality

The projected mortality in each state and sector under Option 4 are summarized in Table B-29. Further description of the mortality in each state and sector is provided in the text below.

Table B-29. Projected Nearshore Rockfish mortality north of 40°10′ N. Lat. from each state and sector under Option 4 (hybrid). Sector-specific allocations within states are provided as an example and are based on No Action. These intra-state allocations are subject to change.

	Washington		**Oregon**		**California**		**Total**
	Rec	Com	Rec	Com	Rec	Com	
Mortality	7.37	NA	26.13	10.45	13.34	11.2	68.49
State Total	7.37		36.58		24.54		
Allocation	7.37		36.58		24.80		69
Projected Percent Attainment	100%		100%		98.9%		99.6%

<u>Washington</u>
Recreational: Under Option 4, additional management measures will be implemented to reduce nearshore rockfish mortality in the Washington recreational fishery by 27 percent compared to Option 1.

Commercial: Closed

<u>Oregon</u>
Recreational: Similar to Options 2 and 3 above, a combination of months of retention and non-retention will be required.

Commercial: If the recreational-commercial split remains the same as shown under No Action, then commercial Nearshore Rockfish mortality is expected to be 10.5 mt under Option 4, a 30 percent reduction relative to No Action. Management measures will be used to reduce mortality to the target level. Therefore, no biological impacts are expected under this option.

<u>California</u>
Recreational: The projected mortality on nearshore rockfish under Option 4 with a May 1 to November 30 season with a 20 fm depth restriction in the Northern Management Area is 13.34 mt, of which 2.88 mt would be blue rockfish. These mortality projections are below the recreational catch share of the California allocation of 13.79 mt under this option.

Commercial: Same as Option 2.

Projected Overfished Species Mortality

<u>Washington</u>
Recreational: No additional overfished species mortality is projected compared to the No Action alternative.

Commercial: Closed

<u>Oregon</u>

Recreational: A preliminary examination of overfished species impacts due to management measures that may be required under this option projects less than 0.01 percent increase in canary and yelloweye rockfish impacts.

Commercial: Same as Options 2 and 3.

California

Recreational: Assuming season lengths under Option 1 of the Preferred Alternative in Management Areas south of 40°10′ N. Lat. and the May 1 to October 31 season with a 20 fm depth restriction in the Northern Management Area, overfished species mortality projected to accrue under Option 4 are 2.8 mt of yelloweye rockfish, 21.6 mt of canary rockfish, 118.3 mt of bocaccio and 1.2 mt of cowcod. The projected impacts are within the respective harvest limits/guidelines.

Commercial: Same as Option 2.

Stock Status

Nearshore Rockfish

None of the stocks in the Nearshore Rockfish complex are currently deemed overfished. The proposed HG under this option will facilitate implementation of inseason actions to prevent the aggregate ACL from being exceeded, decreasing the risk of overfishing component stocks. Thus, the stock status would not be adversely affected by management measures under Option 4.

Overfished Species

The projected mortalities under Option 4 are the same as No Action (Option 1), which are below the respective harvest limits/guidelines. No adverse effects on stock status or rebuilding progress are expected under Option 4.

Socio-economic Impacts under Option 4 Compared to Option 1

Washington

Recreational: Socio-economic impacts would continue to be affected by management measures necessary to keep the Washington recreational fishery within the WA HG for overfished species (yelloweye and canary rockfish). In addition, under Option 4, recreational fishing opportunity would be further reduced. Prohibiting retention of nearshore rockfish for a portion of the season on top of other management measures already in place to protect overfished species may discourage angler participation in recreational fisheries. While it's difficult to predict angler behavior, any reduction in angler fishing effort will have negative socioeconomic impacts.

Commercial: NA

Oregon

Recreational: Same as above Options

Commercial: Socio-economic impacts are between those shown for Options 2 and 4, if recreational-commercial split remain similar to No Action. It is uncertain whether fishing behavior (i.e., fishing location and fishing gear) will change under this option relative to No Action (see Options 2 and 3 above). However, if allocations remain the same between Oregon recreational and commercial fisheries, then landings may be reduced from 15.0 mt (No Action) to between 10.5 mt (maximum, if reduced trip limits result in avoiding Nearshore Rockfish altogether causing no discards, which is unlikely) to 8.6 mt (if encounters were similar to No Action and discarding was necessary, some of which will not survive). The 2013 price per pound for Nearshore Rockfish (weighted average including blue rockfish) was $3.80 per pound for Oregon nearshore fisheries (PacFIN). Under the potential scenarios shown here, lost ex-vessel revenue may range from $37,698 to $53,615 relative to No Action (the loss is higher relative to Preferred Alternative). Additional impacts may be incurred by vessels and crew if the decision is made to fish in less productive areas to avoid Nearshore Rockfish, for example. If such of a choice is made, then it may require extra time and fuel to catch other targeted species relative to No Action.

California

Recreational: Under Option 4, the season length would increase by one and a half months (589 angler trips) relative to the status quo fishery in the Northern Management Area, but the season would be reduced by three months (3,790 angler trips) relative to the longest season that can be afforded under the Preferred Alternative ACLs (Option 1) resulting in lost revenue from those in coastal communities dependent on recreational fishing for their livelihoods.
Commercial: Socio-economic impacts will be similar (slightly worse) than described under Option 3.

Discussion

Under status quo management and the Preferred Alternative seasons, the 69 mt ACL for the Nearshore Rockfish complex are projected to be exceeded. Even with coordinated interstate catch tracking of Nearshore Rockfish complex mortality, inseason action may prove difficult without harvest guidelines for each state on which to base the need for inseason action to reduce mortality as the ACL does not specify amounts to be taken by each state/sector. Establishing harvest guidelines for each state will provide a trigger for inseason action to prevent aggregate mortality from exceeding the ACL. The GMT hopes that the background information regarding proposed methods forming the basis for allocation and implications of each option for the fisheries in each state provided will help inform an allocation decision by the Council and to prevent future ACL overages, while minimizing adverse effects on the fishery.

Appendix 1. Methods used to measure the coastline for each state north of 40°10′ N. latitude.

At the March 2014 Council meeting, the Council requested that the Groundfish Management Team (GMT) calculate the length of the coastlines of California (north of 40°10′ N. latitude), Oregon, and Washington, as a way of approximating the nearshore habitat off each state. Though there may be alternative methods for approximating nearshore habitat, the GMT used the state-federal maritime boundary, i.e., the 3 nautical mile (nm) line, to estimate proportions of coastline among states (Figure B-21) as a starting point for this analysis.[7] Results of this analytical method (e.g., measurement of the 3 nm line (Table B-30) could be used as a basis for allocating Nearshore Rockfish among states. Details regarding this method are described below.

Proportion based on the 3 nm state-federal maritime boundary

Congress established the 3 nm as the boundary between state and federal jurisdiction over the seafloor with the Submerged Lands Act (SLA) of 1953 (43 U.S.C. §1301 et seq.). The 3 nm was established from the official shoreline, called the U.S. normal baseline, which "coincides with the low water line depicted on NOAA charts and includes closing lines across the entrances of legal bays and rivers, consistent with international law."[8] The baseline is approved by the interagency U.S. Baseline Committee and was last evaluated in 2002. The 200 nm exclusive economic zone (EEZ) and 12 nm Territorial Sea boundaries extend from this same baseline.

Shapefiles (i.e., files used in ArcGIS) of the 3 nm boundary, the 200 nm EEZ boundary, and the western U.S. states were downloaded and projected to allow for measurement in ArcGIS (Table B-31). An "addition" was made by the analyst to connect the northern portion of the 3 nm boundary to the EEZ boundary that the U.S. shares with Canada because the shapefiles for these two boundary lines do not connect or overlap (See Figure B-21). The connection was made based on the Bonilla-Tatoosh line defined in Washington's regulations (WAC 220-16-490). The resulting 3 nm boundary line was then measured from the U.S./Canada border to what serves as the WA/OR boundary for the purposes of groundfish management (46°16' N. lat.), to the OR/CA boundary (42° N. lat.), and to the OR/CA boundary to 40°10' N. latitude. The resulting measurements are shown in Table B-30.

This represents one of numerous methods available to measure or approximate miles of coastline. Other methods that the GMT looked at included directly measuring the shoreline (with and without inclusion of islands).[9] A visual comparison of the difference in detail between datasets (i.e., 3 nm line dataset compared to a shoreline dataset) is provided in Figure B-21, which represents a magnified excerpt of Figure B-20. Measurements of coastline may vary depending on many factors including the projected coordinate system used when measuring distances of features depicted on the map (e.g., UTM Zone 10N or WGS 1984), the spatial resolution of the map, image, or file that is used to create the shoreline dataset and the method for defining the shoreline (e.g., mean low water vs. high water). Defining the shoreline is a legal and policy matter as much as a scientific one.[10] These are matters of cartography of which GMT members have limited knowledge.

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[7] If desired by the Council, the GMT could provide other methods.

[8] Source: http://catalog.data.gov/dataset/maritime-limits-and-boundaries-of-united-states-of-america

[9] The following shoreline dataset was used: NOAA et al. 1994. "NOA80K/ALLUS80K: Medium Resolution Digital Vector U.S. Shoreline shapefile Long Island Sound GIS project area." Available at: http://woodshole.er.usgs.gov/openfile/of2005-1162/data/basemaps/coastline/nos80k_faq.htm (accessed 5/21/14).

[10] According to the NOAA Shoreline Website, there is "no legal reference that designates one specific shoreline as the legal shoreline. Furthermore, there is no simple answer to this question as there are many legal, technical, and general uses of the terms related to shoreline (shoreline, coastline, baseline, mean high-water line, mean-low water line, etc.)." Source: "What is the legal U.S. shoreline?" Available at: http://shoreline.noaa.gov/faqs.html?faq=4 (accessed 5/21/14).

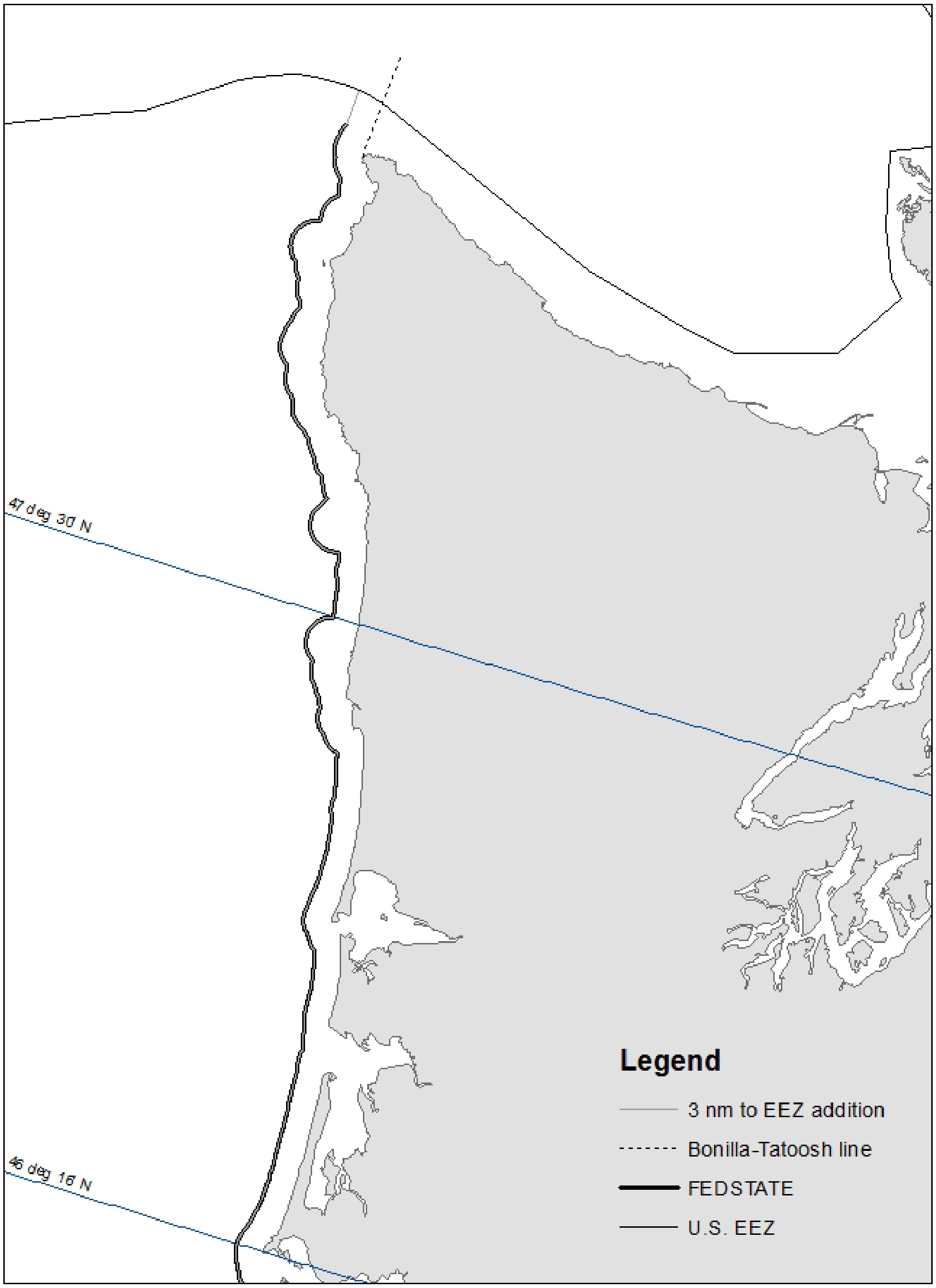

Figure B-20. Detail to show contrast between the coastline and the 3 nm state-federal maritime boundary from the U.S./Canada EEZ to the WA/OR groundfish management line (46°16' N lat.). The connection made from the 3 nm boundary with the EEZ is also shown.

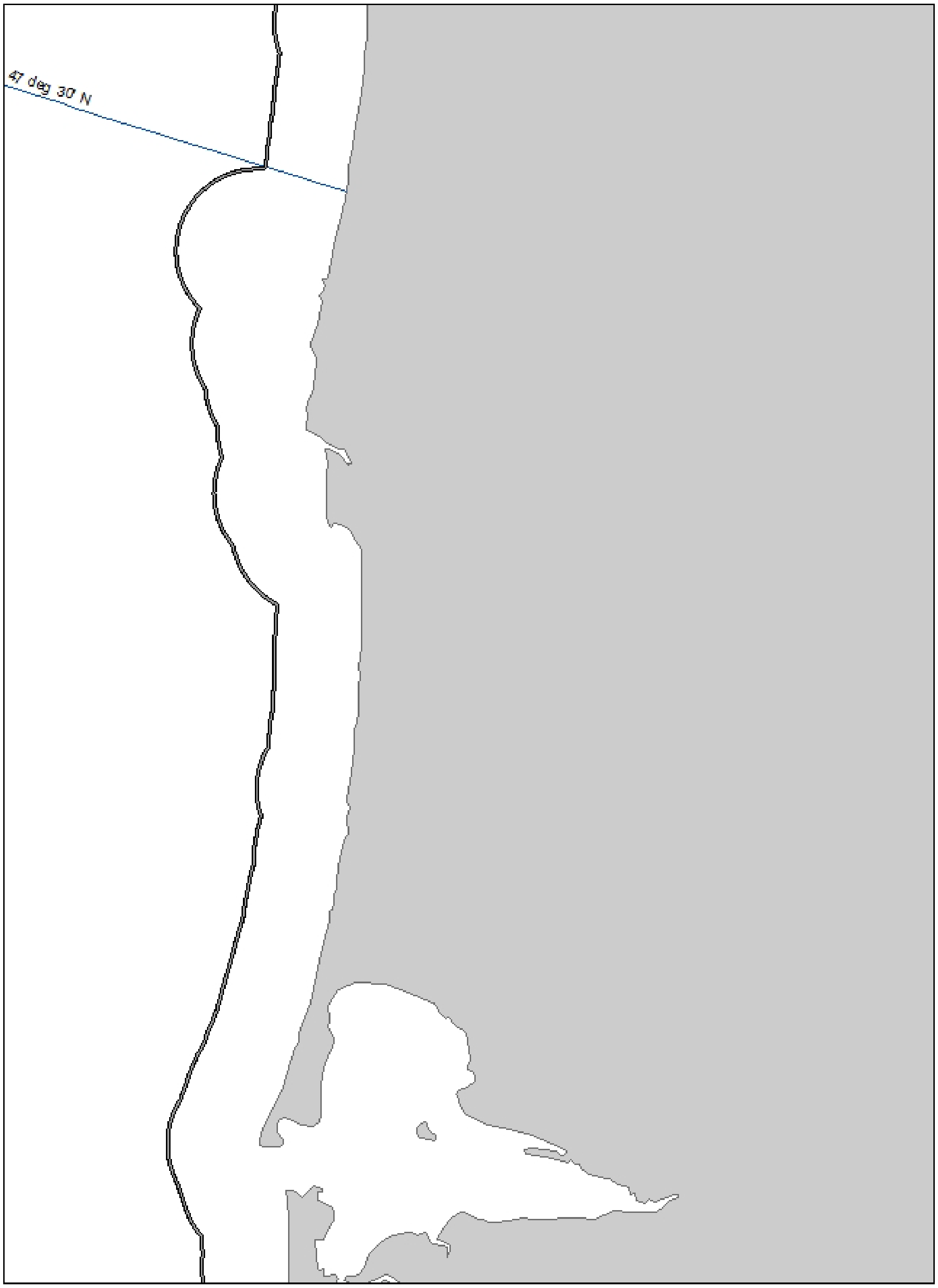

Figure B-21. Detail of Figure B-20, showing differences between the 3 nm line and the shoreline.

Table B-30. Distance estimates using 3 nm state-federal maritime boundary. These differ from what was provided in Agenda Item C.4.b, Washington Department of Fish and Wildlife (WDFW) Report, April 2014.[11]

State	Distance (km)	Percentage of Coastline
Washington	280.01	26.0%
Oregon	530.97	49.3%
Northern California	265.58	24.7%
Total	1,076.56	100%

Table B-31. Source information used for measuring distance of the 3 nm state-federal maritime boundary.

General information	
Software	ArcGIS 10.1
Projected Coordinate System	NAD_1983_2011_UTM_Zone_10N
Geographic Coordinate System	GCS_NAD_1983_2011
Datum	D_NAD_1983_2011
Shapefile information	
Projection of the west coast	U.S. Geological Survey (USGS). 2002. Data Categories: Basemap: State Bounds. Available at: http://coastalmap.marine.usgs.gov/regional/contusa/westcoast/pacificcoast/data.html (5/15/14). Metadata: http://coastalmap.marine.usgs.gov/GISdata/basemaps/boundaries/state_bounds/state_bounds.htm (5/15/14).
Projection of the EEZ	U.S. Geological Survey (USGS). 2013. Data Categories, Boundaries: survey areas, fed/state boundary, U.S. EEZ Boundary. Available at: http://coastalmap.marine.usgs.gov/regional/contusa/westcoast/pacificcoast/data.html (5/15/14). Metadata: http://coastalmap.marine.usgs.gov/GISdata/basemaps/boundaries/eez/NOAA/useez_noaa.htm (5/15/14).
3 nm state boundary	Bureau of Ocean Energy Management. 2002. Submerged Lands Act Boundary. Available at: http://www.marinecadastre.gov/Data/default.aspx (5/19/14).
Latitude lines	Created by GMT analyst, using the following latitude boundaries: 40°10' N., 42° N., and 46°16' N.
Bonilla-Tatoosh line	Created by GMT analyst, using the following coordinates in Washington state regulation at: WAC 220-16-490.

[11] The estimates provided in Table 1 differ from what was provided in the WDFW Report due to the following: 1) the Washington and Northern California proportions were accidentally transposed in the WDFW Report, and 2) the state-federal maritime line (SLA line) used for this GMT analysis utilized a different shapefile source. That is, the U.S. Geological Survey was the source of the SLA line for the WDFW Report and the Bureau of Ocean Energy Management was the source for this GMT analysis.

Appendix 2. Regulatory timeline of regulations affecting management and thus mortality in each state and sector.

Year	Washington [1/]	Oregon		California N. 40°10′ N. Lat.	
	Recreational	**Recreational**	**Commercial**	**Commercial**	**Recreational**
Pre 2004	Depth and Season Restrictions	Depth and Season Restrictions	(2003) Landing caps and 27 fm RCA implemented	(2003) Nearshore permit system implemented	10 fish, Open Year Round No Depth Restriction, Dec 2003 closed
2004	year-round season; 10 rockfish bag limit	year-round season; 40 fm Apr-Sept; 10 marine fish bag limit	Limited entry implemented; 30 fm RCA; Mandatory logbooks; Landing cap increased	30 fm	10 fish RCG, Year Round, Jan - Apr No Depth Restriction, May 1 - Dec 31 30 fm
2005	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year-round season; 40 fm Apr- Sept; 5,8 fish	30 fm	30 fm	30 fm, 10 fish, May 1 - Dec 31
2006	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year-round season, 40 fm Apr- Sept, 6 fish	30 fm Landing cap increased	30 fm Trip limits decreased	30 fm, 10 fish, May 1 - Dec 31
2007	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year-round season, 40 fm Apr- Sept; 6 fish	30 fm Landing cap decreased	30 fm Trip limits increased	30 fm, 10 fish, May 1 - Sep 30
2008	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr-Sept; 5,6 fish	30 fm	30 fm	20 fm, 10 fish, May 1 - Aug 31
2009	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr-Sept; 6,7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Sep 15
2010	year-round season; 10 rockfish bag limit; North Coast, 20 fm May 21 - Sept 30;	year round, season; 20 and 40 fm Apr-Sept; 7 fish	20 fm South[/2] 30 fm North[/2] Landing cap increased	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Sep 15

Year	Washington [1/]	Oregon		California N. 40°10′ N. Lat.	
	Recreational	**Recreational**	**Commercial**	**Commercial**	**Recreational**
	South Coast, 30 fm March 15-June 15				
2011	year-round season; 10 rockfish bag limit; North Coast, 20 fm June 1 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr- Sept; 7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased & restructured	20 fm, 10 fish, May 15 - Oct 31
2012	year-round season; 10 rockfish bag limit; North Coast, 20 fm June 1 - Sept 30; South Coast 30 fm March 15-June 15	year round season; 30 fm Apr- Sept; 7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Oct 31

1/ Washington has not had a commercial nearshore fishery since 1995
2/ The shoreward RCA was 20 fm from the California border to 43° N latitude, and 30 fm from 43° N. latitude to Washington border.

B.6 Non-Trawl: Slope Rockfish Trip Limit Reductions

Analysis of this management measure was not received by the Advanced Briefing Book deadline; it is expected to be delivered as a Supplemental GMT Report.

B.7 Non-Trawl: Lingcod Trip Limit Increases

Need for Action

For 2013-2014 groundfish fisheries, lingcod has been managed, in part, by cumulative bi-monthly trip limits designed to keep catches within the respective ACLs. Trip limits may be adjusted inseason as a result of inseason tracking patterns (higher/lower than projected). This applies to lingcod taken in both the non-nearshore (all three states) and nearshore fisheries (Oregon and California only).

At its April 2014 meeting, the Pacific Fishery Management Council (Council) directed the Groundfish Management Team (GMT) to complete an analysis of various lingcod trip limit and open season options for the west coast commercial non-trawl fixed-gear fishery to estimate economic and biological impacts. Current trip limits and open seasons are given in Table B-32 (No Action = Option 1a). The proposed trip limit and open season configurations (Options 1b and 1c) are summarized in Table B-33, with all trip limits reported in lb per vessel.

Initial analyses were provided to the Council at the April meeting for trip limit options during the open season (Agenda Item C.4.b, REVISED GMT Report, April 2014; pages 39-52 and below in XXX) and options for lingcod retention during the currently closed periods (Agenda Item C.4.b, REVISED GMT

Report, April 2014; pages 52-63 and below in XXX). This document combines results of those previous, separate analyses. Additional details can be found in that April 2014 GMT statement.

Table B-32. No Action Option (Option 1a) for the limited entry and open access non-trawl fixed-gear trip limits (in lb) in effect in 2014 that apply to both north and south of 40°10' N. latitude.

Fleet	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec[a]
Limited entry	closed	closed	800	800	800	400/closed
Open access	closed	closed	400/month			400/closed

[a/]The lingcod commercial fishery is closed from December 1st of a given year through April 30th of the subsequent year (five months total). Therefore, the Nov/Dec trip limit applies only to November.

A critical point in the analysis of lingcod trip limits is how proposed increases in the coastwide trip limit structure may affect the mortality of overfished species (OFS) – primarily the OFS rockfish species, in both the non-nearshore and nearshore fisheries. The approach to these proposed trip limit increases does assume that OFS mortality will not be affected in the non-nearshore fishery because any lingcod catch is mostly incidental to the targeting of sablefish; fishing behavior will likely not change because the main target will continue to be sablefish, the much more lucrative fishery. Therefore, it is assumed that any increase in lingcod mortality (landings) will only affect OFS mortality in the Oregon and California nearshore fisheries (Washington has not had a commercial nearshore fishery since 1995).

Additionally, it is prudent to point out that there is probably little to no chance of increased China rockfish impacts under Alternative 1b and 2a (below). Opening the closed season for lingcod retention will not cause increase catch of any rockfish species (OFS or China), because the proposed increases are equal to or less than average encounter rates of lingcod during the closed season (based on WCGOP bycatch rates during December-April). Increasing the lingcod trip limit during the open season showed some increase in OFS for the 50% increase. On the other hand, the increase in canary rockfish was significant when lingcod was increased by 100%. It is expected that other nearshore rockfish mortality to also increase under that scenario (2b).

Table B-33. Lingcod commercial coastwide trip limits (reported in lb per vessel) comparing the No Action Option (Option 1a) to options that increase the bi-monthly trip limit to 1,200 lb and 1,600 lb for the limited entry sector and increases to 600 lb per month and 800 lb per month for the open access sector (Options 1b, and 1c). Also presented are proposed trip limits that establish trip limits for periods 1 and 2 and December, with period 2 closed south of 40°10' N. latitude for both sectors (Options 2a and 2b).

Proposed lingcod trip limits based on the No Action Option (1a) and Options 1b and 1c						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 1a	closed	closed	800	800	800	400 (Nov only)
Option 1b	closed	closed	1,200	1,200	1,200	600 (Nov only)
Option 1c	closed	closed	1,600	1,600	1,600	800 (Nov only)
Open access						
Option 1a	closed	closed	400 lb/month (Dec closed)			
Option 1b	closed	closed	600 lb/month (Dec closed)			
Option 1c	closed	closed	800 lb/month (Dec closed)			
Proposed lingcod trip limits that apply to the area **NORTH** of 40°10' N. latitude with a year-long season structure						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 2a	200 lb/2 months	200 lb/2 months	1,200 lb	1,200 lb	1,200 lb	600 lb for Nov (200 lb for Dec)
Option 2b	200 lb/2 months	200 lb/2 months	1,600 lb	1,600 lb	1,600 lb	800 lb for Nov (200 lb for Dec)
Open access						
Option 2a	100 lb/month	100 lb/month	600 lb/month (100 lb for Dec)			
Option 2b	100 lb/month	100 lb/month	800 lb/month (100 lb for Dec)			
Proposed lingcod trip limits that apply to the area **SOUTH** of 40°10' N. latitude with March/April closed						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 2a	200 lb/2 months	closed	1,200 lb	1,200 lb	1,200 lb	600 lb for Nov (200 lb for Dec)
Option 2b	200 lb/2 months	closed	1,600 lb	1,600 lb	1,600 lb	800 lb for Nov (200 lb for Dec)
Open access						
Option 2a	100 lb/month	closed	600 lb/month (100 lb for Dec)			
Option 2b	100 lb/month	closed	800 lb/month (100 lb for Dec)			

Background

Lingcod was declared overfished in 1999. In 2005, the stock was designated as rebuilt and a coastwide trip limit structure was established that has essentially stayed the same since. Lingcod trip limits have not been modified since 2005 for the limited entry (LE) sector and since 2007 for the open access sector (OA). Since 2007, no inseason adjustments have been made due to fishing mortality concerns for lingcod. At least one industry request was made for an inseason trip limit increase but was not supported by the GMT (Agenda Item E.2.b, Supplemental GMT Report 2, April 2008). This was because the GMT was concerned that any increase in lingcod trip limits and subsequent targeting could have resulted in increased bycatch of canary and yelloweye rockfish. Regarding the OA sector, the GMT expressed concerns that since the number of participants in that fishery was unlimited (as is still the case), any increase in lingcod trip limits could have led to a rapid expansion in the fishery, without any corresponding accountability measures for bycatch of overfished species. And finally, since the trip limits at that time weren't being attained in either the LE or OA fisheries, the GMT did not support an increase.

Since 2008, the coastwide commercial non-trawl fixed-gear catch of lingcod averaged 82.9 mt (Figure B-22) with the majority of landings made by the OA sector. In 2011 and 2012, total mortality by the non-trawl fixed-gear fleet was 3.0 percent and 3.5 percent, respectively, of the non-trawl allocation. For the 2015-2016 biennial management cycle, the Council is considering increases in lingcod trip limits for both the LE and OA non-trawl fixed-gear sectors to provide more fishing opportunity to the fishing communities in the three states. Additionally, a request was made by industry to explore the possibility of allowing the fleet to land modest amounts during those periods, or months, that are currently closed. This analysis estimates the potential harvest mortality under the various trip limit scenarios and open seasons to assist the Council in its decision for a Preferred Alternative. It also provides estimated mortality

amounts for overfished species that are taken in the nearshore commercial fisheries for Oregon and California when lingcod are also taken (Washington does not have a commercial nearshore fishery).

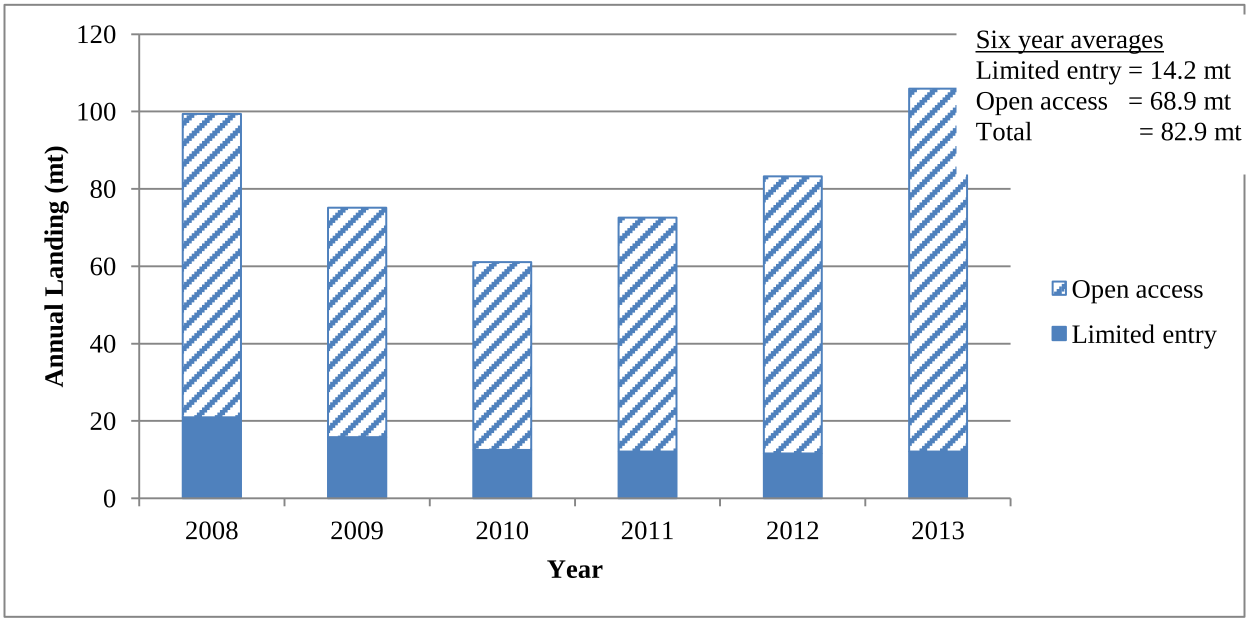

Figure B-22. Coastwide landings of lingcod by the commercial non-trawl fixed-gear fleet for both the limited entry and open access sectors from 2008 to 2013. The 2013 data are preliminary (data source: PacFIN vdrfd).

Methods

A catch-based fleet capacity trip limit model was used, and based on the years from 2008 to 2012. Commercial landings data from PacFIN's vdrfd table were extracted on April 22, 2014 for analysis. Filters were applied to only include: 1) landings made by non-IFQ, shorebased vessels (this applied to 2011 and 2012), 2) hook-and-line or trap gear, 3) Dahl sectors 5 to 10, 12, and 15[12], 4) for the nearshore bycatch model, only those Oregon and California lingcod landings that also showed nearshore species landings, and 5) port of landing north and south of 40°10' N. latitude to identify management area. The model uses a method that establishes a proportion for each participating vessel per period whereby that vessel's actual harvest mortality, as reported from the commercial dealer receipts, is compared to the theoretical maximum that that vessel could have taken. This proportion percentage is then applied to the proposed trip limit for each vessel for each period of allowable fishing. After completing this for all vessels for all periods, the estimated harvest for the fleet is summed for a final annual estimate which is then compared to the annual ACL and/or the non-trawl allocation portion of the ACL.

In addition to the above routine, a portion of the estimated landings under the various trip limit scenarios was identified as those made in conjunction with landings of nearshore species (above). These estimated lingcod landings then inputted into the GMT's nearshore bycatch model to provide estimates of the mortality of overfished species.

More details on methods can be found in Agenda Item C.4.b, REVISED GMT Report, April 2014 (pages 39-52).

[12] Dahl sectors are: 5 nearshore (limited entry), 6 nearshore (open access), 7 non-nearshore (limited entry), 8 non-nearshore (open access), 9 non-nearshore non-sablefish (limited entry), 10 non-nearshore non-sablefish (open access), 12 incidental open access, and 15 commercial non-groundfish.

Results

Lingcod mortality estimates are provided in Table B-34 and Table B-35 for the combined sector options under the different P* values for 2015 and 2016. A final LE and OA sector summary is presented in Table B-36, and lastly overfished species mortality estimates are provided in Table B-37. More detail regarding these estimates is provided below. Also, a comprehensive discussion about trip limits for periods 1 and 2 and December is included in Agenda Item C.4.b, REVISED GMT Report, April 2014, pages 52-63).

Table B-34. Lingcod coastwide commercial mortality estimates using the status quo season structure (closed during periods 1, 2 and December coastwide) comparing No Action (Option 1a) to Options 1b and 1c. The limited entry bimonthly trip limits are shown, along with open access monthly trip limits in parentheses.

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.45						
	Proposed Bimonthly and Monthly Trip Limits (lb)	Estimated Take (mt)	2015		2016	
			Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 1a	800 (400)	88.9	1,950.7	4.6%	1,857.8	4.8%
Option 1b	1,200 (600)	122.3	1,950.7	6.3%	1,857.8	6.6%
Option 1c	1,600 (800)	155.1	1,950.7	8.0%	1,857.8	8.3%

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.25						
	Proposed Bimonthly and monthly Trip Limits (lb)	Estimated Take (mt)	2015		2016	
			Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 1a	800 (400)	88.9	1,444.1	6.2%	1,375.4	6.5%
Option 1b	1,200 (600)	122.3	1,444.1	8.5%	1,375.4	8.9%
Option 1c	1,600 (800)	155.1	1,444.1	10.7%	1,375.4	11.3%

Note: For the limited entry sector, the November trip limits are 400 lb under Option 1a, 600 lb under Option 1b, and 800 lb under Option 1c. The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a, Supplemental REVISED Attachment 2:, April 2014.

Table B-35. Lingcod coastwide commercial mortality estimates under Options 2a and 2b. Season structure modifications for each sector are shown in Table B-33.

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.45					
		2015		2016	
Option	Estimated Take (mt)	Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 2a	151.7	1,950.7	7.8%	1,857.8	8.2%
Option 2b	197.0	1,950.7	10.1%	1,857.8	10.6%

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.25					
		2015		2016	
Option	Estimated Take (mt)	Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 2a	151.7	1,444.1	10.5%	1,375.4	11.0%
Option 2b	197.0	1,444.1	13.6%	1,375.4	14.3%

Notes: South of 40°10' N. latitude the fishery will continue to be closed.
The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a Supplement REVISED Attachment 2, April 2014.

Table B-36. Summary of overall coastwide commercial lingcod mortality estimates for the limited entry and open access sectors for Options 1a, 1b, 1c, 2a, and 2b.

	Trip Limits		Mortality Estimates		
Option	Limited Entry (bi-monthly)	Open Access (monthly)	Limited Entry	Open Access	Total
1a (No Action)	800	400	16.9	72.0	88.9
1b	1,200	600	24.7	97.6	122.3
1c	1,600	800	31.8	123.3	155.1
2a	1,200	600	27.4	124.3	151.7
2b	1,600	800	35.9	161.1	197.0

Note: These trip limit amounts in this table refer to the bi-monthly limited entry sector, whereas the OA sector trip limits are set on a per month basis at one-half the limited entry amount. Refer to Table B-33 for the detailed summary of the actual trip limit amounts.

Table B-37. Overfished species mortality estimates (mt) under the No Action Option (1a), Option 1b, and Option 1c (season structure maintained with periods 1 and 2 and December closed), and under the 2a and 2b options that reflect the season structure modification (i.e., open January – December). These values were calculated by using the five-year commercial averages (2008-2012) of the nearshore species inserted into the nearshore bycatch model.

	Estimated mortality under options with the current season structure in place		
	Option 1a – 800 lb	Option 1b – 1,200 lb	Option 1c – 1,600 lb
Bocaccio	0.4	0.4	0.4
Canary rockfish	6.5	6.6	6.7
Cowcod	0.0	0.0	0.0
Darkblotched rockfish	0.2	0.2	0.2
Yelloweye rockfish	1.1	1.2	1.3

	Estimated mortality under options with an expanded season structure	
	Option 2a – 1,200 lb	Option 2b – 1,600 lb
Bocaccio	0.5	0.5
Canary rockfish	7.0	7.4
Cowcod	0.0	0.0
Darkblotched rockfish	0.2	0.2
Yelloweye rockfish	1.2	1.3

Comparison of Options (Options 1a, 1b, and 1c)

Under Options 1a, 1b and 1c, the coastwide bi-monthly trip limit structure would be maintained whereby commercial retention of lingcod is permitted during periods 3 (May/June), 4 (July/August), 5 (September/October) and November. Retention of lingcod would not be allowed during period 1 (January/February), period 2 (March/April) and in December. Under these three options, trip limit adjustments are considered only for the management area north of 40°10' N. latitude. South of 40°10' N. latitude, the status quo trip limits and season structure would remain in effect for all three options.

<u>No Action (Option 1a)</u>

For 2014, the lingcod commercial bi-monthly non-trawl fixed-gear trip limit for the LE sector is 800 lb per period with 400 lb for November. Fishing would continue to be closed during periods 1 and 2 and December. For the OA sector, trip limits are set at 400 lb per month. Again, periods 1 and 2 and December are closed. These amounts apply on a per vessel basis and apply to all three states. Under the No Action Option (Option 1a), the expected harvest mortality, for both the P* = 0.45 and P* = 0.25 approach, would be less than 10 percent of the non-trawl allocation (Table B-34). The total combined LE and OA mortality would be 88.9 mt.

<u>Fishing Activity Under Option 1a</u>

Under the No Action Option, fishing activity is not expected to change. The number of vessels that will fish would be expected to be about the same as have participated in the fishery over the last few years (Table B-38). In addition, fishing effort per vessel and fishing area are expected to be similar under Option 1a.

Table B-38. Number of vessels in the non-nearshore and nearshore fisheries that made lingcod landings (regardless of the amount) for the three states from 2008 to 2012. Includes both LE and OA vessels.

State	2008	2009	2010	2011	2012	5-Year Avg.
Washington	44	32	37	31	41	37
Oregon	228	219	196	200	202	209
California	251	222	206	223	264	233

Biological Impacts Under Option 1a

With no expected increase in mortality, there are no anticipated biological impacts.

Projected Overfished Species Mortality Under Option 1a

A critical consideration in the lingcod fishery are those catches (landings) that are made in conjunction with nearshore species. These nearshore fishery landings are those that are applied to the nearshore bycatch model as a component necessary for the estimation of overfished species (OFS) mortality. With no expected increase in the take of lingcod and no expected change in fishing behavior under this option, it is also expected that no increase in OFS mortality will be experienced.

Stock Status

Currently, the coastwide lingcod stock is considered healthy. As of the last stock assessment, the point estimate for the depletion of the spawning output (= spawning biomass) at the start of 2009 was 61.9 percent for north of 40°10' N. latitude , 73.7 percent south of 40°10' N. latitude, and 67.0 percent coast wide (Hamel et al. 2009).

Socioeconomic Impacts Under Option 1a

None are expected.

Option 1b

Option 1b maintains the closures during periods 1 and 2 and December. This option also increases the current LE sector trip limit from 800 lb per two months to 1,200 lb per two months and increases the November trip limit from 400 lb to 600 lb. The OA sector trip limit would increase from 400 lb per month to 600 lb per month. The original management measure consideration for this option was to analyze trip limit increases only for the fishery north of 40°10' N. latitude. Trip limit amounts south of 40°10' N. latitude are to be left as is (i.e., remain status quo). Mortality would be expected to increase from 88.9 mt. Under No Action Option 1a to 122.3 mt (37.6 percent increase) under Option 1b, with the majority of this increase coming from the OA sector. Here too, the expected landings mortality would be less than 10 percent of the non-trawl allocation amount at both the P* = 0.45 and P* = 0.25 levels.

Fishing Activity Under Option 1b

With larger trip limits (from 800 lb to 1,200 lb per period for the LE sector and from 400 lb to 600 lb per month for the OA sector) it is reasonable to expect an increase in overall mortality. Table B-36 shows mortality will increase from 88.9 mt (No Action) to 122.3 mt under Option 1b. Despite this expected increase, the total annual mortality will still be substantially less than the non-trawl allocation amount. It is speculated that this modest increase would not generate a surge in fishing activity.

Biological Impacts Under Option 1b

Because the stock is considered very healthy, the 37.6 percent increase (33.4 mt) will have a relatively minor effect on the stock's status. A total mortality of 122.3 mt represents < 10 percent of the non-trawl fixed gear allocation. Projected mortality would not jeopardize the stock's status nor cause the fishery to exceed the non-trawl allocation portion of the annual ACL.

Projected Overfished Species Mortality Under Option 1b
Two overfished species are of major concern: canary and yelloweye rockfish. These two species have been (and will continue to be) the most constraining component of the lingcod fishery and largest concern when considering lingcod trip limit increases. Under this option, both species will experience an approximate 0.1 mt increase from the No Action Option. As per the Preferred Alternative, canary rockfish has a directed nearshore allocation of 6.7 mt (2015) and 6.9 mt (2016) and yelloweye rockfish has a directed nearshore allocation of 1.2 mt (2015) and 1.3 mt (2016). The projected mortality under this option (6.6 mt for canary and 1.2 mt for yelloweye) are equal to or less than the Preferred Alternative nearshore allocations.

Stock Status
Similar to the No Action Option 1a, the stock is expected to remain healthy with no adverse effects from this modest increase in harvest mortality.

Socioeconomic Impacts Under Option 1b
Under this option, the projected increase in total annual landings for both the non-nearshore and nearshore fisheries would be approximately 75,200 lb (34.1 mt). Using the most recent commercial landings data from 2013 as a benchmark, the average coastwide price is $2.50 per pound. Applied to the projected increase of 75,200 lb, the fishery could earn an additional $188,000 compared to the No Action status quo amount – all else being equal.

Option 1c
Option 1c maintains the closures during periods 1 and 2 and December. This option also increases the current LE sector trip limit from 800 lb per two months to 1,600 lb per two months and increases the OA sector trip limit from 400 lb per month to 800 lb per month. The original management measure consideration for this option was to analyze trip limit increases only for the fishery north of 40°10' N. latitude. Trip limit amounts south of 40°10' N. latitude are to remain status quo. Mortality would be expected to increase from 88.9 mt under No Action Option 1a to 155.1 mt (a 74.5 percent increase), with the majority of this increase, again coming from the OA sector. Under this option the projected landings mortality would be less than 10 percent of the non-trawl allocation amount at P* = 0.45 but would be just over 10% (for both 2015 and 2016) for P* = 0.25 (Table B-34).

Fishing Activity Under Option 1c
With larger trip limits (from 800 lb to 1,600 lb per period for the LE sector and from 400 lb to 800 lb per month for the OA sector), it is reasonable to expect an increase in overall mortality. It is possible that there may be a change in fishing behavior with more participants participating in the fishery, but presently it is difficult to estimate what that number may be. Table B-36 shows mortality will increase from 88.9 mt (No Action) to 155.1 mt under Option 1c. Despite this expected increase, the total annual mortality will still be substantially less than the non-trawl allocation amount.

Biological Impacts Under Option 1c
Because the stock is considered very healthy, the 74.5 percent increase (66 mt) compared to the No Action Option will have a relatively minor effect on the stock's status. A total mortality of 155.1 mt under this option represents 10.7 percent of the non-trawl allocation for 2015.

Projected Overfished Species Mortality Under Option 1c
As is the case under Option 1b canary and yelloweye rockfish are the two species that have been (and will continue to be) the most constraining component of the lingcod fishery and largest concern when considering lingcod trip limit increases. Under this option, both species will experience an approximate

0.2 mt increase from the No Action option projection. As per the Preferred Alternative, canary rockfish has a directed nearshore allocation of 6.7 mt (2015) and 6.9 mt (2016) and yelloweye rockfish has a directed nearshore allocation of 1.2 mt (2015) and 1.3 mt (2016). The projected mortality of canary under this option is 6.7 mt, which is equal to the Preferred Alternative nearshore allocation (this morality is 0.2 mt more than the nearshore allocation under than the No Action option estimate of 6.5 mt). For yelloweye, projected mortality under this option is 1.3 mt, which exceeds the Preferred Alternative nearshore allocation for 2015 by 0.1 and equals the Preferred Alternative nearshore allocation for 2016. A mortality of 1.3 mt exceeds the mortality under No Action estimated impact by 0.2 mt.

Stock Status

Similar to the No Action Option 1a, the stock is expected to remain healthy with no adverse effects from this increase in harvest mortality.

Socioeconomic Impacts Under Option 1c

Under this option, the projected increase compared to the No Action Option in total annual coastwide landings would be approximately 146,000 lb (66 mt). Applying the $2.50 per pound value described above provides an estimate that the fishery could earn an additional $365,000 compared to the No Action status quo amount – all else being equal.

Options Overview (Options 2a and 2b)

Under Options 2a and 2b, the coastwide trip limit structure would be modified to accommodate modest trip limits for periods 1 and 2 and December for both the LE and OA sectors (Table B-32). Under these two options, the take of lingcod would be allowed during all periods and months during the year, but only for the management area north of 40°10' N. latitude. South of 40°10' N. latitude, retention of lingcod would continue to be prohibited for both sectors during March and April. Trip limits would also be increased from May-November under these options relative to No Action (Option 1). See Table B-33 for trip limit details.

Option 2a

The intent of Option 2a is to allow retention and landings of lingcod that would otherwise be discarded during the closed season, in addition to increasing trip limits during the currently open season to increase attainment of the non-trawl allocation. Under this option north of 40°10' N. latitude, the LE sector would have a 200 pound trip limit per two months for periods 1 and 2 and 200 lb for December. This sector would also have a 1,200 pound trip limit for periods 3 through 5 and 600 lb in November. For the OA sector, the monthly trip limit would be 100 lb during periods 1 and 2 and 100 lb in December. Additionally, this sector would have a 600 pound monthly trip limit for periods 3 through 5 and November.

Under this option south of 40°10' N. latitude, March and April would continue to be closed to the retention of lingcod. This is proposed because the additional opportunity to fish for lingcod south of 40°10′ N. latitude in period 2, when rockfish is closed, presents the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. Aside from these considerations, the same trip limit amounts would apply for both sectors as is proposed for north of 40°10' N. latitude. See Table B-33 for a summary of trip limit details.

Fishing Activity Under Option 2a

With larger trip limits compared to the No Action Option it is reasonable to expect a modest increase in overall annual lingcod mortality. Compared to the projection for the No Action Option (88.9 mt), the projected mortality would be 151.7 mt, an increase of 62.8 mt (70.6 percent). Despite this projected increase, the total annual mortality will still be substantially less than the non-trawl allocation amounts

(Table B-35). For 2015 and 2016, with a P* = 0.45, the projected percent of the non-trawl allocation would be 7.8 percent and 8.2 percent, respectively. Under a P* = 0.25 scenario, the projected percent of the non-trawl allocation for 2015 and 2016 would be 10.5 percent and 11.0 percent, respectively.

Biological Impacts Under Option 2a

Because the stock is considered very healthy, the 62.8 mt increase will have a relatively minor effect on the stock's status. Lingcod mortality is expected to increase, though encounter rates are not, as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (with an estimated 7 percent mortality). For example, the increased trip limit during the open season is not expected to change fishing behavior (i.e., fishing effort or fishing area). Likewise, allowing retention during December-April at the amounts shown in Table B-33 is not expected to cause increased fishing effort or change in fishing locations (see Agenda Item C.4.b, REVISED GMT Report, April 2014; pages 52-63). Hence, there would be no expected increase in lingcod encounter rates under this option relative to the No Action Option.

Projected Overfished Species Mortality Under Option 2a

With the combination of higher trip limits for the traditional fishing periods coupled with the modest trip limits for the periods that before were closed, projected mortality for canary rockfish is expected to increase. Under the No Action Option 1a, the projected canary rockfish mortality is 6.5 mt (Table B-36), whereas under Option 2a that mortality amount would be 7.0 mt. This projected canary rockfish mortality would exceed the Preferred Alternative nearshore allocation (6.7 mt in 2015 and 6.9 mt in 2016) and the No Action mortality estimate (6.5 mt). Yelloweye rockfish mortality under Option 2a is 1.2 mt, which is the same as shown under Option 1b and equal to the Preferred Alternative nearshore allocation for 2015, but 0.1 mt higher than expected under No Action (1a).

Stock Status

Under Option 2a, no adverse changes to lingcod stock status are expected compared to the No Action Option since lingcod mortality has been far below the non-trawl allocation and is expected to remain so under Option 2a. Estimated lingcod mortality under this option is expected to range between 7.8 percent and 11.0 percent of the non-trawl allocation (Table B-35). Given This level of increase in mortality is far below levels that would result in overfishing and are not expected to adversely affect stock status.

Socioeconomic Impacts Under Option 2a

Allowing fishery participants to retain incidentally encountered lingcod that were previously discarded would increase revenue from current operations targeting other species within incidental lingcod encounters. In 2013, the average price per pound coast wide averaged $2.50 per pound. This amount, applied to the projected increase (approximately 138,500 lb) would result in a coastwide gross estimated ex-vessel increase of approximately $346,000. While low trip limits make it unlikely that fishery participants will choose to target lingcod, such targeting may become worthwhile if the price per pound makes the trip profitable, despite the relatively low trip limits. If trip limits cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely. However, it needs to be pointed out that some vessels do target lingcod on some trips, so any increase would benefit these participants.

Option 2b

The intent of Option 2b is also to allow retention and landings of lingcod that would otherwise be discarded during the closed season, in addition to increasing trip limits during the currently open season. Under this option north of 40°10' N. latitude the LE sector would have a 200 pound trip limit per 2 months periods 1 and 2 and 200 lb for December (the same as for Option 2a). However, this sector would also have a 1,600 pound trip limit for periods 3 through 5 and 800 lb in November. For the OA sector, the monthly trip limit would continue to be100 lb during periods 1 and 2 and 100 lb in December, but the sector would have an 800 pound monthly trip limit for periods 3 through 5 and November. Again, as per Option 2a, south of 40°10' N. latitude, the retention of lingcod would be prohibited during March and April to prevent the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. See Table B-33 for a summary of trip limit details.

Fishing Activity Under Option 2b

With larger trip limits compared to the No Action (Option 1a) and Option 2a, it is reasonable to expect an increase in overall annual lingcod mortality. Compared to the projection for the No Action Option (88.9 mt), the projected mortality would be 197 mt for Option 2b, an increase of 108.1 mt. Despite this projected increase, the total annual mortality will be substantially less than the non-trawl allocation amounts (Table B-35). For 2015 and 2016, with a P* = 0.45, the projected percent of the non-trawl allocation would be 10.1 percent and 10.6 percent, respectively. Under a P* = 0.25 scenario, the projected percent of the non-trawl allocation for 2015 and 2016 would be 13.6 percent and 14.3 percent, respectively. This assumes that no new OA participants would enter the fishery. However, given that this trip limit option would provide a modest increase to potential OA participants, it is reasonable to assume that an increase in the number of participants could occur.

Biological Impacts Under Option 2b

Because the stock is considered healthy, the 108 mt increase compared to the No Action Option will have a relatively minor effect on the stock's status. Lingcod mortality is expected to increase as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (with an estimated 7 percent mortality), as occurs now during the closed season. There may be an increase in lingcod encounter rates under this option relative to the No Action Option, because trip limits during the currently open season would double (Table B-33). The likelihood and impact of this potential increase in effort would be very difficult to quantify. Despite this, however, it is probable that additional sets during a trip may occur to target lingcod (after catching trip limits for other species). This could increase impacts to OFS, as well as China rockfish.

Projected Overfished Species Mortality Under Option 2b

With the combination of higher trip limits for the traditional fishing periods coupled with the modest trip limits for those periods that before were closed, projected mortality for canary is expected to increase. Under Option 1c, the projected canary rockfish mortality is 6.7 mt (Table B-36), whereas under Option 2b that projected mortality amount would increase to 7.4 mt. This projected canary mortality is 0.9 mt higher than shown under No Action (Table B-37) and 0.5 to 0.7 mt higher than the Preferred Alternative allocation. For yelloweye rockfish, the projected mortality under this option will be 1.3 mt, whereas it was 1.2 mt for Option 2a. This projected yelloweye mortality is 0.2 mt higher than shown under No Action, exceeds the Preferred Alternative nearshore allocation for 2015 by 0.1, and equals the Preferred Alternative nearshore allocation for 2016.

Stock Status

Under Option 2b, no changes to lingcod stock status are expected compared to the No Action Option since lingcod mortality has been far below the non-trawl allocation and expected to remain so under Option 2b. Estimated lingcod mortality under this option is expected to range between 10.1 percent and 14.3 percent of the non-trawl allocation (Table B-35). Given the projected increase in mortality that is projected to occur, the level of increase is still expected to be far below levels that would result in overfishing and are not expected to adversely affect stock status.

Socioeconomic Impacts Under Option 2b

Allowing fishery participants to retain more lingcod (some of which were incidentally caught and discarded under status quo) would increase revenue from current operations targeting other species within incidental lingcod encounters. This may also increase revenue by incentivizing increased targeting or change in behavior during the May-November period when trip limits double relative to No Action (Table B-33). In 2013, the average price per pound coast wide averaged $2.50 per pound. This amount, applied to the projected total compared to the No Action Option total would result in a coastwide gross estimated ex-vessel amount of approximately $596,000 more than the No Action Option total. While moderate trip limits make it feasible that fishery participants will choose to target lingcod, such targeting may become more worthwhile if an increase in the overall average price per pound makes the trip profitable. It is speculated that if trip limits cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod could be unlikely.

B.8 Non-Trawl: Allow Lingcod retention in Periods 1, 2, and 6

Need for Action

Lingcod retention is prohibited in Periods 1, 2, and part of 6 for both limited entry and open access fixed gears under the status quo regulations. In recent years, lingcod mortality has been far below the ACL north and south of 42° N. latitude with 25 percent and 13 percent attainment in 2011 and 34 percent and 16 percent in 2012, respectively. Public testimony was received from Mr. Jeff Miles at the September 2013 Council meeting requesting some level of retention during periods 1, 2, and 6. The request was made to land lingcod that are incidentally caught and discarded, with the suggestion that trip limits might be set low enough to prevent changes in fishermen's behavior (i.e., prevent targeting). Higher trip limits than those needed to allow for incidental take may further increase attainment of the non-trawl allocation of the ACL, but bycatch of overfished species while targeting lingcod is a consideration. The proposed change would allow lingcod retention in the restricted access state permitted nearshore fishery in California and Oregon, the open access nearshore fishery in Oregon, and the limited-entry and open access non-nearshore fixed gear fisheries in California, Oregon and Washington.

Background

The prohibition on retention of lingcod during specific periods has been in effect for commercial fixed gear fisheries since the 1990s to improve the conservation of lingcod after being declared overfished. The closure was put in place to minimize impacts on lingcod during their spawning season, which is from December to April (Hamel et al. 2009). Females move in to depths shallower than 50 fm to spawn and males guard nests from predation. Although females do not spend much time in the spawning area, males are concentrated in these shallow waters guarding the eggs during winter and spring months (Love 1996). The season closure for the fixed gear fishery was presumably designed to reduce catch of these males while concentrated during the nest-guarding season to facilitate rebuilding of the stock.

Lingcod was declared rebuilt in 2009, when the status was determined to be 61.9 percent for the northern component and 73.7 percent for the southern component. The coastwide status was 67.0 percent at the beginning of 2009, well above the 40 percent target spawning stock biomass (Hamel *et al.* 2009). As a result, there is no longer a lingcod closed season for individual fishing quota (IFQ fisheries; trawl and fixed gear) or Oregon and California recreational fisheries. The Council is now considering eliminating the spawning season closures in the commercial fixed gear fishery since the lingcod stock has rebuilt and increasing season length may result in higher attainment of the ACL.

Current RCA closures prevent access to much of the lingcod stock, and length restrictions may already as short as they can be while maintaining desirable fillets. Trip limits that are appreciably higher than needed to accommodate bycatch may lead to increase targeting of lingcod, which co-occur with overfished rockfish species. Increasing the season length while maintaining moderate trip limits to allow incidental take may be the most viable means of increasing attainment of the ACL without increasing interactions with overfished species.

Lingcod predate on rockfish both as juveniles and adults. Rockfish and lingcod co-occur on rocky reef habitat and lingcod are currently discarded by participants in the fishery that encounter them while fishing for rockfish during the closed period for lingcod. While mortality on discarded lingcod is relatively low (~7 percent) reflecting hooking and handling mortality since they do not suffer from barotrauma, rockfish discarded by those targeting lingcod exhibit mortalities ranging from 30 – 54 percent in depths less than 30 fm and 100 percent mortality in depths greater than 30 fm. The main concern, therefore, is that targeting of lingcod will result in increased mortality for overfished rockfish species and the potential for the sector allocations to be exceeded.

One important consideration is that period 2 is closed for rockfish retention in the nearshore fishery south of 40°10′ N. latitude. Allowing any retention of lingcod during period 2 in the south may result in increased rockfish bycatch and discard. Maintaining a closure for lingcod during the corresponding months of March and April shoreward of the RCA may be considered under each of the options analyzed to prevent greatly increased rockfish discard mortality in the region in question.

In order to evaluate the potential benefits and impacts from retention by various fixed gear sectors (i.e. nearshore vs. non-nearshore, limited entry vs. open access) under the existing regulations, trip limits were developed to reflect current bycatch rates and to emulate trip limits that are currently allowed during other months. Based on these principals, the following options were analyzed:

Management Options

Option 1: No Action – maintain prohibition on retention of lingcod in the commercial fixed gear fisheries in periods 1, 2 and 6 (December).

Option 2**:** Allow retention of lingcod in commercial fixed gear fisheries during periods 1, 2 and 6 at incidental-catch levels equivalent to average current encounters during the closed periods of 100 lb. per month in the open access fishery and 200 lb. per two month period in the limited entry fishery (i.e., to allow the retention of discarded bycatch).

Option 3**:** Allow retention of lingcod in commercial fixed gear fisheries during periods 1, 2 and 6 with trip limits of 400 lb per month in the open access fishery and 800 lb per two month period in the limited entry fishery (i.e., equivalent to the trip limits during current open months).

Data

Catch and effort for lingcod were estimated for the closed season (December – April) and the open season (May – November). Estimates were calculated and evaluated for the nearshore fixed gear commercial fishery and the non-nearshore fixed gear commercial fishery. Data from WCGOP from 2002-2011 provided lingcod catch (discard and retained) by trip. PacFIN data (2007-2012) provided the average number of trips per vessel per month, average number of vessels fishing per month, and recent landings by the fleet. Lingcod catch per trip (from WCGOP) was then expanded to estimate average lingcod catch per vessel per month (PacFIN data) used in deriving trip limits reflecting incidental catch levels.

Only WCGOP data from the nearshore fixed gear fishery were used to provide maximum bycatch-rate estimates during the current closed period. Encounters with lingcod seaward of the RCA during winter months (the current closed period) are infrequent relative to encounters by the nearshore fixed gear fishery (i.e., many of the larger lingcod are shallow during the spawning season). As such, allowing retention in the non-nearshore fishery that is far higher than their incidental encounter rates during December –April would likely not result in a substantial increase in lingcod targeting. Densities of lingcod seaward of the RCA are low during the December-April period and increased effort for lingcod (i.e., targeting) may not make economic sense for that fishery. For example, the average lingcod catch during the closed periods for the nearshore fishery is 35 lb per trip, whereas the average lingcod catch for the non-nearshore fishery is 7.2 lb per trip during the same periods (WCGOP data). Note that lingcod catch (discard + retained) during the open periods (May – November) are 39 lb per trip for nearshore fixed gear and 43.2 lb per trip for the non-nearshore fishery. The higher encounter rate during the open season makes sense, since this is during the non-spawning season and many larger adults migrate back to deeper waters.

Comparison of Options

Option 1: No Action
Under the No Action Option, retention of lingcod by the fixed gear fishery is prohibited in periods 1, 2 and 6 with the exception of November when a 400 lb. per month trip limit is allowed in both the limited entry and open access fisheries.

Fishing Activity in Commercial Fixed Gear Fisheries under Option 1

The nearshore fixed gear fishery in California and Oregon are subject to state-limited entry permits, while Washington does not allow a commercial fishery in the nearshore. The non-nearshore fixed gear fishery is prosecuted in all three states. Both nearshore and non-nearshore fishery trip limits are divided at 40°10′ N. latitude. The limited entry and open access (Federal) fixed gear trip limits in each period or month are provided in Table B-39.

It is important to point out that the nearshore rockfish fishery south of 40°10′ N. latitude is currently closed in period 2 (March and April), whereas the nearshore rockfish fishery is open year round to the north. The non-nearshore fishery operates year round and primarily targets sablefish. In the nearshore fishery, an average of 3.3 trips per month was taken during the closed season by a monthly average of 82 vessels during 2007-2012. During the open season, an average of 4.2 trips per month and 168 vessels per month took place during the open season. The higher effort during the open season coincides with months of relatively fair weather, allowing greater fishing opportunities.

Table B-39. Commercial fixed gear trip limit regulations for lingcod north and south of 40°10′ N. latitude by sector with closed periods (in gray) under Option 1.

Sector	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec	
LE North	Closed		800 lb./ 2 months			400 lb.	Closed
LE South	Closed		800 lb./ 2 months			400 lb.	Closed
OA North	Closed		400 lb./ month				Closed
OA South	Closed		400 lb./ month				Closed

Biological Impacts under Option 1

Projected Lingcod Mortality
Under the no action alternative, lingcod mortality in the fixed gear fisheries during periods 1, 2 and 6 are expected to be the same as recent years in the past, assuming trip limits for other co-occurring target species do not change. If the trip limits for other target species during the closed season increase, the number of lingcod and overfished species encountered and discarded may increase. At present a 7

percent discard mortality rate reflecting rod and reel gear is anticipated for released lingcod[13]. The landings of lingcod in the last five years for each sector from Washington, Oregon and California are provided in the Table B-40. An average of 52.5 mt of lingcod mortality from the fixed gear fishery north of 42° N. latitude and 31.4 mt to the south are expected under the no action alternative based on the average mortality in 2011 and 2012 from WCGOP total mortality reports. The non-trawl allocations in 2014 were stratified at of 42° N. latitude and mortality from the non-trawl fishery in 2011 and 2012 were 21 percent and 49 percent of the respective allocations north and south, respectively indicating that the fishery has fallen far short of attainment under the current regulations.

Table B-40. Landings of lingcod in nearshore and non-nearshore fixed gear fisheries in California North and South of 40°10′ N. latitude, Oregon and Washington under status quo regulations (Option 1).

Period	Sector			
	Washington	Oregon	California North of 40°10′ N. latitude	California South of 40°10′ N. latitude
Nearshore LE	NA	2.85	0.47	0.52
Nearshore OA	NA	25.70	4.41	15.32
Non-Nearshore LE	3.26	5.10	1.60	0.62
Non-Nearshore OA	2.03	12.85	1.94	3.19

Projected Overfished Species Mortality
In 2011 and 2012 an average of 1.6 mt of yelloweye rockfish, 1.6 mt of canary rockfish, 0 mt of cowcod and 2.8 mt of bocaccio mortality were estimated to have occurred in the fixed gear fishery in pursuit of all targets both in the nearshore and non-nearshore. These estimates reflect the expected mortality under the no action alternative. However, for comparison of alternatives, we provide the no-action projected impacts by using the GMT Overfished Species Nearshore Model. These projected impacts, using 5-year average landed catches from PacFIN (2008-2012) as model inputs, are shown in Table B-41. The projected impacts under Option 1 (No Action) using the Nearshore Model for the Oregon and California nearshore fisheries north and south of 40°10' N latitude are provided in Table B-41. Note that the projected impacts are different than the average mortality shown by WCGOP. The inter-annual variability for overfished species impacts is high, and the projection model estimates long-term average impacts.

Table B-41. Projected mortality for OFS (in mt) from the nearshore bycatch projection model using the lingcod mortality from year round fishing projected from the 5-year average landings of lingcod and targeted nearshore species as inputs. California north and south reflects the management line separating them at 40°10' N latitude.

Species	Oregon	CA North	CA South	Total
Bocaccio	0.00	0.00	0.46	0.46
Canary rockfish	0.93	0.53	5.59	7.05
Cowcod	0.00	0.00	0.00	0.00
Darkblotched	0.12	0.00	0.07	0.18
Yelloweye rockfish	0.82	0.22	0.12	1.16

Stock Status

[13]http://www.pcouncil.org/groundfish/current-season-management/past-management-cycles/2009-2010-final-environmental-impact-statement/, pg. 307.

Lingcod
Though once overfished, the lingcod stock was deemed rebuilt after the most recent assessment in 2009 and are now considered healthy (>40 percent of historical biomass). The coastwide stock status was estimated to be 67 percent of historical spawning stock biomass, with the stock south of 42° N. latitude at 61.9 percent and north of 42° N. latitude at 73.7 percent. Current harvest is far below the non-trawl allocation and will not adversely affect the stock status.

Overfished Species
Under Option 1, the mortality of overfished species is projected to remain the same as recent years, which is expected to be below the sector specific fixed gear allocations. Thus the stock status of overfished species and rebuilding plans would be unaffected.

Socioeconomic Impacts under Option 1

Under the no action alternative, lingcod caught as bycatch during the closed months of the fishing season are discarded and revenues from landing them is forgone by participants in the fishery. In addition, no targeted fishery for lingcod is permitted during the closed months preventing effort from being exerted to increase attainment of the ACL, resulting in forgone revenue from directed effort. Thus fishery participants and coastal communities will continue to forgo potential revenue from converting lingcod discards to landings.

Option 2
Option 2 would allow retention of lingcod in fixed gear fishery during periods 1, 2 and 6 at incidental levels equivalent to the average encounter rates observed during the closed periods in recent years (WCGOP, 2002-2011) and expanded by recent fishing effort (PacFIN, 2008-2012). The trip limits would be 100 lb. per month for the open access fishery and 200 lb. per two month period in the limited entry fishery (Table B-42).

Change in Fishing Activity Compared to Option 1

The average estimates of discarded lingcod during the closed months in each sector from WCGOP provided the basis for the trip limits under Option 2 provided in Table B-42. The intent of Option 2 is to allow retention and landings of lingcod that would otherwise be discarded during the closed season. The encounter rates in the nearshore fishery were much higher than the non-nearshore fishery during the closed period (35 lb per trip versus 7 lb per trip, respectively) since lingcod move onshore during the winter and spring months for spawning. Thus estimates from the nearshore fishery were used as the basis for discard rates to better accommodate incidental take and convert more discards to landings. An attempt was made to adjust trip limits to account for discarding due to length restrictions during the open season, but discarding may also be due to overages against the trip limits in open months, which were confounding. Given the average lb of lingcod encountered with and without accounting for discarding of 80 and 117 lb. per month, respectively, we provide a bracketed value for trip limits of 100 lb. per month for the open access fishery and 200 lb. per two month period for the limited entry fishery (Table B-43).

Since the average encounters per month across all nearshore fishery participants were used as the basis for trip limits, many vessels encountered more lingcod than the average (Figure B-23). Thus many vessels would still incidentally encounter more lingcod than the trip limits would allow them to retain, which would still be discarded under Option 2. As seen in Figure B-23, with a trip limit of 100 lb per month, 69.5 percent of the trips would not exceed the trip limit, but 30.5 percent of trips would continue to discard some of the encountered lingcod. Trends in the percent of trips with a given amount of catch per month were examined for both longline and vertical hook and line gear. While those fishing with longline gear encountered nearly 10 lb. per month more than vertical hook-and-line gear, the difference was not great enough to justify the added complexity of trip limits for each gear type. Thus the values for all nearshore participants combined were used to derive trip limits irrespective of gear type.

The landing restrictions under Option 2 are not expected to result in additional mortality of other target stocks or overfished rockfish species. While fisheries are expected to be prosecuted in a similar fashion to Option 1, the additional opportunity for lingcod south of 40°10′ N. latitude in period 2 when rockfish is closed presents the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. While this is a possibility, the landing restrictions may be low enough that participants in the fishery may not opt to target lingcod during the closed season for rockfish in period 2 as the revenue generated from lingcod alone may not be sufficient to be profitable on its own. Thus, the landing restrictions are expected to be sufficiently low to prevent an appreciable increase in overfished species mortality, even if trip limits are attained.

Table B-42. Average lingcod discard rates from WCGOP, fishing effort from PacFIN, and projected lingcod catch for open and closed seasons. The average number of trips per vessel per month, combined with the average lingcod catch rate, formed the basis for the lingcod trip limits under Option 2 intended to allow retention of incidental catch.

Fishery and Period	Metrics	Values
Nearshore fishery (Dec-April; "closed")	Average Lingcod Catch per Trip (All Discarded; lb)	35.0 lb
	Average Number of Trips/Vessel/Month	3.3
	Average Number of Vessels Making Landings / Month	82
	Average Expected Lingcod Catch/Vessel/Month =(35 lb) x (3.3 trips/vessel/month) [a]	117 lb / month, or 234 lb / 2 mos
	Average Expected Landings / Vessel / Month, assuming 32% discard rate = (68%) x (117 lb)[b]	80 lb / month or 160 lb / 2 mos

Table B-43. Proposed commercial fixed gear trip limits for north and south of 40°10′ N. latitude by sector, under Option 2.

Sector	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec	
LE North	200 lb./2 months		800 lb./ 2 months			400 lb.	100 lb.
LE South	200 lb./2 months		800 lb./ 2 months			400 lb.	100 lb.
OA North	100 lb./ month		400 lb./ month				100 lb.
OA South	100 lb./ month		400 lb./ month				100 lb.

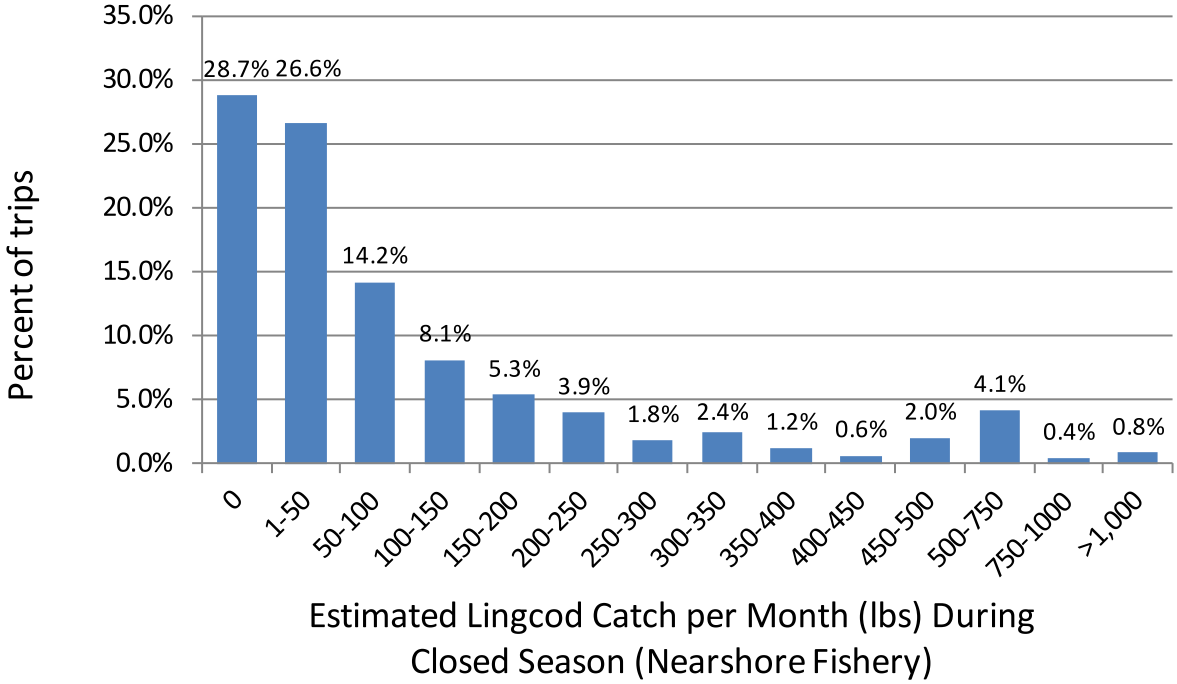

Figure B-23. Projected catch of lingcod per month during the closed season by individual vessels (percent) in the nearshore fixed gear fishery.

Biological Impacts Compared to Option 1

Lingcod Mortality

Lingcod mortality is expected to increase, though encounter rates are not, as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (at 7 percent mortality). There would be no expected increase in lingcod encounter rates under this option relative to Option 1. Increased targeting during the closed period is not expected under Option 2, because trip limits were set to reflect incidental catch rates. The projected mortality of lingcod under this alternative is provided in Table B-44.

Table B-44. Projected landings of lingcod in nearshore and non-nearshore fixed gear fisheries in California North and South of 40°10′ N. latitude, Oregon and Washington under Option 2.

Period	Sector			
	Washington	Oregon	California South of 40°10′ N. latitude	California North of 40°10′ N. latitude
Nearshore LE	NA	3.49	0.55	1.70
Nearshore OA	NA	29.94	5.02	17.34
Non-Nearshore LE	3.67	5.91	1.70	0.70
Non-Nearshore OA	2.0	14.59	2.13	3.44

Overfished Species Mortality

Under Option 2, no additional mortality of overfished species is anticipated since trip limits are set low enough to only accommodate conversion of already encountered but discarded lingcod to landings while targeting other species. Only the nearshore fishery south of 40°10′ N. latitude would be expected to incur additional mortality in period 2 if trip limits of lingcod were targeted, since rockfish is closed during this period. Given that trip limits are set low enough that targeting of lingcod alone is unlikely to be profitable, overfished species mortality is expected to be similar to that under Option 1. If the open access fishery increases effort in nearshore waters to target lingcod, there may be a minor increase in rockfish bycatch including overfished species.

Data Uncertainty Compared to Option 1

Though the trip limits are set to allow retention of lingcod encountered as bycatch, it may encourage some additional effort from the open access fishery, presenting some uncertainty in the lingcod and overfished species mortality. If selective gear is employed, any increase in open access effort may be exerted with minimal unintended consequences in the form of overfished species bycatch. If period 2 remains closed south of 40°10′ N. latitude, there will be less uncertainty in mortality as any additional effort targeting lingcod during the rockfish closure would result in additional bycatch of rockfish relative to Option 1. Though opening lingcod retention for open access during period 2 south of Point Conception could result in increased uncertainty in lingcod and overfished species impacts relative to Option 1, it is expected that trip limits may be low enough to prevent lingcod targeting; therefore, rockfish mortality is expected to be similar to Option 1.

Stock Status

Lingcod

Under Option 2**,** no changes to lingcod stock status are expected compared to the no action alternative since lingcod mortality has been far below the non-trawl allocation and expected to remain so under Option 2. Given the projected increase in impacts, the level of increase is expected to be far below levels that would result in overfishing and are not expected to adversely affect stock status.

Overfished Species

Under Option 2**,** no changes to the stock status or rebuilding progress of overfished species are expected since mortality is projected to remain below the sector specific harvest limits for the nearshore and non-nearshore fisheries.

Socio-economic Impacts compared to Option 1

Allowing fishery participants to retain incidentally encountered lingcod that were previously discarded would increase revenue from current operations targeting other species within incidental lingcod encounters. In 2013, the average price per pound coast wide ranged from $0.36 to $3.62 per lb. depending on the month, state and sector providing $36 to $362 per month of potential revenue from lingcod assuming the trip-limit can be attained. While the low trip limits make it unlikely that fishery participants will choose to target lingcod, such targeting may become worthwhile if the price per pound makes the trip profitable, despite the relatively low trip limits. If the trip-limit cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely.

Option 3

Option 3 would allow retention of lingcod in fixed gear fishery during periods 1, 2 and 6 with trip limits of 400 lb per month in the open access fishery and 800 lb per two month period in the limited entry fisheries.

Change in Fishing Activity Compared to Option 1

The intent of Option 3 is to allow trip limits for lingcod that are the same as the status quo in months currently open to fishing in both the open access and limited entry fisheries during periods 1, 2 and 6 (Table B-45). If effort is the same as the months currently open to fishing at the current trip limits, landings are expected to be lower than those observed in the open months as the trip limits would be the same, but effort is lower during the winter and early spring due to weather. The fishing effort for lingcod would be expected to increase during periods 1, 2 and 6 relative to the no action alternative. The magnitude of the increase in mortality depends on changes in fishing behavior of the limited entry fishery and the number of participants in the open access fishery which is difficult to predict.

Approximately eight percent of trips fishing for nearshore rockfish species during the closed months encountered more lingcod than can be retained under the 400 lb. per month open access trip limits and one percent encountered more than the 800 lb. per two month limited entry trip limits during open months (Figure B-23). It should be noted that even at the trip limit levels of 400 lb. per month for open access or 800 lb. per two months in the limited entry fishery, some participants would still be discarding lingcod even if the current trip limits during the open season were employed during the closed season (Figure B-23). Thus the trip limits under Option 3 will continue to limit landings for some trips and reduce lingcod mortality relative to an unregulated fishery.

The effort in the limited entry fishery is capped by the number of permit holders, thus the 800 lb. per two month trip-limit may increase targeting/harvest relative to other options, but the number of participants is fixed, limiting the magnitude of potential increase relative to the open access fishery. Both open access and limited entry non-nearshore fisheries primarily target sablefish, and the magnitude of the revenue generated by allowing retention of lingcod in this fishery is not expected to cause increased targeting of lingcod because the revenue they would generate is far lower than from sablefish landings. In addition, lingcod encounters are less common in the non-nearshore fishery than in the nearshore fishery during the closed season (see Table B-45), when lingcod move onshore to spawn during the winter and early spring (Love 1996). Lingcod encounters in the nearshore fishery peak during the summer month during the open season. In the nearshore fishery, the increased trip limits are expected to increase revenues and lingcod targeting. It is uncertain whether the increase would be sufficiently high to drive increased participation of latent capacity. Weather is also a factor in that the closed period coincides with a period of more inclement weather, which is expected to limit the amount of additional effort that may be exerted under Option 3.

Table B-45. Proposed commercial fixed gear trip limits for north and south of 40°10′ N. latitude by sector under Option 3.

Sector	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec
LE North	800 lb./ 2 months					
LE South	800 lb./ 2 months					
OA North	400 lb./ month					
OA South	400 lb./ month					

Biological Impacts Compared to Option 1

Lingcod mortality is expected to increase relative to the no action alternative, though it is difficult to determine the extent to which effort will increase. If additional entrants begin fishing in the open access fishery, impacts may increase further than shown here. The low increase in potential revenue makes extreme increases in effort unlikely especially considering that attainment is likely to fall short of the trip limit if targeting lingcod proves difficult. The 800 lb. per two month trip limit on the limited entry fishery may allow additional landings relative to other options, but the number of participants is limited by the number of permit holders.

To project lingcod mortality for the limited entry and open access sectors under Option 3, recent mortality during the open period was expanded to the currently closed periods (i.e., Periods 1, 2 and the second half of 6) using historical proportions of catch by time. The standard fleet capacity trip limit model documented under the analysis of trip limits for 2015-2016 was used to calculate the projected lingcod mortalities for the following fishery sectors per state including limited entry/nearshore open access (Oregon and California only) and Non-nearshore limited entry (all three states) /Non-nearshore open access (in all three states). Using the 1995-1997 period during which lingcod was open to fishing year round, the proportional take per period and/or month was calculated and used to emulate those proportions of catch by time for mortality projections. The projected annual mortalities (mt) were then calculated using the 2008-2012 set of landings as the trip limit base period. The proportions of catch by period and/or month were used to estimate the mortality during the closed months given the recent mortality during the base period. Assuming the trip limit is attained by all participants that landed lingcod during the open season, impacts on lingcod would increase in the nearshore fishery. The resulting lingcod mortalities for the fixed gear fisheries are provided in Table B-46.

Table B-46. Projected landings of lingcod in nearshore and non-nearshore fixed gear fisheries in California North and South of 40°10′ N. latitude, Oregon and Washington under Option 3.

Sector	Washington	Oregon	California	
			North of 40°10' N. Latitude	South of 40°10' N. Latitude
Nearshore LE	NA	3.89	0.71	0.69
Nearshore OA	NA	36.65	6.88	23.55
Non-nearshore LE	4.78	7.27	1.92	0.82
Non-nearshore OA	3.13	19.83	2.72	4.55

Overfished Species Mortality

The nearshore overfished species projection model was applied to calculate the OFS mortalities using five-year averages for Oregon (north of 42° N latitude) and California (between 42° N latitude and 40°10' N latitude and south of 40°10' N latitude). Under Option 3, the higher estimated catch of lingcod was imputed in the model to project the relative increase in overfished species impacts expected with trip limits shown in Table B-46. The result is an estimated percent increase in mortality in the nearshore fishery of 6.9 percent (0.08 mt) for yelloweye rockfish, 6.1 percent (0.43 mt) for canary rockfish, 6.5 percent (0.03 mt) for bocaccio and no increase in cowcod. The resulting overfished species mortality and magnitude of increase relative to status quo (in brackets) in Oregon and regions of California are presented in Table B-47.

There is no model for projecting the mortality of overfished species in the non-nearshore fishery using lingcod mortality. The assumption is made that overfished rockfish mortality will not increase in the non-nearshore fishery because it is unlikely that the trip limit will lead to additional targeting lingcod. Relatively few lingcod are encountered while targeting sablefish, especially during the winter and early spring when lingcod move onshore to spawn. If the open access fishery increases effort in nearshore waters to target lingcod, there may be an unanticipated increase in rockfish bycatch including overfished species, though the moderate trip limits for lingcod are expected to prevent excessive additional effort from the open access fishery. Relative to the contributions from the remainder of the year, the allocation to the fixed gear sectors and the ACL, the projected increase in overfished species mortality in Table B-47 are negligible.

Table B-47. Projected mortality for OFS from the nearshore bycatch projection model using the 5-year averages compared to what the OFS mortality projected increases would be with the addition of increased lingcod mortality amounts for periods 1, 2, and the second half of 6, applying the current trip limit structure (amounts) to the closed periods.

Species	Oregon	California North of 40°10' N latitude	California South of 40°10' N latitude	Total
Bocaccio	0.00 (+0.0)	0.00 (+0.0)	0.49 (+0.03)	0.49 (+0.03)
Canary rockfish	1.00 (+0.07)	0.55 (+0.02)	5.93 (+0.34)	7.48 (+0.43)
Cowcod	0.00	0.00	0.00	0.00
Darkblotched	0.13 (+0.01)	0.00 (+0.0)	0.07 (+0.0)	0.20 (+0.02)
Yelloweye rockfish	0.88 (+0.06)	0.23 (+0.01)	0.12 (+0.0)	1.24 (+0.08)

Data Uncertainty Compared to Option 1

Though the trip limits under Option 3 are set to allow retention of lingcod encountered as bycatch and facilitate attainment of the non-trawl allocation, it may encourage some additional effort from the open access fishery. The open access and limited entry fixed gear fisheries cannot retain rockfish in California waters during period 2 south of 40°10' N latitude, thus discarding of rockfish, including overfished species, may increase under Option 3. If the prohibition on retention of lingcod south of 40°10' N latitude in period 2 is maintained, uncertainty in overfished species bycatch projections and discard mortality of healthy rockfish stocks would be reduced. If selective gear is employed, open access effort may be exerted with less unintended consequences in the form of overfished species bycatch.

Stock Status

Lingcod

Under Option 3**,** no changes to lingcod stock status are expected since lingcod mortality is projected to be far below the non-trawl allocation. Given the projected increase in impacts, the level of increase is expected to be far below levels that would result in overfishing.

Overfished Species

The projected increase overfished species mortality under Option 3 is projected to result in mortality that is still below their respective harvest limits. Thus the stock status and rebuilding plans are not expected to be adversely affected by the regulations under Option 3.

Socio-economic Impacts compared to Option 1

Landing of fish previously discarded as bycatch would increase revenues for participants in the fishery and increase the profitability of existing operations by increasing marginal revenue per trip at no or limited additional cost. For those who choose to target lingcod, the revenue generated from landing lingcod may make a few trips per bi-monthly period worth taking to attain the moderate landings under the trip limit as long as the price per pound and landings make the trip economically viable. In 2013, the average price per pound coast wide ranged from $0.36 to $3.62 per lb. depending on the month, state and sector resulting in $144 to $1448 per month of potential revenue from lingcod assuming the trip-limit can be attained. If the trip-limit cannot be attained or if fuel and other variable costs exceed revenue or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely.

B.9 Non-Trawl: Trip Limit Adjustment for Shortspine Thornyhead N., Bocaccio S., and Shelf Rockfish S.

Need for Action

For 2013-2014 groundfish fisheries, shortspine thornyhead (north of 34°27' N. latitude), bocaccio (south of 34°27' N. latitude) and the minor shelf rockfish complex (south of 34°27' N. latitude), have been managed, in part, by cumulative bi-monthly trip limits, designed to keep catches within the respective ACLs. As a result of inseason tracking patterns (higher/lower than projected), trip limits may be adjusted inseason. For shortspine thornyheads, bocaccio, and the shelf rockfish complex, trip limit increases were implemented on August 13, 2013 as per the GMT's June 2013 Inseason Adjustment statement (http://www.pcouncil.org/wp-content/uploads/F9b_SUP_GMT_JUN2013BB.pdf). These trip limit options are in addition to those increases seen in 2013. The fishery sectors considered in the following analyses are the non-trawl fixed-gear fisheries.

The trip limit models used for these species/sectors are catch-based fleet capacity models, whereby the proportional take of the theoretical maximum (for the selected base years and species) that could have been made by each participating vessel is used to estimate take for various trip limit amounts per vessel per period (bi-monthly or monthly); the sum of which represents the estimated annual catch or mortality. When possible, the final estimated mortality was adjusted by also adding the estimates of discard mortality for the respective fishery sectors. One assumption built into this model is that vessels participation does not vary significantly from the base years used in calculations. However, with the open access fishery (OA), that assumption may be in jeopardy if high enough trip limits prompt individuals to jump into what they perceive as a developing lucrative fishery. Another assumption is that any vessel that landed at least 80 percent of its theoretical maximum period amount would probably take 100 percent of an increased period amount. This 20 percent buffer amount compensates for a form of within-fleet latent capacity. Additionally, estimated discard mortality amounts were calculated using the West Coast Groundfish Observer Program (WCGOP) Groundfish Mortality Reports for 2011 and 2012 and factored into the final projected estimates.

2015-2016 Management Considerations

For the 2015-2016 biennial management cycle, trip limit options for the above fishery sectors are analyzed relative to the No Action Option (based on the 2014 amounts) and two additional options, based on a P* of 0.45 and P* of 0.25, which establish fishery harvest guideline amounts for the non-trawl fixed-gear sectors. Estimated mortality is provided that also incorporates discard mortality using estimated amounts derived from WCGOP Groundfish Mortality Reports. Trip limits under any option could be adjusted inseason as needed to attain, but not exceed, a given catch limit (non-trawl allocation portion of the annual ACL).

Generally speaking, bocaccio and shelf rockfish south of 34°27' N latitude have been underutilized during recent years relative to non-trawl sector allocations, whereas shortspine thornyhead utilization north of 34°27' N latitude has been much higher (Table B-48) .

Table B-48. Comparison of estimated mortality (mt) and the non-trawl allocations (including the recreational sector) from 2011 through 2013 for the following non-trawl, fixed-gear fisheries: shortspine thornyheads (SSTH) – north of 34°27' N latitude, bocaccio – south of 34°27' N latitude, and the minor shelf rockfish complex – south of 34°27' N latitude (Note: Limited entry (LE) and open access sectors are combined and 2013 data are preliminary).

	2011			2012			2013		
	Non-trawl	Est. mort.	% of non-trawl	Non-trawl	Est. mort.	% of non-trawl	Non-trawl	Est. mort.	% of non-trawl
SSTH	76	72.9	95.4%	76	63.2	83.2%	74	59.3	80.1%
Bocaccio	58.6	2.3	3.9%	58.6	3.3	5.6%	73.2	2.3	3.1%
Shelf RF	626.9	19.9	3.2%	626.9	23.1	3.7%	586.5	16.2	2.8%

Table B-49. Expected mortality (mt) under No Action and under the Preliminary Preferred Alternative for the non-trawl sector for 2015-2016 for the following non-trawl, fixed-gear fisheries: shortspine thornyheads (SSTH) – north of 34°27' N latitude, bocaccio – south of 40° 10' N latitude, and the minor shelf rockfish complex – south of 40°10' N latitude (Note: Limited entry (LE) and open access sectors are combined and 2013 data are preliminary)

Species or Complex	No Action	Preliminary Preferred (P*=0.45)		Preliminary Preferred (P* = 0.25)	
		2015	2016	2015	2016
SSTH	77.3	84.3	83.3	61.4	60.8
Bocaccio	4.5	258.8	268.7	258.8	268.7
Shelf RF	387	1,383.2	1,384.0	659.7	659.7

B.9.1 Shortspine Thornyhead North of 34°27' North Latitude Management Measures

For 2013-14 west coast groundfish fisheries, shortspine thornyhead have been managed to sector specific harvest guidelines (95 percent trawl and 5% percent non-trawl). Because the recreational sector does not utilize this species, all analyses and totals represent only the commercial fishery. The HG for the non-trawl fixed gear fishery is expected to increase from 73.3 mt (in 2014) to 84.3 mt in 2015 and 83.3 mt in 2016 (Table B-49). The most recent assessment of shortspine thornyhead (Taylor 2013), indicates the stock is healthy with an estimated spawning stock biomass of 74.2 percent of its initial, unfished biomass. As a result, the Council requested analysis of higher trip limits for the LE sector north of 34°27' N. latitude. The 2014 commercial management measures for shortspine thornyhead are described in Table B-50.

Table B-50. Shortspine thornyhead management measures north of 34 °27' N latitude for the 2014 commercial fishery.

Fishery	
Commercial	Sorting requirement for all commercial landings
Limited Entry Trawl	Managed under IFQ
Limited Entry Fixed Gear	Bi-monthly limit management Current trip limits north of 34°27' N latitude are: Periods 1 -3: “2,000 lb/ 2 months” Periods 4 -6: “2,500 lb/ 2 months” Bi-monthly trip limits can be adjusted through routine in-season action
Open Access Fixed Gear	“CLOSED”

2015-2016 Management Considerations
For the 2011-2013 non-trawl sector (which is allocated 5 percent of the annual take north of 34°27' N latitude) catches were between 80 percent and approximately 90 percent of the allocation (Table B-48). The shortspine thornyhead non-trawl fixed-gear fishery north of 34°27' N latitude is restricted to the LE entry sector. The open access sector is not allowed to retain shortspine thornyhead, where the discard mortality is relatively small (e.g., 0.78 mt during 2012 WCGOP Groundfish Mortality Report). During the 2011-2012 management cycle, 116 LE vessels (85 percent of the LE fleet) landed less than 20 percent of the theoretical maximum amount they could have landed under the trip limits that were in place at the time.

Management Options

Option 1 – No Action: Maintain current shortspine thornyhead trip limits for the limited entry sector north of 34°27' N latitude. Under Option 1, the 2014 trip limits (Table B-51) would remain in place for the LE sector, and the OA sector would remain closed.

Option 2a – Increase trip limits for the limited entry sector north of 34°27' N latitude: Under Option 2a, increased bi-monthly trip limits north of 34°27' N latitude were investigated to determine what the projected morality would be compared to the No Action Option (Table B-51).

Option 2b: Further trip limits for the limited entry sector north of 34°27' N latitude: Under Option 2b moderate trip increases, compared to Option 2a, are explored (Table B-51)..

Biological Impacts Under Option 1

Projected Mortality
Under No Action, projected mortality for shortspine thornyhead north of 34°27' N latitude is 77.3 mt for the LE fixed-gear sector (with no open access fishery allowed). At this level of harvest, the projected mortality represents 92 percent of the 2015 HG (84.3 mt) and 93 percent of the 2016 HG (83.3 mt) at a P* value of 0.45 (Table B-49). At a P* value of 0.25 this exceeds the 2015 HG (61.4 mt) by 26 percent and exceeds the 2015 HG (60.8 mt) by 27 percent. This mortality is expected to be within the HG at the current level of vessel participation only at a P* value of 0.45. This assumes that the vast majority of vessels will continue to take less than 20 percent of their theoretical maximum allowable amount.

Stock Status
The shortspine thornyhead stock was determined to be healthy in the last stock assessment (Taylor 2013) and projections under status-quo catches showed little change in stock status.

Overfished Species Mortality

Overfished species (OFS) are encountered by non-nearshore fixed gear fisheries, which also catch shortspine thornyhead. For example in 2013, non-nearshore fixed gear fishery mortality for OFS was bocaccio rockfish South 40°10' N. latitude (2.62 mt), canary rockfish (0.12 mt), darkblotched rockfish (9.04 mt), Pacific ocean perch (0.41 mt), yelloweye rockfish (0.34 mt), and petrale sole (0.83 mt). It is expected that similar catches may be observed under Option 1 (No Action) during 2015 and 2016.

The non-nearshore fishery primarily targets sablefish. Other species, such as shortspine thornyhead, are incidentally caught (not targeted) and retained. In addition, many of the OFS (e.g., canary and yelloweye rockfish primarily live at shallower depths than shortspine thornyhead, and therefore largely do not co-occur.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Other species are encountered by non-nearshore fixed gear fisheries, which also catch shortspine thornyhead. For example, rougheye rockfish was taken by the non-nearshore fixed gear fisheries (when shortspine thornyheads were also landed) as follows: 29.7 mt in 2011, 26.2 mt in 2012, and 19.4 mt in 2013. Shortraker rockfish was also taken as follows: 2.5 mt in 2011, 4.53 mt in 2012, and 0.16 mt in 2013. Lastly, blackspotted rockfish was taken as follows: 0.25 mt in 2011, 4.53 mt in 2012, and 0.16 mt in 2013. However, increases in shortspine thornyhead trip limits are not expected to have any additional impact on the mortality of these species because shortspine thornyhead are incidentally caught while fixed gear fishermen are targeting other higher-valued species. For example, slope rockfish and shortspine thornyhead catch is primarily incidental for fishermen targeting sablefish. Fishing effort and fishing behavior (i.e., selection of fishing locations) are not expected to change due to shortspine thornyhead trip limit increases. Therefore, mortality of these three species of rockfish is not expected to change.

Options 2a and 2b – Increase trip limits for the limited entry sector north of 34°27' N latitude
Under Option 2, increased bi-monthly trip limits north of 34°27' N latitude were investigated to determine what the projected morality would be compared to the No Action Option.

Individual vessel landings reported in PacFIN (table vdrfd) from 2011-2012 for the LE sector were used to analyze catch limits by the fleet. The years 2011 and 2012 were ultimately chosen as the basis for this model because they are the most representative of current and future fishing behavior for the three states. Even though the vast majority of vessels take less than 20 percent of their theoretical maximum annual amount, a small increase in the bi-monthly trip limits could cause the fishery to reach or exceed the HG (non-trawl allocation portion of the annual ACL).

Limited Entry Bi-monthly Trip Limit Options
The LE entry trip limit options for the shortspine thornyhead non-trawl fixed gear fishery north of 34°27' N latitude are shown in Table B-51. Option 2a provides for an increase from 2,000 lb to 2,250 lb per bi-monthly period for periods 1 - 3, and does not change the trip limit for periods 4-6, which remain at No Action level of 2,500 lb per bi-monthly period. Option 2b provides for an increase from 2000 lb to 2,500 lb per bi-monthly period for periods 1-3, resulting in 2,500 lb per bi-monthly period for the entire year (Option 2b).

Table B-51. Comparison of projected landings of shortspine thornyhead in the LE non-trawl fixed-gear sector north of 34°27' N. latitude under No Action (Option 1) and increases for periods 1-3 only (Option 2a) and setting the trip limits to 2,500 lb per period for all six periods (Option 2b).

	Limited Entry Shortspine Thornyhead North 34°27' N. Latitude at a **P* of 0.45**					
	Bi-monthly Trip Limits	Projected	HG (mt)		% of HG	
Options	(in lb)	landings (mt)	2015	2016	2015	2016
Option 1	2,000 for periods 1-3 and 2,500 for periods 4-5	77.3	84.3	83.3	91.7 %	92.8%
Option 2a	2,250 for periods 1-3 and 2,500 for periods 4-5	80.3	84.3	83.3	95.3 %	96.4%
Option 2b	2,500 for all six periods	83.4	84.3	83.3	98.9 %	100.1%

	Limited Entry Shortspine Thornyhead North 34°27' N. Latitude at a **P* of 0.25**					
	Bi-monthly Trip Limits	Projected	HG (mt)		% of HG	
Options	(in lb)	landings (mt)	2015	2016	2015	2016
Option 1	2,000 for periods 1-3 and 2,500 for periods 4-5	77.3	61.4	60.8	126%	127%
Option 2a	2,250 for periods 1-3 and 2,500 for periods 4-5	80.3	61.4	60.8	131%	132%
Option 2b	2,500 for all six periods	83.4	61.4	60.8	136%	137%

Biological Impacts Under Options 2a and 2b

Projected Mortality

Under Option 2a and Option 2b, the projected mortality of shortspine thornyhead north of 34°27' N latitude would result in the fishery nearly reaching its HG (Option 2a) and exceeding it (Option 2b) under a P*=0.45 approach (Table B-49). Expected catches under these options are expected to exceed the HG using a P*=0.25 approach.

Stock status

While the stock is considered healthy, no negative consequences would probably result from trip limit increases shown in Table B-51. The IFQ mortality since 2011 ranged from 50 to 60 percent of its allocation. That, coupled with the non-trawl fixed-gear allocation of 5 percent indicates that the projected mortality would not likely jeopardize the stock's health.

Overfished Species Mortality

Details shown in Option 1 also apply to Options 2a and 2b. In addition, increases in shortspine thornyhead trip limits are not expected to have any additional impact on overfished species mortality, because shortspine thornyhead are incidentally caught while fixed gear fishermen are targeting other higher-valued species (i.e., sablefish). Fishing effort and fishing behavior (i.e., selection of fishing locations) are not expected to change due to shortspine thornyhead trip limit increases. Therefore, overfished species impacts are not expected to change.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish

As was pointed out for Option 1, an increase in shortspine thornyhead trip limits are not expected to have any additional impact on the mortality of these species. If increases in catch of slope rockfish were to occur following increases to shortspine thornyhead trip limits, it is expected that such increases would be minimal because shortspine thornyheads are not the primary target species.

Impact to Industry

Higher trip limits for shortspine thornyhead could increase access to healthy stocks, resulting in increased ex-vessel value, although the amount is difficult to quantify. Changes as a result of this action may not have a large effect on the stock per se; the possibility of exceeding harvest limits could have a negative impact on the fishery, albeit a small impact because the take of shortspine thornyheads in this sector represents a bycatch amount of the sablefish fishery. The latest anecdotal information received from the industry, regarding the 2014 sablefish fishery, indicates that demand may experience an upswing, which could result in an increased mortality of thornyheads.

B.9.2 Bocaccio South of 34°27' North Latitude Management Measures

For 2013-2014 California groundfish fisheries, bocaccio has been managed to sector specific harvest amounts (i.e., trawl, non-trawl, recreational). The HG for non-trawl fixed gear is expected to increase in 2015 and 2016 to 80.1 mt and 83.1 mt respectively (Table B-53). The 2011 update assessment (Field 2013) indicated that a strong 2010 year class is moving through the fishery (particularly south of 34°27' N. latitude) and as such, encounters (and discarding) have increased. This, combined with the information that recent mortality of this stock is far below the non-trawl harvest guideline (Table B-53), prompted the Council to request an analysis of higher trip limits for the LE and OA sectors south of 34°27' N. latitude. The 2014 commercial management measures for bocaccio rockfish are described in Table B-52.

Table B-52. Bocaccio management measures south of 34°27' N. latitude for the 2014 commercial groundfish fisheries.

Fishery	
Commercial	Sorting requirement for all commercial landings
Limited Entry Trawl	Managed under IFQ
Limited Entry Fixed Gear	Bi-monthly limit management. Current limits south of 34°27' N. latitude are: Period 1: *"300 lb/2 months"* Period 2: Closed Period 3: *"300 lb/2 months"* Periods 4-6: *"500 lb/2 months"* Bi-monthly limits can be adjusted through routine in-season action.
Open Access	Bi-monthly limit management. Closed Period 2 Current limits south of 34°27' N. latitude are: Period 1: *"100 lb/2 months"* Period 2: Closed Period 3: *"100 lb/2 months"* Periods 4-6: *"200 lb/2 months"* Bi-monthly limits can be adjusted through routine in-season action.

2015-2016 Management Considerations
Fewer than 10 LE vessels land bocaccio south of 34°27' N. latitude, while the number of OA vessels landing this species is roughly twice as many. Total mortality estimates reported from WCGOP indicate that approximately six percent of the non-trawl fixed gear HG was attained in 2012 (Table B-53). Encounters are expected to increase as the bocaccio population continues to rebuild (i.e. rebuilding paradox). During the 2011-2012 management cycle, 5 LE vessels (83 percent of the six vessels that landed bocaccio) landed less than 20 percent of the theoretical maximum amount of bocaccio they could have landed south of 34°27' N. latitude. In the OA sector, 28 of 39 vessels (72%) that landed bocaccio south of 34°27' N. latitude landed less than 20 percent of their theoretical maximum amount of bocaccio.

Table B-53. Total bocaccio mortality (in mt) in the non-trawl fixed gear sector (LE and OA combined) south of 40°10' N latitude from 2011-2012. (source: WCGOP)

Year	Mortality	HG	% HG
2011	2.3	58.6	4 %
2012	3.3	58.6	6 %

Management Options

Option 1-No Action: Maintain current trip limits for LE and OA sectors south of 34°27' N latitude.
Under Option 1, the 2014 trip limits (Table B-52) would remain in place for both LE and OA sectors.

Option 2a: Increase trip limits for LE and OA sectors south of 34°27' N latitude: Under Option 2a moderate trip increases, compared to Option 1- No Action, are explored (Table B-56).

Option 2b: Further increase trip limits for LE and OA sectors south of 34°27' N latitude: Under Option 2b moderate trip increases, compared to Option 2a, are explored (Table B-56).

Biological Impacts Under Option 1: No Action

Projected Impacts
Under No Action, projected mortality for bocaccio south of 34°27' N latitude is 1.0 mt and 3.5 mt for the LE and OA sectors, respectively (Table B-54). Between 40°10' and 34°27' N. latitude, average landings (2011 and 2012) for both sectors combined were 0.9 mt. The projected landings for the entire area south of 40°10' N. latitude under No Action is therefore 5.4mt (Table B-53), which is well below the HGs for 2015 and 2016 (258.8 mt and 268.7 mt, respectively) for both P*=0.45 and P*=0.25 (Table B-53).

Table B-54. Summary of bocaccio projected landings south of 40°10' N. latitude (by sector) under No action.

Area	Limited Entry	Open Access
40°10' to 34°27' N. lat.	0.9	
South of 34°27' N. lat.	1.0	3.5
Total	5.4	

Stock Status
The bocaccio stock south of 40°10' N. latitude was formally designated as overfished in 1999. The current stock assessment (Field, 2013) indicates an increasing abundance trend and progress towards rebuilding (Field, 2011). Under Option 1, no changes in progress towards rebuilding are expected.

Overfished Species Mortality

Bocaccio mortality has been minimal south of 34°27' N latitude. Annual average landings from 2008 to 2013 for the LE and OA sectors were 0.2 mt and 1.08 mt, respectively (Table B-55). During this five-year period, a total of only six vessels participated in the LE fishery and 52 in the OA fishery where bocaccio was taken. Of the 52 vessels in the OA fishery, only two averaged more than 0.1 mt of bocaccio per year; one at 0.18 mt and the other at 0.13 mt.

Table B-55. Bocaccio landings (mt) by sector and year from 2008 – 2012 for the non-trawl, non-nearshore fixed-gear fisheries south of 34°27' N latitude. Data source: PacFIN.

Sector	Sector description	Year and landings (mt)					Total	5-yr avg.
		2008	2009	2010	2011	2012		
7	Non-nearshore LE			0.00	0.02	0.36	0.39	0.08
8	Non-nearshore OA	0.04		0.00	0.00	0.16	0.21	0.04
9	Non-nearshore non-sablefish LE	0.17	0.05			0.40	0.62	0.12
10	Non-nearshore non-sablefish OA	1.16	0.73	0.66	1.17	1.28	5.01	1.00
12	Incidental OA	0.08	0.02	0.03	0.05	0.02	0.20	0.04
	LE total						1.00	0.20
	OA total						5.42	1.08

Note: Since these are PacFIN amounts (table vdrfd) and not West Coast Groundfish Observer Program estimates, no discard mortality estimates are included.

A range of bocaccio trip limits and calculated projected mortality under three alternatives for both the LE and OA sectors was analyzed (Table B-56). The years 2011 and 2012 were used because they were the most representative of current and future fishing behavior, with the assumption that potential trip limit increases would not significantly change fishing behavior (i.e. the number of vessels increasing per fishery sector).

Table B-56 . Projected mortality for bocaccio under a range of Options for the LE and OA fixed gear fisheries south of 34°27' N latitude.

No Action Option 1							
Sector	Period and trip limit (lb)						Total estimated mortality (mt)
	1	2	3	4	5	6	
LE FG	300	closed	300	500	500	500	1.2
OA FG	100	closed	100	200	200	200	2.0

Option 2a							
Sector	Period and trip limit (lb)						Total estimated mortality (mt)
	1	2	3	4	5	6	
LE FG	750	closed	750	750	750	750	1.7
OA FG	250	closed	250	250	250	250	5.0

Option 2b							
Sector	Period and trip limit (lb)						Total estimated mortality (mt)
	1	2	3	4	5	6	
LE FG	1,000	closed	1,000	1,000	1,000	1,000	2.3
OA FG	500	closed	500	500	500	500	9.9

Currently, projected mortality for bocaccio in the GMT scorecard is informed by two sources of data – the sablefish bycatch projection model for the area between 40°10' N latitude and 36° N latitude and by trip limit models south of 34°27' N latitude. Mortality between 36° N latitude and 34°27' N latitude (i.e., Morro Bay port complex) in not currently accounted.
WCGOP data were examined for the area south of 36° N latitude to estimate mortality of co-occurring overfished species (OFS; canary, darkblotched, and yelloweye rockfish) that may occur as a result of increases to the bocaccio rockfish trip limits in the LE and OA sectors. WCGOP data from 2011 to 2012 revealed that no OFS were encountered on the observed bocaccio trips during this time frame. Given the small sample size (5 vessels) informing the data and location of fishing, it is reasonable to assume that some OFS are encountered as bycatch, albeit in very small and unquantifiable amounts.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Other species are encountered by non-nearshore fixed gear fisheries, which also catch bocaccio. However, this is not the case for rougheye, blackspotted, and shortraker rockfish if we use the 2011 and 2012 mortality amounts as examples. During these years, no recorded landings of these three species of rockfish were made when landings of bocaccio were made. This is due primarily to the fact that these three species are infrequently taken south of 40°10' N. latitude.

Options 2a and 2b: Increase trip limits for LE and OA sectors south of 34°27' N latitude
Under Option 2, increased bi-monthly trip limits south of 34°27' N. latitude were investigated to accommodate increased encounters and minimize discarding as the stock continues to rebuild.

Individual landings reported in PacFIN from 2011-2012 for LE and OA sectors were used to analyze catch limits by the fleet. Although the HG for bocaccio applies to the entire area south of 40°10' N latitude, only modifications to trip limits south of 34°27' N latitude were investigated (i.e., trip limits between 40°10' and 34°27' N. latitude were status quo). For analytical and managerial ease, bi-monthly trip limits are assumed the same for each period. The years 2011 and 2012 were chosen as the basis for this model because they may be representative of current and future fishing behavior. Average landings during this time period for the area between 40°10' and 34°27' N latitude were added to the analytical options to project landings for the entire area south of 40° 10' N latitude.

Limited Entry Bi-Monthly Trip Limit Options

The LE bi-monthly trip limit options for bocaccio south of 34°27' N. latitude range from 750 lb/2 months (Option 2a) to 1,000 lb/2 months (Option 2b; Table B-57). In recent years the majority of vessels have taken less than half of the maximum trip limit during any given period.

Open Access Bi-Monthly Trip Limit Options

The OA bi-monthly trip limits range from 250 lb/2 months (Option 2a) to 500 lb/2 months (Option 2b; Table B-57). Participation in the OA sector has traditionally been more variable than LE, making it difficult to predict catch and fleet behavior; therefore it is possible that landings could be higher than projected.

Projected landings under each option for the LE and OA sectors are provided (Table B-57). These options are not mutually exclusive. , That is, the Council could recommend a different option for each sector.

Table B-57. Comparison of projected landings (mt) of bocaccio in the LE and OA sectors under No Action trip limits (Option 1), and two options with trip limit increases (Options 2a and 2b) to the 2015 non-trawl HG (258.8 mt) and the 2016 non-trawl (268.7 mt). Trip limit increases apply only to the open periods (currently period 2 (March/April) is closed). This applies to a P* of 0.45 and 0.25. Projected landings between 40°10' and 34° 27' N. latitude are based on average landings during 2011-2012.

2015							
Option	LE S. 34°27' N. lat.		OA S. 34°27' N. lat.		Projected Landings (mt) 40°10' -34°27' N. lat.	Total (mt)	% of Non-trawl Allocation
	Trip limit (lb.)	Projected Landings (mt)	Trip limit (lb.)	Projected Landings (mt)			
Option 1	300 for periods 1 and 3 500 for periods 4-6	1.0	100 for periods 1 and 3 and 200 for periods 4-6	3.5	0.9	5.4	2.0%
Option 2a	750 – all open periods	1.7	250 - all open periods	6.2	0.9	8.8	3.4%
Option 2b	1,000 – all open periods	2.2	500 - all open periods	12.4	0.9	15.5	6.0%

2016							
Option	LE S. 34°27' N. lat.		OA S. 34°27' N. lat.		Projected Landings (mt) 40°10' -34°27' N. lat.	Total (mt)	% of Non-trawl Allocation
	Trip limit (lb.)	Projected Landings (mt)	Trip limit (lb.)	Projected Landings (mt)			
Option 1	300 for periods 1 and 3 500 for periods 4-6	1.0	100 for periods 1 and 3and 200 for periods 4-6	3.5	0.9	5.4	1.9%
Option 2a	750 – all open periods	1.7	250 - all open periods	6.2	0.9	8.8	3.3%
Option 2b	1,000 – all open periods	2.2	500 - all open periods	12.4	0.9	15.5	5.8%

Note: Although status quo provides for differential trip limits by period (i.e. lower in Periods 1 and 3, and higher in Periods 4-6), for purposes of this analysis a constant trip limit amount was analyzed for all open periods.

Biological Impacts

Under Option 2a, landings are projected to increase approximately 70 percent (0.7 mt) and 63 percent (3.4 mt) in the LE and OA sectors respectively compared to No Action (Option 1; Table B-57). While under Option 2b projected landings are expected to increase by 120 percent (1.2 mt) in the LE sector and 187 percent (10.1 mt) in the OA sector compared to No Action. Similar to Option 1, mortality for bocaccio south of 40°10' N. latitude is projected to be well below the non-trawl fixed gear HGs (i.e., 3.4% to 6.0% of the non-trawl harvest guideline; Table B-57).

Stock Status

Similar to Option 1, no changes to rebuilding progress are expected.

Overfished Species Mortality
Same as Option 1. In addition, increases in bocaccio limits relative to Option 1 are not expected to have any additional impact on overfished species mortality, because bocaccio are incidentally caught while fixed gear fishermen are targeting other higher-valued species (i.e., sablefish). Fishing effort and fishing behavior (i.e., selection of fishing locations) are not expected to change due to bocaccio trip limit increases. Therefore, overfished species impacts are not expected to change.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Same as No Action Option 1: no impacts expected.

Impacts to Industry

Higher trip limits for bocaccio may convert discards into retained fish, thus increasing landings, resulting in increased ex-vessel value, although the amount is difficult to quantify. Changes as a result of this action may not have a large effect on the sectors as a whole, but could be of importance to some individuals in each sector.

B.9.3 Minor Shelf Rockfish Complex South of 34°27' North Latitude Management Measures

Although the shelf rockfish complex is managed as a single stock south of 40°10´ N. latitude, trip limit options analyzed herein are for the management area south of 34°27' N. latitude. For 2013-14 California groundfish fisheries, the minor shelf rockfish complex south of 40°10´ N. latitude has been managed to sector specific allocations (i.e. trawl, 12.2% and non-trawl, 87.8%). Shelf rockfish are not formally allocated within non-trawl sectors, that is, the non-trawl commercial LE and OA sectors, as well as the recreational sector, share the non-trawl allocation. The non-trawl allocation south of 40°10´ N. latitude is expected to increase substantially from 615 mt in 2014 to 1,383.2 mt in 2015 and 1,384.0 mt in 2016 at a P* = 0.45 (Table B-59). At P* = 0.25, the 2015 and 2016 allocations would be 659.7 mt for both years. Based on an industry request, the Council requested analysis of higher trip limits for LE and OA sectors south of 34°27' N. latitude. The 2014 commercial management measures for shelf rockfish south of 34°27' N. latitude are described in Table B-58.

Table B-58. Shelf rockfish management measures for the 2014 commercial groundfish fisheries, south of 34°27' N. latitude.

Fishery	
Commercial	Sorting requirement for all commercial landings
Limited Entry Trawl	Managed under IFQ
Limited Entry Fixed Gear	Bi-monthly limit management. Current limits south of 34°27' N. latitude are: Period 1: *"3,000 lb/2 months*" Period 2: Closed Period 3: *"3,000 lb/2 months*" Periods 4-6: *"4,000 lb/2 months"* Bi-monthly limits can be adjusted through routine in-season action.
Open Access	Bi-monthly limit management. Current limits south of 34°27' N. latitude are: Period 1: *"750 lb/2 months"* Period 2: Closed Period 3: *"750 lb/2 months"* Periods 4-6: *"1,000 lb/2 months"* Bi-monthly limits can be adjusted through routine in-season action.

2015-2016 Management Considerations

Participation in the fixed gear shelf rockfish fishery south of 34°27' N. latitude is limited, with fewer than 30 vessels operating in the OA sector and six vessels in the LE sector during 2011 and 2012. Total mortality estimates reported from WCGOP indicate that approximately 61 percent of the non-trawl allocation south of 40° 10′ N. latitude was attained in 2012 (Table B-58). If an intersector allocation (i.e. trawl, non-trawl allocations) had been in place in 2009 and 2010, attainment would have been approximately 47 and 31 percent in each year respectively, although the recreational sector accounts for the majority of the total estimated mortality (Table B-59). During the 2011-2012 management cycle, nine LE vessels that made shelf rockfish landings (100 percent of LE vessels making shelf rockfish landings) landed less than 20 percent of the theoretical maximum amount of shelf rockfish they could have landed. In the OA sector, 42 vessels (84 percent) landed less than 20 percent of their theoretical maximum amount. Data indicate that few participants attained greater than half of the allowable limit, averaging approximately 240 lb/2mo and 280 lb/2mo in the LE and OA fleets respectively during 2011 and 2012.

Table B-59. Total Mortality (in mt) in the minor shelf rockfish complex non-trawl fixed gear sector (LE and OA combined) south of 40°10' N. latitude from 2009-2012. (source: WCGOP)

Year	Commercial (non-trawl)	Recreational	Non-Trawl Allocation	% Non-trawl Allocation
2009	8.3	246	615	41%
2010	14.2	212	615	37%
2011	19.9	326	615	53%
2012	23.1	354	615	61%

Management Options

Option 1-No Action: No increase to trip limits for shelf rockfish south of 34°27' N. latitude: Under Option 1, the 2014 trip limits would remain in place for both LE and OA sectors.

Option 2a: Increase trip limits for LE and OA sectors south of 34°27' N. latitude: Under Option 2a, increased, compared to Option 1, were investigated (Table B-61).

Option 2b: Further increase trip limits for LE and OA sectors south of 34°27' N latitude: Under Option 2b moderate trip increases, compared to Option 2a, are explored (Table B-61).

Biological Impacts Under Option 1

Projected Impacts

Under No Action, projected mortality for minor shelf rockfish south of 34°27' N. latitude is 3.9 mt and 14.3 mt for the LE and OA sectors, respectively (Table B-60); between 40° 10' N. and 34° 27' N. latitude, average landings during 2011 and 2012 were 16.1 mt for both sectors combined. Assuming that take in the recreational fishery south of 40° 10' N. latitude is unchanged from 2012 (354 mt; WCGOP Groundfish Mortality Report, 2012); projected mortality of shelf rockfish south of 40° 10' N. latitude is 387 mt. This represents 28 percent of 2015 allocation of 1,383.2 mt under P* of 0.45, and 58.7 percent of the 2015 allocation of 659.7 mt under P* of 0.25. For 2016, this represents 28 percent of the 2016 allocation of 1,384.0 mt under P* of 0.45, and 58.7 percent of the 2016 allocation of 659.7 mt under P* = 0.25.

Table B-60. Summary of commercial minor shelf rockfish landings south of 40° 10' N. latitude (by sector) under No Action.

Area	Limited Entry	Open Access
40° 10' to 34° 27' N. lat.	16.1	
South of 34° 27' N. lat.	3.9	14.3
Total	34.3	

Stock Status

The minor shelf rockfish complex south of 40° 10' N. latitude is comprised mainly of unassessed stocks, with the exception of greenspotted rockfish and greenstriped rockfish. The greenspotted rockfish assessment indicated the stock is in the precautionary zone; greenstriped rockfish was considered healthy. Greenspotted rockfish have shown a substantial increase in biomass since the RCAs were implemented in 2003 (2013-2014 FEIS). Given that shelf rockfish are particularly well protected by the RCAs, the shelf rockfish ACL is expected to increase in 2015-16, and only 31-67 percent of the non-trawl allocation has been caught during recent years (Table B-59), no changes to stock status are expected under No Action.

Overfished Species Mortality

Under the No Action Option, there is no anticipated increase to the mortality of OFS.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish

Other species are encountered by non-nearshore fixed gear fisheries, which also catch minor shelf rockfishes. However, this is not the case for rougheye, blackspotted, and shortraker rockfish if we use the 2011 and 2012 mortality amounts as examples. During these years, no recorded landings of these three species of rockfish were made when landings of minor shelf rockfish were made. This is due primarily to the fact that these three species are infrequently taken south of 40°10' N. latitude.

Options 2a and b: Increase trip limits for LE and OA sectors south of 34° 27' N. latitude

Under Option 2, increased bi-monthly trip limits south of 34° 27' N. latitude were investigated, which may afford greater opportunity under the increased non-trawl allocation.

Individual vessel landings reported in PacFIN from 2011-2012 for LE and OA sectors were used to analyze catch limits by the fleet. Although the allocation for the minor shelf rockfish complex applies to the entire area south of 40° 10' N. latitude, only modifications to trip limits south of 34° 27' N. latitude were investigated (i.e. trip limits between 40° 10' and 34° 27' N. latitude were status quo). For analytical and managerial ease, bi-monthly limits are assumed the same in each period. The years 2011 and 2012 were ultimately chosen as the basis for this model because they may be representative of current and future fishing behavior. Average commercial landings between 40° 10' and 34° 27' N. latitude during this time period and the 2012 recreational total mortality reported by WCGOP for the area south of 40° 10' N. latitude were added to the analytical options to project mortality for the entire area south of 40° 10' N. latitude.

Limited Entry Bi-Monthly Trip Limit Options
The LE bi-monthly trip limit options for minor shelf rockfish complex south of 34° 27' N. latitude are shown in Table B-61. These options range from 4,000 lb/2 months (Option 2a) to 5,000 lb/2 months (Option 2b). In recent years the majority of vessels have taken less than half of the maximum trip limit during any given period. The proposed trip limit increases apply only to the existing open periods.

Open Access Bi-Monthly Trip Limit Options
The OA bi-monthly trip limit options for minor shelf rockfish complex south of 34° 27' N. latitude are shown in Table B-61. These options range from 1,500 lb/2 months (Option 2a) to 2,500 lb/2 months (Option 2b). Although no effort shift occurred during previous inseason actions, participation in the OA sector has traditionally been more unpredictable than LE, making it difficult to predict catch and fleet behavior; therefore it is possible that projected landings (Table B-61) could be higher than expected if the trip limit is increased sufficiently enough to encourage entry into the fishery by new participants.

Projected landings under each Option for the LE and OA sectors are provided (Table B-61). These Options are not mutually exclusive, that is, the Council could recommend a different option for each sector.

Table B-61. Comparison of minor shelf rockfish projected landings south of 40o 10′ N. latitude in the LE and OA sectors under No Action (Option 1), and two options with trip limit increases (Options 2a and 2b) to the 2015 and 2016 HGs under P*=0.45 (1,282.2 mt and 1,383.0 mt respectively) and the 2015 and 2016 HGs under P*=0.25 (659.7 mt). . Projected landings between 40° 10' and 34° 27' N. latitude are based on average landings during 2011-2012. (Note: recreational catch were derived from the 2012 WCGOP Groundfish Mortality Report.)

	P*=0.45 (2015 allocation = 1,382.2 mt and 2016 allocation = 1,384.0 mt)								
	Limited Entry S. 34° 27' N. lat.		Open Access S. 34° 27' N. lat.		Projected Landings 40° 10' -34° 27' N. lat	Projected Recreational Catch	Total	% of Non-trawl Allocation	
Option	Trip limit	Projected Landings	Trip limit	Projected Landings				2015	2016
Opt. 1	3,000	3.9	750	14.3	16.1	354	387	28%	28%
Opt. 2a	4,000	4.3	1,500	24.0	16.1	354	399	29%	29%
Opt. 2b	5,000	5.4	2,500	39.9	16.4	354	416	30%	20%

	P*=0.25 (2015 and 2016 allocations = 659.7 mt)							
	Limited Entry S. 34° 27' N. lat.		Open Access S. 34° 27' N. lat.		Projected Landings 40° 10' -34° 27' N. lat	Projected Recreational Catch	Total	% of Non-trawl Allocations
Option	Trip limit	Projected Landings	Trip limit	Projected Landings				
Opt. 1	3,000	3.9	750	14.3	16.1	354	387	58.7%
Opt. 2a	4,000	4.3	1,500	24.0	16.1	354	399	60.5%
Opt. 2b	5,000	5.4	2,500	39.9	16.4	354	416	63.1%

Biological Impacts

Projected Mortality

Under Option 2a, landings are projected to increase approximately 10 percent (0.4 mt) and 68 percent (9.7 mt) in the LE and OA sectors respectively compared to No Action (Option 1; Table B-61). Under Option 2b projected landings are expected to increase by 38 percent (1.5 mt) in the LE sector and 179 percent (25.6 mt) in the OA sector compared to No Action. Similar to Option 1, mortality of shelf rockfish south of 40° 10' N. latitude is projected to be well below the non-trawl allocation (Table B-61).

Stock Status

Similar to Option 1, no changes to stock status are expected as a result of this action. The increase in projected landings will keep mortality well within the non-trawl allocation (Table B-61) and no changes to the current RCAs structure have been proposed (i.e. the RCA protections afforded under option 1 will remain in place).

Overfished Species Mortality

There may be a small increase in the bycatch of OFS, but at present, no quantifiable method has been explored to determine how much this may be. Any increase in trip limit is expected to increase fishing effort for shelf rockfish species. Likewise, increased catch of overfished species would likely occur. The amount of the increase is uncertain and cannot be estimated at this time. This could be an issue that would affect more the OA sector since this fishery is open-ended compared to the LE sector. It is difficult to estimate how many new participants that could enter the fishery as a result of increased trip limits, and thus the extent of increased OFS mortality.

Mortality of Rougheye, Blackspotted, and Shortraker Rockfish
Same as Option 1.

Impacts to Industry
Higher trip limits could increase harvest given the sizeable increase in the non-trawl allocation; although difficult to quantify, increased ex-vessel value could be expected as a result. Given the relative size of the fleet, changes as a result of this action may not have a large effect on the sectors as a whole, but could be of importance to some individuals in each sector.

B.10 Non-Trawl: Coastwide Sablefish Trip Limits

Need for Action
This section discusses projected landings and associated cumulative landing limits ("trip limits") for the four fixed gear sablefish, daily trip limit (DTL) fisheries. They include limited entry (LE) and open access (OA) fisheries, north and south of 36° North latitude. Hereafter, they will be referred to as follows: LE North, LE South, OA North, and OA South. The two northern fixed gear sablefish DTL fisheries account for approximately 13.5 percent of the northern sablefish ACL, while the southern ones account for approximately 58 percent of the southern ACL (during 2015, under the Preferred Alternative).

Proposed trip limits for 2015 and 2016 in these fisheries were produced GMT landing forecast models (described briefly below, and in detail in the 2011-2012 Groundfish Harvest Specifications Environmental Impact Statement; EIS).

While the tables show trip limits in this section as simply bimonthly, weekly, or daily, it is worth noting that the language in regulation applies each limit in a specific way when there is a mix of limits for the different time periods, within one fishery. This is the case for the two open access sablefish DTL fisheries. For example, the limits in regulation under No Action for the OA North fishery read as follows: "300 lb. per day or one landing per week of up to 800 lb., not to exceed 1,600 lb. per two months".

Analytical description
The purposes of this analysis are to produce and compare trip limits and predicted landings between the No Action Alternative and the other alternatives, for the four fixed gear, sablefish DTL fisheries. The ACLs, regional allocations, harvest guidelines and fishery landed shares vary among the alternatives.

Proposed trip limits under the alternatives for 2015 and 2016 were produced with the objective of keeping projected catch within the proposed management targets, which resulted from different values of the sablefish P-star (P*) and corresponding ACL, harvest guidelines, and shares for the areas north and south of 36° N. latitude. Forecasted landings under the action alternatives were intentionally constrained to between 90 and 95 percent of the landings share for each fishery, in order to produce trip limits which are likely to result in high attainment of the harvest guideline, while maintaining a sufficiently precautionary remainder; one that is appropriate for the uncertainty associated with use of the forecast models, and the accuracy of the estimated landings data used as model inputs. This strategy has been used over the past several years in inseason management, in the 2013-14 Groundfish Harvest Specifications EIS, and most recently in establishing trip limits for 2014, at the November, 2013 meeting of the Pacific Fishery Management Council (PFMC). These annual trip limit schedules can be adjusted through the inseason process as early as the preceding November meeting of the PFMC, as well as throughout the year, in order to account for updated data, or changes in science or policy.

Model description

The catch projection models used in this analysis are multiple linear regression models that relate trip limits and other predictor variables to bimonthly or monthly landings, separately for each fishery. They are also used for inseason management. Detailed descriptions of the models can be found in Appendix A. of the 2011-2012 harvest specifications EIS. Models were originally produced by members of the GMT, Oregon Department of Fish and Wildlife (ODFW), National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center (SWFSC) and Northwest Fisheries Science Center (NWFSC) in 2006 (limited entry) and 2009 (open access). Changes in model specification are made as needed over time, to increase accuracy of projections where possible. Changes since the 2013-14 harvest specifications include: Limited entry models were translated from SAS to R. In the LE North model, sablefish ex-vessel price (adjusted for inflation) was added as a predictor, separate regressions were carried out for each bimonthly period, and landings were predicted similarly to the open access models, where predicted landings equals predicted number of vessels participating, times the average landed catch per bimonthly period. The Producer Price Index from the U.S. Bureau of Labor Statistics for “fresh and frozen seafood” was used to deflate the time series of ex-vessel prices in the LE North model. New landings data through 2012 were added to all four models. The time range of data included in each model varies between from 2004-2012, to 2007-2012, depending on its information content for making projections. Accuracy of prediction varies among the four models. Of the four, the best fit of predicted to actual, bimonthly landings is produced by the LE North model, with an R^2 value of 0.956. Under the most recent data, the worst fit between predicted and actual landings comes from the LE South model, with an R^2 value of 0.528. We are still able to manage the LE South DTL fishery to a high level of attainment through inseason management and close tracking of data throughout the year, in spite of the relatively low model fit seen under the current data.

Model input data

Landings and catch data were acquired from PacFIN using the query “slct_ves_sabl_arid_DTL_tab_no_EFP.sql”. This query pulls vessel-daily landings data from tables that separate fixed gear, sablefish DTL landings from sablefish primary landings, on a vessel-daily basis, using software and an algorithm and developed by PacFIN and NWR staff in 2010 and 2011. For the LE North fishery, the software tracks landings accumulation by vessel, against their sablefish endorsed tier permits. If the vessel has active sablefish endorsed primary tier permits attached, the season is open, and there is room on the attached permits, landings are counted as primary. When either the tier permits on the vessel are exhausted, or the season ends, landings are then counted as DTL. The algorithm in the software adheres to the specific federal regulations concerning primary and DTL landings in 50 CFR 660.232.

Accounting for discards and discard mortality

Harvest guidelines applicable the sablefish DTL fisheries were reduced in order to account for discard mortality, which resulted in landed shares for use in projection modeling to predict landings, and determine necessary trip limits. A harvest guideline is defined as numerical management harvest objective which is not a quota. These are either cited in regulation or calculated from other higher level numerical management objectives appearing in regulation.

The applicable harvest guideline was multiplied by 16.6 percent (discard rate estimate), and by 20 percent (discard mortality rate estimate). Then that product (estimated dead discarded sablefish) was subtracted from the harvest guideline, resulting in a “landed share”, which projected landings should be beneath, in order to keep total catch within the harvest guideline. The estimated discard rate used by GMT was taken from the report “Estimated Discard and Catch of Groundfish Species in the 2012 US West Coast Fisheries”, by the West Coast Groundfish Observer Program, of the NWFSC. The discard mortality rate estimate was taken from information in Davis (2001, LTtp://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.2001.tb00495.x/abstract), Shirrippa and Colbert (2005, LTtp://www.pcouncil.org/wp-content/uploads/Sable05_complete.pdf), and Shirrippa (2007, LTtp://www.pcouncil.org/wp-content/uploads/Sable07v3_0.pdf). Shirrippa (2005) used experimental data and sea surface temperature to predict varying release mortality by gear. The GMT considered that Davis (2001) demonstrated high sensitivity to temperature and deck time, along with high variability of predicted discard mortality in Shirrippa (2005) informed by sea surface temperature data, and adopted an estimate of 20 percent. This value was also adopted by Taylor 2011 in the current sablefish stock assessment.

Values for landed shares among the alternatives

Landed share values for each of the DTL fisheries are shown by year, fishery and alternative below in Table B-62 and Figure B-24.

Table B-62. Landed shares for each of the fixed gear sablefish, DTL fisheries, used for making projections, under each of the alternatives.

	LE N	OA N	LE S	OA S
No Action 2014	214	319	483	393
Preferred Alternative 2015	236	388	531	432
Preferred Alternative 2016	258	425	581	472
Alt. 1 2015	247	406	555	451
Alt. 1 2016	269	443	606	492
Alt. 2 2015	202	333	455	370
Alt. 2 2016	223	367	503	409

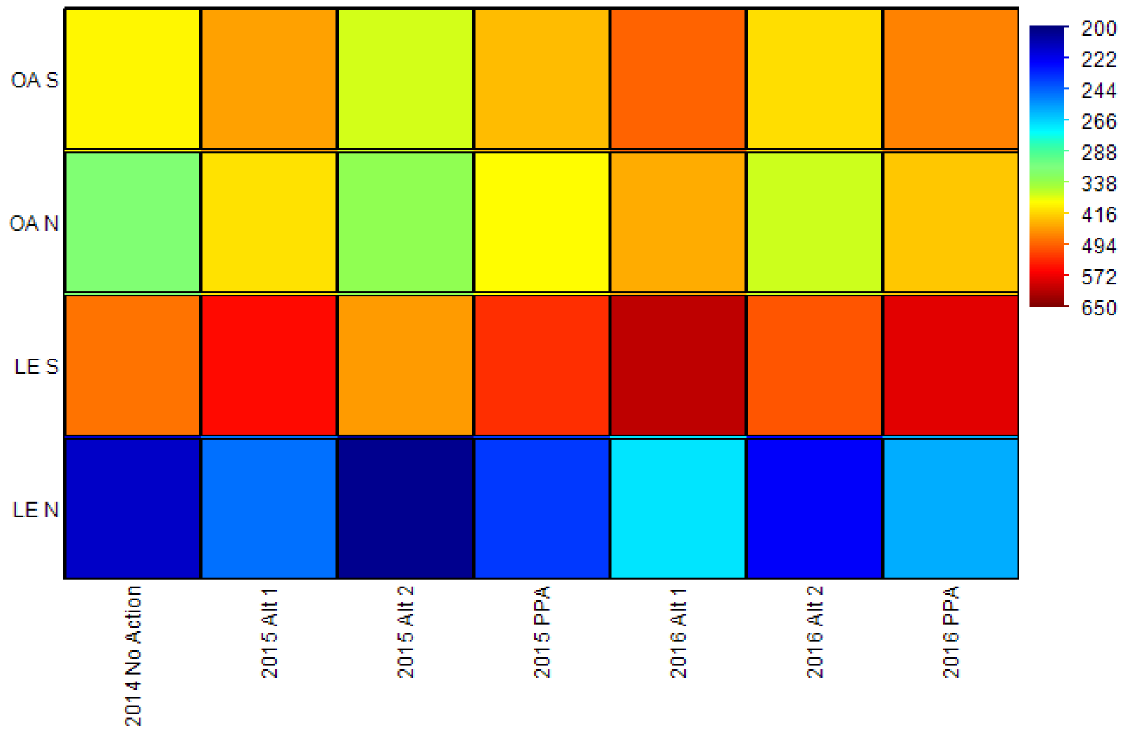

Figure B-24. Heatmap showing variation in potential landed shares used for making projections, for each of the fixed gear sablefish DTL fisheries, under each of the alternatives.

B.10.1 No Action Alternative

Area restrictions

Under No Action, the following RCA boundaries for use of fixed gear, from 2014 regulations, would remain in place for 2015 and 2016 (Table B-63, from Table 2 North, and South, to Part 660, Subpart E, Codified Federal Regulations).

Table B-63. Rockfish Conservation Area (RCA) boundaries for fixed gear, under the No Action Alternative.

Area	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
North of 46° 16'	shoreline - 100 fm line					
42° - 46° 16’	30 fm line - 100 fm line					
40° 10’ - 42°	20 fm depth contour - 100 fm					
34° 27’ - 40° 10’	30 fm - 150 fm line					
South of 34° 27’ (w/islands)	60 fm line – 150 fm line (also applies around islands)					

Trip limits and projected impacts under No Action

The No Action trip limit structures for 2014 in each fishery are presented in Table B-64. The No Action Alternative resulted in projected attainments ranging between 71 and 99 percent, using the best available data, and 2014 trip limits set in the November, 2013 council meeting (Table B-65). The aim throughout all the alternatives was to enable harvest of a high proportion of the landed share, yet accommodate uncertainty. The GMT and the Council considered, while constructing and adopting them, respectively, the uncertainty in the landings data (in terms of correctly separating sablefish DTL fishery landings from those of the sablefish primary fishery, and IFQ landings) along with uncertainty associated with making model-based projections.

These trip limits can be adjusted as needed inseason, to influence higher or lower catch as the year progresses. We strove to produce trip limits with a predictable and temporally uniform structure, which was appreciated by the GAP in their statement at the November 2011 council meeting, and subsequent meetings.

Table B-64. Trip limits for sablefish DTL fisheries under the No Action Alternative (2014).

Fleet	Area	Bimonthly limit	Weekly limit	Daily limit
LE	**N**	2,850	950	NA
OA	**N**	1,600	800	300
LE	**S**	NA	2,000	NA
OA	**S**	3,200	1,600	300

Projected attainment values for the four sablefish DTL fisheries under the No Action Alternative are within the range generally recommended by the Council, of between 90 and 95 percent, with the exception of the OA North fishery, which has a projected attainment of 99 percent, and the OA South fishery, which has been maintained at a lower level in recent years, partially to allow some buffer for the LE South fishery (Table B-65). The reason for the higher than usual projected attainment in the OA North fishery under Alternative 1 is that actual landings have been running much lower than projected for the past two years, under recent poor sablefish market conditions.

Table B-65. Model-projected landings under the No Action Alternative, for the fixed-gear, sablefish DTL fisheries. Landed shares and projected impacts are in metric tons (mt) of landed catch.

No Action	LE N	OA N	LE S	OA S	South sum
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Difference	9.6	2.3	45.2	113.3	158.5

B.10.2 Preferred Alternative – Sablefish Trip Limits

Preferred Alternative for 2015

Trip limits and projected impacts under the Preferred Alternative for 2015

The trip limit structures for each fishery in 2015 under Preferred Alternative are presented in Table B-66. Differences between Preferred Alternative and No Action limits also appear in the table. Trip limits are generally higher under Preferred Alternative than for No Action. Higher limits were needed to influence similar attainment, under the higher shares. Differences range from 25 lb per week smaller for the OA South, to 225 lb per two months higher in the LE North fishery.

Table B-66. Trip limits under the Preferred Alternative, No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2015. Limits are in lb of landed catch per time period listed.

		2015 Preferred			**No Action**			**Difference**		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	3,075	1,025	NA	2,850	950	NA	225	75	NA
OA	**N**	1,800	900	300	1,600	800	300	200	100	0
LE	**S**	NA	2,100	NA	NA	2,000	NA	NA	100	NA
OA	**S**	3,200	1,575	315	3,200	1,600	300	0	-25	15

Projected landings, attainment and remainder in 2015, under the Preferred Alternative are presented in Table B-67. The same metrics are also presented for the No Action Alternative, and the differences between these two alternatives, in the table.

Attainment rates are very similar between the Preferred Alternative and No Action with the exception of the OA North fishery for reasons explained in No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is consistently higher under the Preferred Alternative than No Action; between 15.4 mt and 58.4 mt higher, due to the higher trip limits, produced to influence similar attainment under the higher landed shares of the Preferred Alternative.

Table B-67. Model-projected landings under the Preferred Alternative, No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2015. Landed shares and projected landings are in metric tons (mt).

2015 Preferred	**LE N**	**OA N**	**LE S**	**OA S**	**South sum**
Projected landings	219.7	358.3	496.3	310.2	806.4
Landed share	236	388	531	432	963.0
Percent attainment	93%	92%	93%	72%	84%
Remainder	16.3	29.7	34.7	121.8	156.6
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	15.4	41.6	58.4	30.5	88.9
Landed share	22.0	69.0	48.0	39.0	87.0
Percent attainment	-2%	-7%	3%	1%	2%
Remainder	6.6	27.4	-10.4	8.5	-1.9

Preferred Alternative for 2016

Trip limits and projected impacts under Preferred Alternative for 2016

The trip limit structures in 2016 under the Preferred Alternative for each fishery are presented in Table B-68. Differences between the Preferred Alternative and No Action limits also appear in the table. Trip limits are generally higher under the Preferred Alternative than for No Action. Higher limits were needed to influence similar attainment under the higher shares. Differences range from 25 lb per week higher for the OA South, to 525 lb per two months higher in the LE North fishery. The daily limit for the OA North fishery remains unchanged under all alternatives.

Table B-68. Trip limits under the Preferred Alternative, No Action Alternative, and comparison between them, for the fixed-gear, sablefish, DTL fisheries for 2016. Limits are in lb of landed catch per time period listed.

		2016 Preferred			**No Action**			**Difference**		
fleet	area	bimo	week	day	bimo	week	day	bimo	week	day
LE	**N**	3,375	1,125	NA	2,850	950	NA	525	175	NA
OA	**N**	2,000	1,000	300	1,600	800	300	400	200	0
LE	**S**	NA	2,175	NA	NA	2,000	NA	NA	175	NA
OA	**S**	3,250	1,625	325	3,200	1,600	300	50	25	25

Projected landings, attainment, and remainder under the Preferred Alternative are presented in Table B-69. The same values for the No Action Alternative are also presented in the table, and the differences between these two alternatives.

Attainment rates are very similar between the Preferred Alternative and No Action with the exception of the OA North fishery, for reasons explained in No Action section; attainment rates are nearly equal for each fishery, among the action alternatives by design. The amount of landed catch projected is consistently higher under the Preferred Alternative than No Action; between 36.7 mt and 105.5 mt higher, due to the higher trip limits produced in order to influence the same attainment under the higher landed shares of the Preferred Alternative.

Table B-69. Model-projected landings under the Preferred Alternative, No Action Alternative, and comparison between them, in the fixed-gear, sablefish, DTL fisheries for 2016. Landed shares and projected landings are in metric tons (mt).

2016 Preferred	LE N	OA N	LE S	OA S	South sum
Projected landings	241.0	402.5	543.3	344.2	887.5
Landed share	258	425	581	472	1,053.0
Percent attainment	93%	95%	94%	73%	84%
Difference	17.0	22.5	37.7	127.8	165.5
No Action					
Projected landings	204.4	316.7	437.8	279.7	717.5
Landed share	214	319	483	393	876.0
Percent attainment	95%	99%	91%	71%	82%
Remainder	9.6	2.3	45.2	113.3	158.5
Difference					
Projected landings	36.7	85.8	105.5	64.5	170.0
Landed share	44.0	106.0	98.0	79.0	177.0
Percent attainment	-2%	-5%	3%	2%	2%
Remainder	7.3	20.2	-7.5	14.5	7.0

B.11 Recreational: Canary Rockfish Sub-Bag Limit in Oregon Fisheries

Need for Action

Although the canary rockfish stock is a category 1 stock, some unresolved problems and uncertainties have been identified in the stock assessment. The current stock abundance is relatively uncertain. In part this is because the only measure of relative abundance does not occur in the primary habitat (rocky reef) of canary, and many other, rockfish. Future stock abundances are also uncertain because the bottom trawl survey primarily catches very large (and old) canary rockfish, which means recruitment events (of young individuals) are difficult to determine or verify. The last full assessment (Stewart 2009) indicated that historical and current relationship between canary rockfish distribution and habitat features should be investigated to provide more precise estimates of abundance from the surveys, and to guide survey augmentations that could better track rebuilding through targeted application of newly developed survey technologies.

Uncertainties of the current and future abundance of the canary rockfish stock could be improved if recreational groundfish fishery data were available. The recreational fishery occurs almost entirely over rocky reef habitats, therefore the recreational fishery catch rates could be used to provide an index of relative abundance (catch per unit effort; CPUE) of canary rockfish from their primary habitat. Additionally, since recreational fishery gears catch smaller and younger canary rockfish than trawls, biological data from the recreational fishery could be used to better detect recruitment events needed to better track rebuilding.

For recreational fishery catch to aid in the data used for future canary rockfish stock assessments, retention of canary rockfish would have to be permitted. Since anglers are currently required to discard all canary rockfish catch, biological samples are currently obtained from infrequent illegal landings. The number of canary rockfish reported to have been discarded by anglers is too uncertain to be used as a CPUE index in an assessment. Allowing retention so dockside creel samplers can verify the species and collect and biological samples could address some of the stock assessment uncertainty.

Determine or verify future canary rockfish abundances (recruitment)
Since there is a large gap in sizes and ages of canary rockfish caught by trawl surveys used in the assessment, it takes at least ten years to verify recruitment signals using NWFSC bottom trawl survey data alone; the SWFSC pre-recruit pelagic trawl survey catches Age-0 fish and the NWFSC bottom trawl survey is selective for 40-50 cm fish (based on peak of length frequency distributions), which roughly corresponds to females Age-10 and older (Wallace and Cope 2011).

Since recreational gears are selective for intermediate size and age fish relative to the trawl surveys (> 30 cm; Figure B-25), recruitment signals from the pre-recruit survey could be verified in as few as three to five years (corresponding ages for 30 cm females) by using biological data from the recreational fishery (instead of ten years for the bottom trawl).

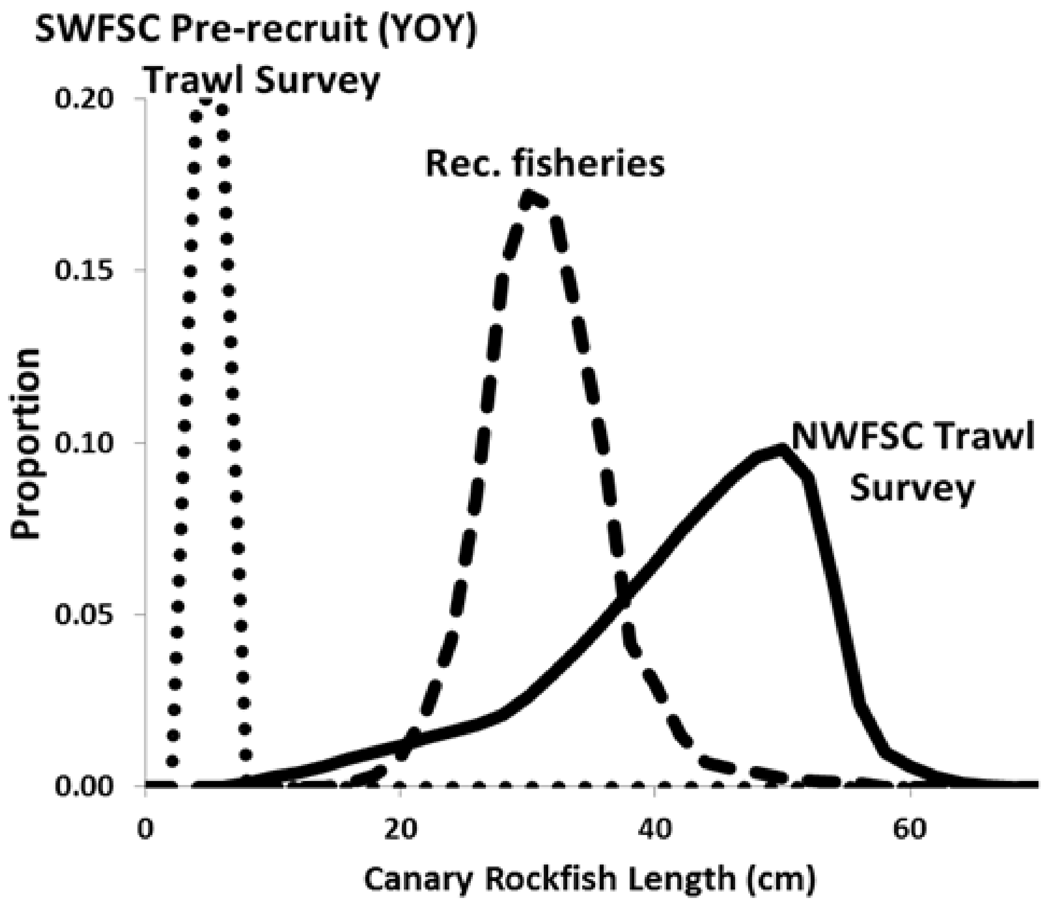

Figure B-25 Canary rockfish length frequency comparison for the trawl surveys and the recreational fisheries. NFWSC curve is an approximation for combined sexes from 2003-2010, from Figure 11 of the Canary rockfish assessment (Wallace and Cope 2011). Recreational data from RecFIN query, 2006-2013; OR, WA, and CA (pooled due to infrequency of (illegal) catches).

Increase accuracy of removals
Allowing retention of canary rockfish in the recreational fisheries could improve the accuracy of canary rockfish removal estimates because catches could then be landed and verified by dockside creel samplers. In contrast, anglers are currently required to discard all canary rockfish encountered, and angler reported

data is consequently needed to determine discard mortality. Potential sources of uncertainty in discard mortality estimates from angler reported data include: (1) misidentification of the species discarded (2) misreporting of the quantity released and (3) misreporting of the factors that affect which discard mortality rate will be applied to their discards (i.e., depth of capture and if a descending device was used).

Allowing retention of canary rockfish may be a cost-effective and, viable solution to improving removal estimates. For example, it would be impractical and unsafe to require small private recreational boats (generally less than 22 feet) to carry observers to monitor discards.

Though canary rockfish has a coastwide OFL and ACL, each state's recreational fishery has its own HG. And each of the West Coast states manages their recreational groundfish fishery independently of each other (e.g. season length, bag limits) to stay within their HG. Therefore analysis of allowing canary rockfish retention was completed on a state by state basis. Under the Preferred Alternative, canary retention was selected only for the Oregon recreational fisheries. As such, the description of the Preferred Alternative is described below whereas the analysis for Washington and Oregon is contained in the Considered but Rejected for Implementation Section, B.20.

Management options

Status Quo**:** Retention of canary rockfish will remain prohibited in the Oregon recreational fisheries.

Option 1**:** One canary rockfish per day, which will be a sub-bag limit of the miscellaneous groundfish daily bag limit of ten (includes rockfish, cabezon, greenlings, elasmobranchs) in the Oregon recreational fisheries.

Option 2**:** Up to ten canary rockfish per day, as part of the federal miscellaneous groundfish daily bag limit, may be reduced under state regulations (currently seven fish) in the Oregon recreational fisheries.

Abundance index of canary rockfish from their primary habitat (rocky reef)off of Oregon
Currently, the only index of relative abundance used in the canary rockfish stock assessment (for adults), the NWFSC bottom trawl survey, occurs in marginal habitat utilized by the species (i.e., sand or flat bottom; Love 2002; Johnson et al. 2003) and does not appear to be detecting a possibly increasing population trend occurring in their primary habitat (i.e., rocky reef). Since 2008 catch frequencies on Oregon recreational groundfish trips, which occurs over rocky reef in all depths, have increased while they have remained stable for trawl survey tows (Figure B-26).

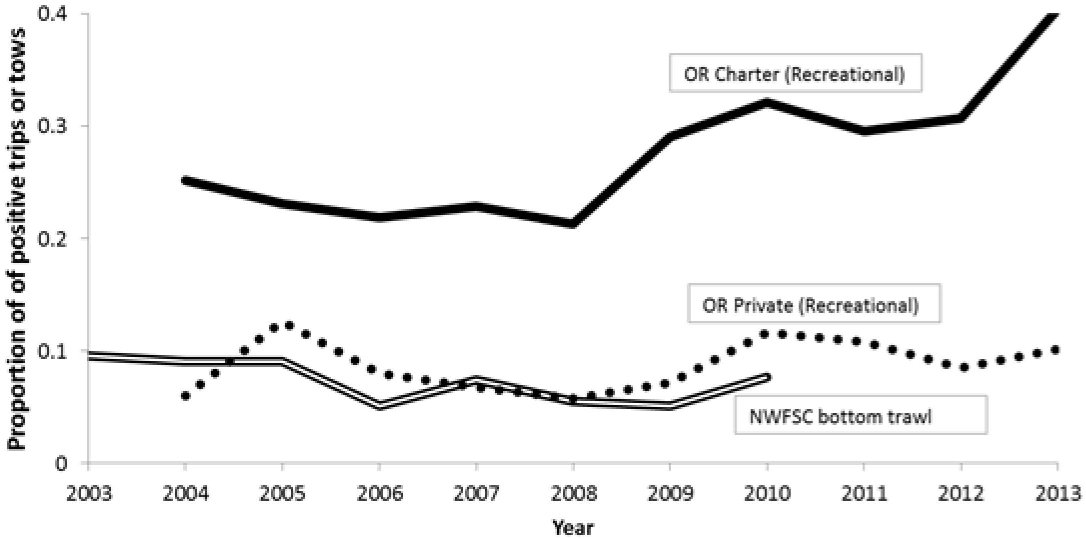

Figure B-26. Comparison of canary rockfish relative abundances from marginal habitat (sand and flat bottom; NWSFC bottom trawl survey) and primary habitat (rocky reef; OR charter and OR recreational groundfish fisheries).

Although the Oregon recreational groundfish fishery provides a measure of relative abundance of canary rockfish in their primary habitat, it has not been used as an index in assessments because it is based on uncertain data (David Sampson, Oregon State University, personal communication). If this uncertainty were resolved by allowing retention of canary rockfish (catches would be landed and verified by creel samplers), then a recreational index of abundance could potentially be incorporated into the canary rockfish assessment, in a similar fashion as used in the black rockfish assessment (logistic regression; Sampson 2007).

There would be minimal to no additional costs to management to develop a recreational CPUE index of abundance for canary rockfish, as the marine recreational creel survey already obtains the necessary data (assuming retention was allowed) for catch and effort accounting. Further, a recreational canary rockfish index of abundance would be robust due to high sample sizes (~9,000-10,000 recreational groundfish interviews per year), year-round coverage, and fine spatial data (i.e., by depth and reef quadrant). Given this wide-scale temporal and fine spatial coverage, it may be possible to apply a post-hoc survey design to the data (e.g., randomly selecting 100 samples from each reef area by a time period).

In order for a recreational canary rockfish catch per unit effort (CPUE) index to be indicative of population trends (and therefore useful to the assessment), fishing behavior would have to be relatively standardized (e.g., would be difficult to determine population trends if some targeted canary rockfish while others did not). By limiting the canary rockfish to one per angler per day, there would less incentive for anglers to target them, and a relatively standardized fishing behavior would be expected (harvests would be from incidental catches). Additionally, post-hoc methods could be used to standardize fishing behavior by limiting catch rate comparison to similar locations (reef block and depth), times, boat types (charter or private), and even by individual vessels (sample data contains unique vessel information; name of boat for charters and registration number for private boats).

No increase to the projected rebuilding time

The Oregon recreational fishery is projected to remain within the most recent canary rockfish HG (11.1 mt in 2014) for all canary rockfish harvest alternatives (Table B-70), and by doing so, no delays to the projected rebuilding time would occur (assume full attainment of ACLs). The projected difference in mortality between non-retention (3.1 mt; bag limit=0) and a one fish sub-bag limit (8.1 mt) is attributed to the infrequency of canary rockfish catches by recreational anglers. Since 2009, 73 percent (13,536 of 18,703) of canary rockfish caught by recreational anglers has been from trips where the number of anglers outnumbered the canary rockfish catch (Figure B-27). Accordingly, all of those canary rockfish would have been legal to harvest had the bag limit been one. And had they kept their catch, the discarded mortality impacts from released fish would have been greatly reduced (3.0 mt vs. 0.8 mt, respectively), since their discarded dead catch would have been converted to harvested dead catch.

Since most of the catch comes from trips where anglers catch fewer than one canary rockfish per person, an increase in the bag limit from one to seven[14] (8.1 mt vs. 9.5 mt, respectively) is projected to have much less effect on mortality (Table B-70); only 24 percent (4,548 of 18,703) of past canary rockfish catch has been from trips where anglers caught greater than one but less than or equal to seven canary rockfish (Figure B-27). A bag limit of seven would result in the conversion of near all discarded catch to harvested, as 97 percent of canary rockfish caught by recreational anglers have been from those who caught seven of fewer. The only remaining discards would come from the very infrequent large volume catches 'lightning strikes'.

Projections of catch if retention were permitted are based on the assumption that no targeting would have occurred, as anglers did not have incentive to catch them in the past due to the harvest prohibition. While it is unrealistic to assume that no targeting will occur, targeting is expected to be minimal because canary rockfish catches are greater in deep depths (>30 fm; Figure B-28), and to maximize their catch rates, they would have to leave the shallower depths where the catch rates of their primary target species (black rockfish) and others are greatest. Further, the majority of recreational anglers tend to fish seaward of 30 fm (76 percent) when they are permitted to fish all-depths. In short, in order to target canary rockfish, they would be paying more in fuel, driving further, and leaving the most productive shallow depths.

Table B-70. Projected canary rockfish total (grey boxes), discard, and harvest mortality for each harvest option. Projected harvests (# of fish) are shown to demonstrate sample sizes of biological samples that may be attained by allowing retention. (The current bag limit of seven fish in Oregon state regulations was used for this analysis, rather than the ten fish bag limit in federal regulations)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
	Projected (fish)	237	298	714	803	1455	1887	2300	2584	1081	535	124	77	12096	
Bag=0	Discard Mortality	0.07	0.09	0.21	0.17	0.41	0.47	0.53	0.62	0.23	0.16	0.04	0.02	3.0	Total=3.1 mt
	Harvest Mortality	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	
	# Harvested													125	
Bag=1	Discard Mortality	0.02	0.02	0.05	0.04	0.10	0.12	0.13	0.16	0.06	0.04	0.01	0.01	0.8	Total=8.1 mt
	Harvest Mortality	0.14	0.18	0.43	0.48	0.87	1.13	1.38	1.55	0.65	0.32	0.07	0.05	7.3	
	# Harvested	178	224	536	602	1091	1415	1725	1938	811	401	93	58	9072	
Bag=7	Discard Mortality	<0.01	<0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	<0.01	<0.01	0.1	Total=9.5 mt
	Harvest Mortality	0.18	0.23	0.55	0.62	1.13	1.46	1.78	2.00	0.84	0.41	0.10	0.06	9.4	
	# Harvested	229.49	288.56	690.91	776.62	1407.2	1824.7	2223.7	2498.9	1045.5	517.33	119.95	74.509	11697	

[14] The current bag limit specified in Oregon state regulations, in federal regulations the bag limit is ten.

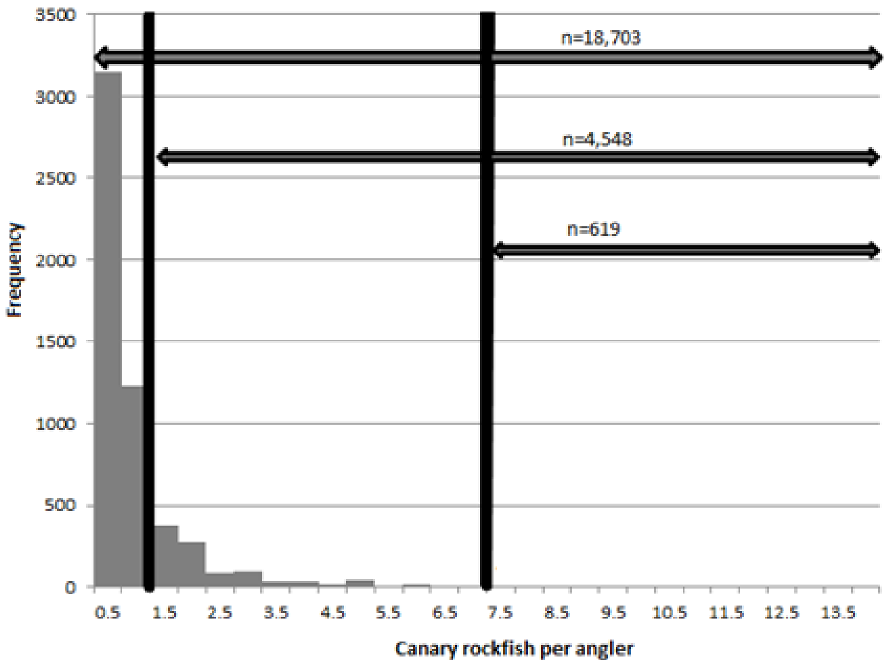

Figure B-27. Canary rockfish catch rate (bars) frequencies for trips that caught one or more and the corresponding quantity of canary rockfish associated with those trips (numbers by arrows), 2009-current.

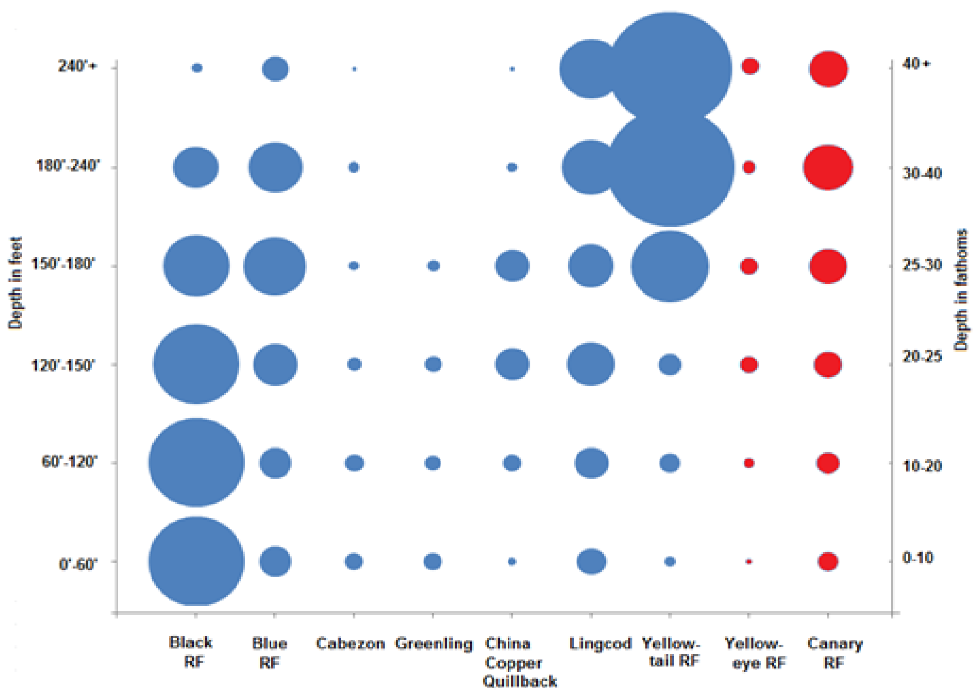

Figure B-28. Relative catch rates by depth of overfished species and harvestable species constituting the bulk of recreational fishery landings.

<u>Projection methods</u>

Canary rockfish mortality was projected for the harvest options via application of a conversion factor (Formula 1) to the output of the canary rockfish mortality model (of the Oregon recreational groundfish model). The conversion factor converted discarded catch of canary rockfish from historic trips to harvested catch up to the boat limit (aggregate of individual bag limits) and any catch in excess of the boat limit remained as discarded (retention was modeled at a boat level because anglers continue to fish and share their catch until the bag limits of all have been caught). For example, if the bag limit was one and seven anglers discard five canary rockfish, then five were converted to harvested (boat limit) and two remained as discarded (excess of boat limit).

Formula 1: Conversation factor applied to the canary rockfish mortality model to project mortality of canary rockfish if harvest (H) were permitted. M=Mortality; H=harvested (1 or 7); CR=Canary rockfish per angler.

$$M_{Baglimit(H)} = \text{Discard } M_{BagLimit=0}\left[\frac{\#Fish_{CR > Baglimit(H)}}{\#Fish_{Baglimit=0}}\right] + \#Fish_{Baglimit=0}\left[\frac{\#Fish_{CR \leq Baglimit(H)}}{\#Fish_{Baglimit=0}}\right]\left[\frac{\text{FishWeight (kg)}}{\text{.001 (kg to mt)}}\right]$$

Reduces discarded catch due to harvest | ***Converts discarded catch to harvest catch***

Reduce waste of the resource

As previously described in the projected impact section, allowing harvest converts discard mortality (waste) to harvest mortality. Instead of wasting 3.0 mt of canary rockfish by prohibiting retention, this could be reduce to 0.8 mt with a bag limit of one and 0.1 mt with a bag limit of seven (the current bag limit in Oregon state regulations). A sub-bag limit of one fish should prevent most targeting of canary rockfish, while allowing retention of those canary rockfish that are incidentally encountered. A bag limit of up to seven (state regulation) or ten (federal regulation) could change angler behavior, such as targeting areas of canary rockfish. Additionally, allowing retention of incidentally encountered canary rockfish could aid anglers in filling their bag with less time on the water.

Possible reduction of impact to healthy species

The following rationale has been proposed by anglers: canary rockfish are "abundant", and if allowed to keep one, impacts to other harvested groundfish species would be reduced by 14 percent; as anglers could substitute one of the seven fish they are allowed to catch (current bag limit) with a canary rockfish (thereby reducing impacts by $1/7^{th}$ or 14 percent).

This reduction *would only apply to trips in which both a bag limit attainment and catch of canary rockfish occurred*. Since limits only occur in less than 20 percent of trips (19.4 percent; 6,371 of 32,769 trips; Figure B-29) and canary rockfish are only caught during 13 percent of trips that had limited (828 of 6,371), the projected reduction in catch of harvestable species by allowing canary retention is only 0.3 percent (19.4 percent x 13 percent x 14 percent), not the hypothesized 14 percent. In short, the $1/7^{th}$ reduction in catch from allowing canary retention would only apply to the 2.5 percent of trips that limit and have canary rockfish catch.

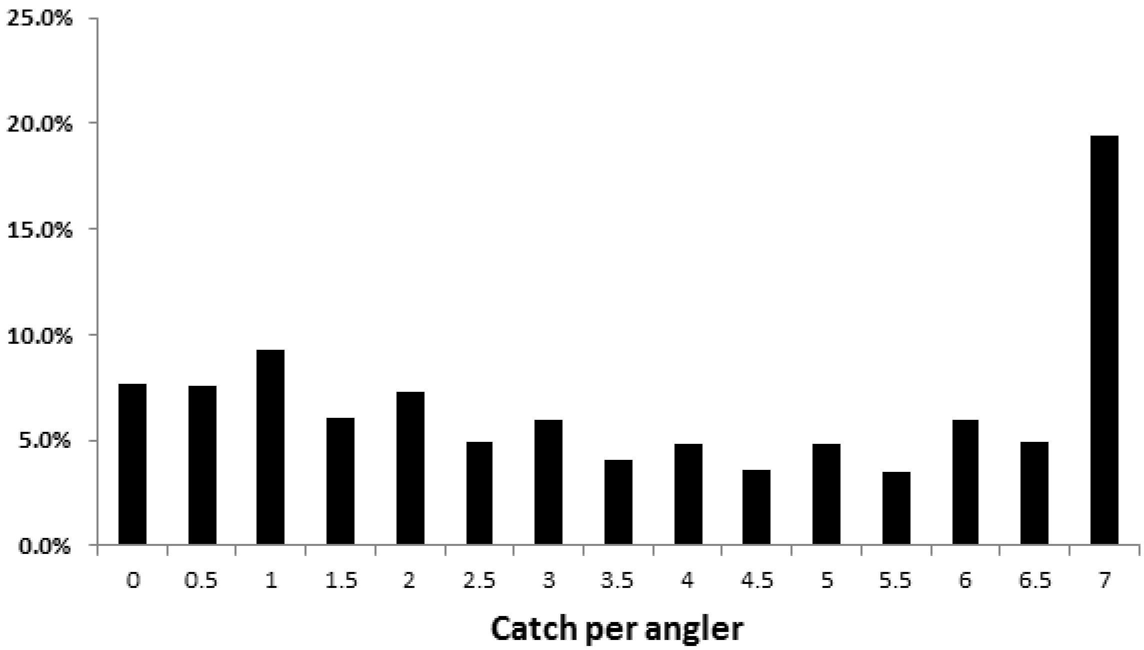

Figure B-29. Percentage of angler trips that caught 0-7 miscellaneous groundfish bag limit. Data is from 32,769 bottomfish trips that occurred from 2009-2013.

Discussion
The potential new recreational fishery data sources could be acquired without additional monetary costs (i.e., dockside creel survey needed to collect the data already exists) or delays to the projected rebuilding times of canary rockfish. No delays to the projected rebuilding times would be expected because the recreational fishery currently only obtains a fraction of the harvest guideline (e.g., 29 percent of the Oregon recreational HG in 2013) and could therefore continue to stay within the harvest guideline even if several thousand canary rockfish were landed (rebuilding analyses assume 100 percent of ACLs harvested).

In summary, allowing retention of canary rockfish in the recreational fishery could be a simple, cost-effective, and impact neutral (to projected rebuilding times) method to increase the understanding of canary rockfish, and therefore provide the Council better information to manage of one the most important groundfish stocks.

B.12 Retain groundfish, lingcod only, or flatfish only during the Pacific halibut fisheries

Need for Action
Recreational Pacific halibut anglers have expressed a desire to change the regulation that prohibits them from harvesting groundfish on “all-depth” days (while in possession of a halibut). Many anglers have stated that they travel 15-30 miles offshore for halibut and fish in waters 100 fm (600 feet) or greater. Going that far, they would like to be able to retain more than just one halibut (e.g. other species

incidentally encountered) Additionally, after reeling up a lingcod, or other bottomfish, from those depths they would like to be able to retain them, for their efforts. Anglers participating in the groundfish fishery are allowed to keep halibut incidentally encountered on days when the nearshore halibut fishery is open. The reasoning for the groundfish retention prohibition on "all-depth" days is unclear to anglers because it does not pertain to groundfish that can be harvested, but rather as a means to reduce discard (catch-and-release) mortality of overfished species, specifically yelloweye rockfish.

In order to keep yelloweye rockfish mortality within sector-specific limits, regulations to limit how often recreational anglers fish deep water reefs (>40 fm; 240 feet) are used as the primary management tool; anglers fishing deep reefs more commonly encounter yelloweye rockfish than those fishing shallower reefs, and a higher percentage of those released die due to barotrauma inflicted injuries. The additive effects of high catch rates and high discard mortality rates are too excessive to provide anglers much opportunity to fish deep water reefs, and still keep the groundfish fishery open year round.

Since groundfish anglers target reefs, depth restrictions are used to prevent groundfish anglers from fishing deep reefs during the greatest effort months (April-September). Halibut anglers are permitted to fish beyond the groundfish depth restrictions because this is where the fishery has historically occurred, and because halibut anglers actively avoid reefs (to prevent gear loss and because halibut fishing is better over gravel or sand habitat). The regulation prohibiting retention of groundfish is used to prevent anglers from also targeting groundfish (over the deep reefs) during their halibut trip. Allowing retention of groundfish by halibut anglers on "all-depth" days while intended to allow retention of incidentally encountered groundfish while halibut fishing, could also create a loophole allowing anglers to target groundfish any depth they choose under the guise of 'halibut fishing' on "all-depth" days, and reducing the effectiveness of the groundfish depth restrictions.

If allowed to retain groundfish, some halibut anglers would be expected to (and have told state agency staff that they would) target deep water reefs because they are already in the area and because there is a perception that trophy lingcod (highly desirable to recreational anglers) are more common over deep reefs than shallow water reefs.

Due to somewhat different regulations and fishing behaviors between the Washington and Oregon Pacific halibut fisheries, analysis for each state are separated below.

B.12.1 Washington

Recreational halibut fisheries in Washington are restricted to reduce encounters with overfished species, particularly yelloweye rockfish. Depth restrictions are the primary tool used to reduce encounters with overfished species. Depth by management area become more prohibitive as you move from south to north along the coast due to increasing rocky relief habitat along the northern Washington coast and the increased likelihood of encounters with yelloweye and canary rockfish. While groundfish fisheries are restricted to the nearshore area, recreational halibut fisheries are permitted in the deeper water because this is where the largest concentrations of halibut occur. To reduce encounters with yelloweye and canary rockfish during the recreational halibut fishery, groundfish retention restrictions are in place; these restrictions vary by management area. In the North Coast management area (Neah Bay and La Push), groundfish retention is prohibited seaward of 20 fm from May 1 through September 30 with the exception that lingcod, Pacific cod and sablefish can be retained on days open to recreational halibut fishing. In the south coast (Westport), lingcod retention is allowed seaward of the 30 fm depth restriction, which is in place from March 15 through June 15, on days the recreational halibut fishery is open. In the Columbia River management area (Ilwaco/Chinook), only sablefish and Pacific cod are allowed with halibut on board from May 1 through September 30.

Season length also varies by management area (Table B-71). Recreational halibut seasons in recent years in the North Coast (Neah Bay and La Push) and South Coast (Westport) management areas typically last fewer than 10 days; the halibut season lasted four days in the North Coast and five days in the South Coast in 2013. In contrast, the Columbia River area recreational halibut season has lasted from May through September for the most recent seasons. Even though the North and South Coast management areas include more habitat typically associated with yelloweye and canary rockfish, the short season length limits the opportunity for encounters with overfished species during the recreational halibut fishery.

Table B-71. Recreational halibut season length (days) by management area.

	2009	2010	2011	2012	2013
North Coast (Neah Bay / La Push)	6	7	8	7	4
South Coast (Westport)	11	7	7	5	5
Columbia River	37	48	40	60	66

Management Measures by Area

Recent changes to groundfish retention management measures associated with the recreational halibut fisheries in the North and South Coast management areas may provide insight when considering groundfish retention during the recreational halibut fishery in areas such as the Columbia River where it is currently prohibited (with exception of Pacific cod and sablefish).

South Coast (Westport)

In 2010, changes to the Pacific Fishery Management Council's Pacific Halibut Catch Sharing Plan were implemented that allowed lingcod retention in the area seaward of the 30 fm depth restriction on days open to the recreational halibut fishery. Prior to 2010, only Pacific cod and sablefish could be retained seaward of 30 fm from May 1 through June 15 (reflecting the time period that the primary halibut fishery would likely be open). An additional management measure change that permitted rockfish retention seaward of the 30 fm depth restriction was analyzed in the 2011-2012 Harvest Specification and Management Measures Environmental Impact Statement and implemented in 2011. Table B-72 summarizes the most common groundfish encountered (retained and released groundfish) on recreational halibut trips in the South Coast (Westport) management area from 2006 through 2013. Black rockfish and lingcod make up the bulk of groundfish encountered during recreational halibut trips in the South Coast region.

Table B-72. Groundfish encounters (retained + released) per 100 recreational halibut angler trips in the South Coast management area.

Species	2006	2007	2008	2009	2010	2011	2012	2013
Black RF	273	134	100	157	95	73	84	151
Lingcod	35	23	59	43	73	135	119	82
Spiny dogfish	2	23	6	11	28	4	3	3
Yellowtail RF	6	4	6	6	15	13	8	2
Misc.	3	3	5	6	5	6	2	2
Quillback RF	5	3	6	3	0	1	2	1
Flatfish	1	1	1	1	6	2	1	4
Canary RF	0	0	4	1	1	2	3	2
Yelloweye RF	0	0	2	2	1	1	2	3
Bocaccio	0	0	3	0	0	1	0	0

Average groundfish encounters during the four years prior (2006-2009) to the management change allowing lingcod retention on halibut trips is compared groundfish encounters during the four years after (2010-2013) (Table B-73). Allowing lingcod retention seaward of the 30 fm depth restriction on days open to the recreational halibut fishery increased the number of lingcod retained as expected but following the management change, encounters with yelloweye and canary rockfish doubled on average.

Table B-73. Groundfish encounters (retained + released) per 100 recreational halibut angler trips in the South Coast management area.

Species	Avg. 2006-2010	Avg. 2010-2013
Black RF	166	101
Lingcod	40	102
Spiny dogfish	11	10
Yellowtail RF	6	9
Misc.	4	4
Quillback RF	4	1
Flatfish	1	3
Canary RF	1	2
Yelloweye RF	1	2
Bocaccio	1	0

North Coast (Neah Bay and La Push)

In 2013, groundfish regulations were changed through inseason action to address increased yelloweye rockfish encounters in the North Coast management area. The change revised the time period that groundfish retention seaward of 20 fm is prohibited from June 1 through September 30 to May 1 through September 30. In addition, because encounters with yelloweye rockfish primarily increased in the recreational halibut fishery, groundfish retention during the recreational halibut fishery was changed from allowing all groundfish seaward of 20 fm on days open to halibut fishing to limiting groundfish retention to lingcod, sablefish and Pacific cod on days open to the recreational halibut fishery.

Similar to the South Coast management area, black rockfish and lingcod are the most common groundfish encountered on recreational halibut trips. Changes in 2013 to revise the length of time the depth closure is in place and limit the amount of groundfish that can be retained on halibut trips did reduce encounters with yelloweye rockfish compared to the average per angler encounter rate between 2009 and 2012 (Table B-74). In addition to somewhat lower encounter rates of yelloweye rockfish after the management change, in 2013 61 percent of the yelloweye rockfish were encountered in waters deeper than 20 fm compared to 83 percent in 2012, reducing the total morality of yelloweye on recreational halibut trips.

Table B-74. Groundfish encounters (retained + released) per 100 halibut angler trips in the North Coast management area.

Species	2009	2010	2011	2012	Avg. 09-12	2013
Lingcod	123	139	166	149	*144*	131
Black RF	134	124	122	138	*130*	149
Yelloweye RF	9	9	9	14	*10*	9
Yellowtail RF	7	9	9	8	*8*	3
China RF	5	6	6	8	*6*	8
Bocaccio	8	3	7	7	*6*	6
Cabezon	5	6	6	8	*6*	5
Kelp greenling	4	10	3	5	*6*	7
Quillback RF	3	6	5	5	*5*	2
Canary RF	3	3	4	6	*4*	5
Spiny dogfish	4	3	3	3	*3*	2
Flatfish	3	3	2	2	*3*	1
Blue RF	1	7	3	1	*3*	1
Copper RF	2	1	2	3	*2*	2
Misc.	2	3	2	2	*2*	2
Vermillion RF	1	1	1	2	*1*	1
Pacific cod	0	1	3	2	*1*	1

Columbia River

Management measures associated with groundfish retention on recreational halibut trips in the Columbia River area have remained unchanged since 2005 with only Pacific cod and sablefish allowed when a halibut is on board from May 1 through September 30. There are no depth restrictions associated with the recreational groundfish fishery in this area as there are in the North Coast and South Coast management areas. In 2012, a lingcod restriction was implemented to reduce encounters with yelloweye rockfish associated with anglers targeting lingcod in deep water in the Columbia River area.

The species composition of groundfish encountered on recreational halibut trips in the Columbia River area is different than what is reported in the North Coast and South Coast management areas with Spiny dogfish and flatfish comprising a large proportion of the groundfish encountered (Table B-75). Overfished species encounters on recreational halibut trips are lower in the Columbia River area than in the North Coast and South Coast management area (Table B-76).

Recently, anglers have expressed interest in revising regulations to allow lingcod retention during the recreational halibut fishery in this area.

Table B-75. Groundfish encounters (retained + released) per 100 halibut angler trips in the Columbia River management area.

Species	2009	2010	2011	2012	2013
Spiny dogfish	25.45	50.13	11.66	20.64	11.91
Flatfish	20.49	14.89	2.60	8.21	8.98
Lingcod	4.90	8.04	9.10	17.97	11.40
Misc.	2.83	5.87	8.53	13.05	10.27
Black RF	0.19	2.69	0.69	3.62	12.52
Yellowtail RF	1.70	2.91	9.52	3.53	0.31
Gen RF	1.81	5.98	0.63	2.14	0.00
Bocaccio	0.00	0.17	0.69	0.17	0.16
Cabezon	0.37	0.00	0.00	1.15	0.00
Canary RF	0.37	3.23	0.47	1.46	0.78
Gen cod	2.43	1.52	0.62	0.89	0.00
Pacific cod	0.72	0.17	1.62	1.27	0.00
Yelloweye RF	0.33	0.70	0.46	0.99	0.31
Vermillion RF	0.00	0.56	0.00	0.44	0.63
Kelp greenling	0.66	0.00	0.00	0.18	0.31
Quillback RF	0.00	0.00	0.00	0.77	0.00

Table B-76. Overfished species encounters (retained + released) per 100 halibut angler trips by management area (average 2009-2013).

	Yelloweye	Canary
North Coast	10	4
South Coast	2	2
Columbia River	0.56	1.26

Summary

In Washington, due to the regional variability in encounters with all groundfish species, including overfished species and regional differences in the length of the recreational halibut season, consideration for allowing groundfish retention during recreational halibut fishing should be evaluated on a management area basis.

Encounters with yelloweye and canary rockfish on recreational halibut trips is lower in the Columbia River management area than in other areas and expanding the groundfish species allowed on halibut trips might be a viable alternative for the recreational halibut fishery that occurs in this area along the Washington coast. However, this management area extends to Cape Falcon, Oregon and so it is important to consider groundfish encounters in the Oregon recreational halibut fishery which may be different from the Washington recreational fishery. In addition, each state has separate harvest guidelines for yelloweye and canary rockfish and allowing retention of these overfished species would have to be evaluated to include trade-offs to other fishing opportunities in other management regions in both sates depending on each states projected attainment of their state specific harvest guidelines.

It is difficult to project whether or not anglers would spend more time fishing in deepwater areas targeting groundfish such as lingcod where encounters with overfished species is higher if retention were allowed on recreational halibut trips. But, analysis of the recent changes to management measures in the North Coast and South Coast suggest that encounters with overfished species is likely to increase.

B.12.2 Oregon

Although many halibut anglers would be expected to target groundfish is allowed to do so (and some have told ODFW staff that they would), the actual percentage that would is unknown. Therefore, additional yelloweye rockfish impacts by allowing retention of groundfish were projected across a wide range of percentages (of halibut anglers that would also target groundfish; Figure B-30). If none of the halibut anglers targeted groundfish, no additional yelloweye rockfish impacts would be expected to occur from the halibut fishery; however, the impacts could be substantial if a greater percentage of targeting occurs. For example, yelloweye rockfish mortality from the Oregon halibut fishery would be expected to increase to 1.4 mt (from 0.8 mt) if as few as 20 percent of anglers targeted groundfish during halibut trips. If this percentage increases to 75 percent, then yelloweye rockfish impacts from the halibut fishery alone are expected to exceed the 2013 harvest guideline level (similar to the HG for 2015 and 2016) for all Oregon recreational fisheries.

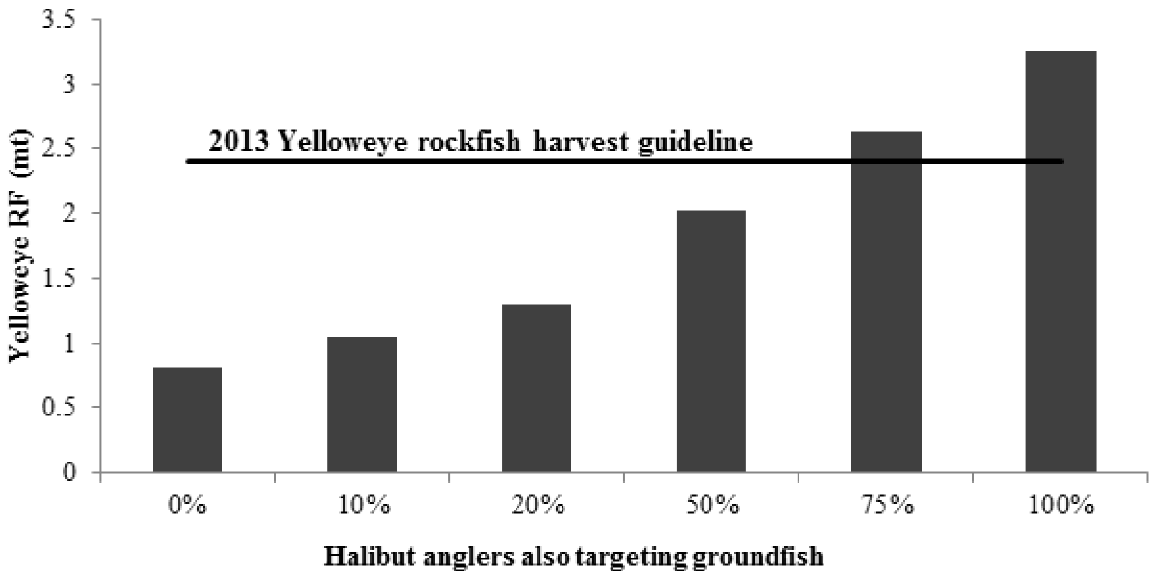

Figure B-30. Projected mortality of yelloweye rockfish from the Oregon recreational halibut fishery if halibut anglers were allowed to retain groundfish during halibut trips for various degrees of targeting of groundfish by halibut anglers. Since the percentage of anglers that would target groundfish during their halibut trip is unknown, mortality is shown for a wide range of targeting. The horizontal black line represents the 2013 harvest guideline for all Oregon recreational fisheries.

Since there is currently little room for any additional yelloweye rockfish mortality, sacrifices would likely have to be made to the recreational groundfish fishery, in the form of more restrictive regulations, in order to allow retention of groundfish by halibut anglers. While further regulations would come at great costs to groundfish anglers (e.g., shorter seasons, lesser bag limits, more restrictive depths), the benefits to halibut anglers are expected to be minimal. Allowing halibut anglers to retain incidental groundfish catches does not provide much benefit because these catches are infrequent (based on angler reports to ORBS to be 0.3 fish per halibut trip) and primarily consist of species that are overfished or non-desired (e.g., sharks, skates, and arrowtooth flounder; Figure B-31). Although anglers would be pleased if allowed to retain desirable species, such as lingcod or petrale sole, their trip satisfaction is much more dependent on whether or not they catch a halibut, their primary target. Further, allowing retention of groundfish would not increase halibut effort (the best measure of value of recreational fisheries) because the fishery is already at full capacity (quotas always caught).

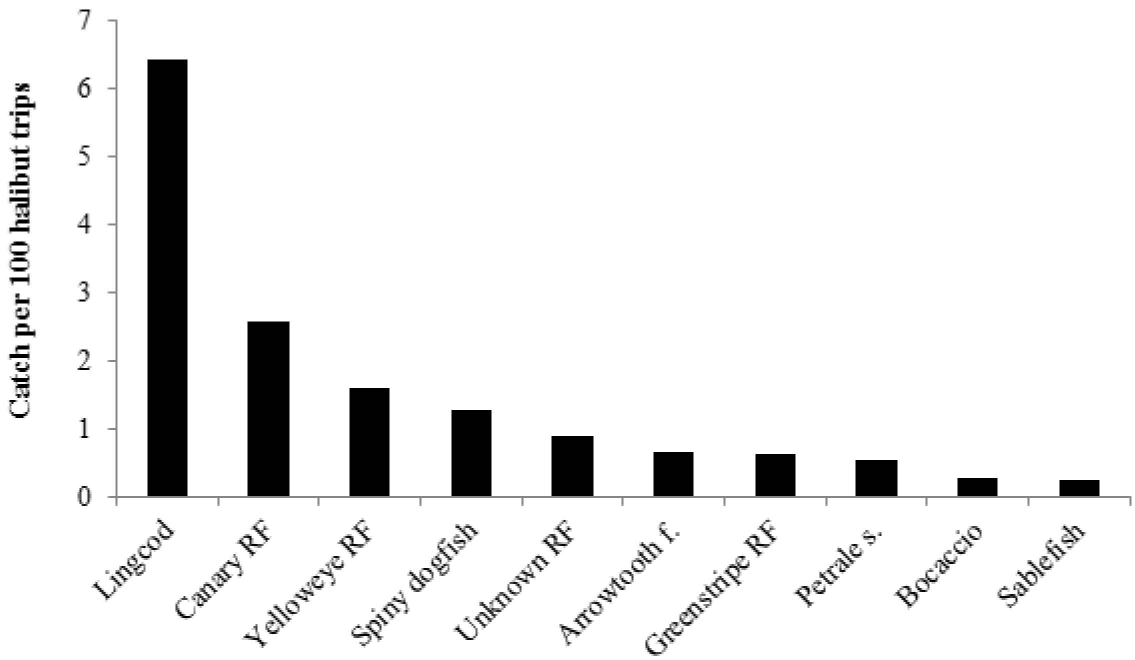

Figure B-31. Catch rates of the top ten most commonly encountered groundfish species by recreational halibut anglers in Oregon.

A modification to allow halibut anglers to harvest groundfish species that are not associated with reef habitat (i.e. other flatfish species), and thereby extending the current rule which allows sablefish and Pacific cod has also been requested. Lingcod and rockfish would remain prohibited as they are primarily associated with reef habitat. This modification could reduce the risk (incentive for anglers to target deep reefs) and may provide some additional harvest opportunities and increase angler satisfaction.

Adoption of the any change to these regulations would also have to be implemented via the Pacific Halibut Catch Share Plan, wherein the regulatory language for incidental groundfish retention for halibut fisheries is housed.

Management Options

No action: No groundfish except for sablefish and Pacific cod can be retained during all-depth halibut season while in possession of a halibut

Option 1: All groundfish can be retained during all-depth halibut season
Option 2: No groundfish except for sablefish, Pacific cod, and flatfish may be retained during all-depth halibut season while in possession of a halibut --or-- specify the groundfish can be retained except for rockfish and lingcod

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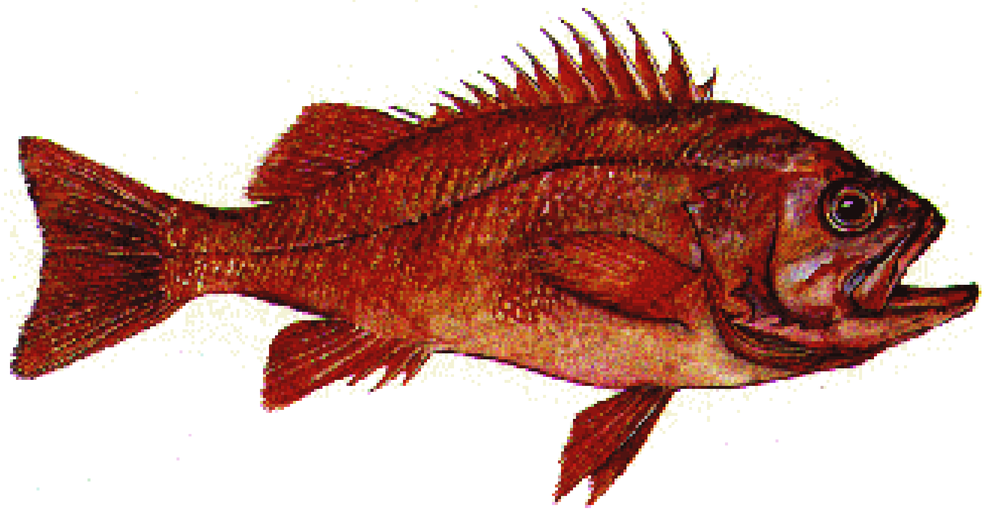
Agenda Item F.7.a
Attachment 7 (Electronic Only)
June 2014

STATUS OF THE PACIFIC COAST GROUNDFISH FISHERY



Stock Assessment and Fishery Evaluation

DESCRIPTION OF THE FISHERY

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June 2014

1.1 Description and Status of Groundfish Stocks

There are over 90 stocks managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). The actual number of FMP stocks is equivocal since all endemic species of the genus *Sebastes* are included and new species of this diverse genus are periodically described in the literature providing results of genetic/taxonomic research. These species include over 64 species of rockfish in the family *Scorpaenidae,* 7 roundfish species, 12 flatfish species, assorted shark, skate, and a few miscellaneous bottom-dwelling marine fish species. Table 1 depicts the latitudinal and depth distributions of groundfish species managed under the groundfish FMP, and Figure 1 depicts management area divisions.

The following sections contain information on the life histories of a subset of the groundfish managed under the groundfish FMP. While reading these sections, it is important to keep in mind how certain life history traits of the species have important implications on how the stocks are sustainably managed.

In contrast to the highly variable, and often volatile, population cycles of many coastal pelagic and invertebrate populations in the California Current, many of the resident groundfish in the California Current have evolved entirely different life history approaches to coping with environmental variability. Sablefish, Dover sole, spiny dogfish and a large number of rockfish (*Sebastes* and *Sebastolobus*) species have life spans that typically span decades, and in some extreme examples may reach ages of 100 or greater (Beamish, *et al.* 2006; Love, *et al.* 2002). Although large initial catches of many rockfish had given the impression that these stocks were also highly productive, a growing body of scientific evidence soon made it clear that many of these species were incapable of sustaining high intensity fishing pressure using modern fishing methods (Francis 1986; Gunderson 1977; Gunderson 1984; Leaman and Beamish 1984).

Among the concerns raised in some of the early research and analyses were that the large standing stocks of older individuals were simply maintaining themselves within the dynamic bounds of their ecosystem, and that the failure to consider the role of such longevity in Northeast Pacific groundfish could lead to management challenges. Factors such as extreme longevity, low natural mortality, increasing fecundity with age, and infrequent reproductive success (recruitment) were explicitly considered when initial harvest rate strategies were developed for the Council (Clark 1991). However, the paucity of data and magnitude of some of these factors as related to the low productivity of many species were not fully appreciated in many early studies, and are now known to be important considerations in developing harvest rate guidelines and management policies (Clark 2002; Dorn 2002a)Dorn, 2002 #490}. Consequently, harvest rates for many species have been reduced repeatedly in recent years to account for the improved knowledge regarding the overall productivity of these stocks. As new information continues to emerge regarding the significance of diverse age structures and other factors in sustaining groundfish resources (Berkeley 2004; Berkeley, *et al.* 2004; Bobko and Berkeley 2004), such information continues to be evaluated and incorporated into the stock assessment and assessment review processes that provide the scientific basis upon which management decisions are made.

Management of these groundfish species is based on principles outlined in the Magnuson-Stevens Fishery Management and Conservation Act (MSA), groundfish FMP, and National Standard Guidelines, which provide guidance on the 10 national standards in the MSA. Stock assessments are based on resource surveys, catch trends in west coast fisheries, and other data sources.

Table 1. Latitudinal and depth distributions of groundfish species (adults) managed under the Pacific Coast Groundfish Fishery Management Plan. [a/]

Common name	Scientific name	Latitudinal Distribution		Depth Distribution (fm)	
		Overall	Highest Density	Overall	Highest Density
		Flatfish Species			
Arrowtooth flounder	*Atheresthes stomias*	N 34º N lat.	N 40º N lat.	10-400	27-270
Butter sole	*Isopsetta isolepis*	N 34º N lat.	N 34º N lat.	0-200	0-100
Curlfin sole	*Pleuronichthys decurrens*	Coastwide	Coastwide	4-291	4-50
Dover sole	*Microstomus pacificus*	Coastwide	Coastwide	10-500	110-270
English sole	*Parophrys vetulus*	Coastwide	Coastwide	0-300	40-200
Flathead sole	*Hippoglossoides elassodon*	N 38º N lat.	N 40º N lat.	3-300	100-200
Pacific sanddab	*Citharichthys sordidus*	Coastwide	Coastwide	0-300	0-82
Petrale sole	*Eopsetta jordani*	Coastwide	Coastwide	10-250	160-250
Rex sole	*Glyptocephalus zachirus*	Coastwide	Coastwide	10-350	27-250
Rock sole	*Lepidopsetta bilineata*	Coastwide	N 32º30' N lat.	0-200	summer 10-44 winter 70-150
Sand sole	*Psettichthys melanostictus*	Coastwide	N 33º50' N lat.	0-100	0-44
Starry flounder	*Platichthys stellatus*	Coastwide	N 34º20' N lat.	0-150	0-82
		Rockfish Species [b/]			
Aurora rockfish	*Sebastes aurora*	Coastwide	Coastwide	100-420	82-270
Bank rockfish	*Sebastes rufus*	S. 39º30' N lat.	S. 39º30' N lat.	17-135	115-140
Black rockfish	*Sebastes melanops*	N 34º N lat.	N 34º N lat.	0-200	0-30
Black-and-yellow rockfish	*Sebastes chrysomelas*	S. 40º N lat.	S. 40º N lat.	0-20	0-10
Blackgill rockfish	*Sebastes melanostomus*	Coastwide	S. 40º N lat.	48-420	125-300
Blackspotted rockfish	*Sebastes melanostictus*	Coastwide	N 40º N lat.	27-400	27-250
Blue rockfish	*Sebastes mystinus*	Coastwide	Coastwide	0-300	13-21
Bocaccio [c/]	*Sebastes paucispinis*	Coastwide	S. 40º N lat., N 48º N lat.	15-180	54-82
Bronzespotted rockfish	*Sebastes gilli*	S. 37º N lat.	S. 37º N lat.	41-205	110-160
Brown rockfish	*Sebastes auriculatus*	Coastwide	S. 40º N lat.	0-70	0-50
Calico rockfish	*Sebastes dallii*	S. 38º N lat.	S. 33º N lat.	10-140	33-50
California scorpionfish	*Scorpaena gutatta*	S. 37º N lat.	S. 34º27' N lat.	0-100	0-100
Canary rockfish	*Sebastes pinniger*	Coastwide	Coastwide	27-460	50-100
Chameleon rockfish	*Sebastes phillipsi*	37º-33º N lat.	37º-33º N lat.	95-150	95-150
Chilipepper rockfish	*Sebastes goodei*	Coastwide	34º-40º N lat.	27-190	27-190
China rockfish	*Sebastes nebulosus*	N 34º N lat.	N 35º N lat.	0-70	2-50

Common name	Scientific name	Latitudinal Distribution		Depth Distribution (fm)	
		Overall	Highest Density	Overall	Highest Density
Copper rockfish	*Sebastes caurinus*	Coastwide	S. 40º N lat.	0-100	0-100
Cowcod	*Sebastes levis*	S. 40º N lat.	S. 34º27' N lat	22-270	100-130
Darkblotched rockfish	*Sebastes crameri*	N 33º N lat.	N 38º N lat.	16-300	96-220
Dusky rockfish [d/]	*Sebastes ciliatus*	N 55º N lat.	N 55º N lat.	0-150	0-150
Dwarf-Red rockfish	*Sebastes rufinanus*	33º N lat.	33º N lat.	>100	>100
Flag rockfish	*Sebastes rubrivinctus*	S. 38º N lat.	S. 37º N lat.	17-100	shallow
Freckled rockfish	*Sebastes lentignosus*	S. 33º N lat.	S. 33º N lat.	22-92	22-92
Gopher rockfish	*Sebastes carnatus*	S. 40º N lat.	S. 40º N lat.	0-30	0-16
Grass rockfish	*Sebastes rastrelliger*	S. 44º40' N lat.	S. 40º N lat.	0-25	0-8
Greenblotched rockfish	*Sebastes rosenblatti*	S. 38º N lat.	S. 38º N lat.	33-217	115-130
Greenspotted rockfish	*Sebastes chlorostictus*	S. 47º N lat.	S. 40º N lat.	27-110	50-100
Greenstriped rockfish	*Sebastes elongatus*	Coastwide	Coastwide	33-220	27-136
Halfbanded rockfish	*Sebastes semicinctus*	S. 36º40' N lat.	S. 36º40' N lat.	32-220	32-220
Harlequin rockfish [e/]	*Sebastes variegatus*	N 40 º N lat.	N 51º N lat.	38-167	38-167
Honeycomb rockfish	*Sebastes umbrosus*	S. 36º40' N lat.	S. 34º27' N lat.	16-65	16-38
Kelp rockfish	*Sebastes atrovirens*	S. 39º N lat.	S. 37º N lat.	0-25	3-4
Longspine thornyhead	*Sebastolobus altivelis*	Coastwide	Coastwide	167->833	320-550
Mexican rockfish	*Sebastes macdonaldi*	S. 36º20' N lat.	S. 36º20' N lat.	50-140	50-140
Olive rockfish	*Sebastes serranoides*	S. 41º20' N lat.	S. 40º N lat.	0-80	0-16
Pacific ocean perch	*Sebastes alutus*	Coastwide	N 42º N lat.	30-350	110-220
Pink rockfish	*Sebastes eos*	S. 37º N lat.	S. 35º N lat.	40-200	40-200
Pinkrose rockfish	*Sebastes simulator*	S. 34º N lat.	S. 34º N lat.	54-160	108
Puget Sound rockfish	*Sebastes emphaeus*	N 40º N lat.	N 40º N lat.	6-200	6-200
Pygmy rockfish	*Sebastes wilsoni*	N 32º30' N lat.	N 32º30' N lat.	17-150	17-150
Quillback rockfish	*Sebastes maliger*	N 36º20' N lat.	N 40º N lat.	0-150	22-33
Redbanded rockfish	*Sebastes babcocki*	Coastwide	N 37º N lat.	50-260	82-245
Redstripe rockfish	*Sebastes proriger*	N 37º N lat.	N 37º N lat.	7-190	55-190
Rosethorn rockfish	*Sebastes helvomaculatus*	Coastwide	N 38º N lat.	65-300	55-190
Rosy rockfish	*Sebastes rosaceus*	S. 42º N lat.	S. 40º N lat.	8-70	30-58
Rougheye rockfish	*Sebastes aleutianus*	Coastwide	N 40º N lat.	27-400	27-250
Semaphore rockfish	*Sebastes melanosema*	S. 34º27' N lat.	S. 34º27' N lat.	75-100	75-100
Sharpchin rockfish	*Sebastes zacentrus*	Coastwide	Coastwide	50-175	50-175
Shortbelly rockfish	*Sebastes jordani*	Coastwide	S. 46º N lat.	50-175	50-155

Common name	Scientific name	Latitudinal Distribution		Depth Distribution (fm)	
		Overall	Highest Density	Overall	Highest Density
Shortraker rockfish	*Sebastes borealis*	N 39º30' N lat.	N 44º N lat.	110-220	110-220
Shortspine thornyhead	*Sebastolobus alascanus*	Coastwide	Coastwide	14->833	55-550
Silvergray rockfish	*Sebastes brevispinis*	Coastwide	N 40º N lat.	17-200	55-160
Speckled rockfish	*Sebastes ovalis*	S. 38º N lat.	S. 37º N lat.	17-200	41-83
Splitnose rockfish	*Sebastes diploproa*	Coastwide	Coastwide	50-317	55-250
Squarespot rockfish	*Sebastes hopkinsi*	S. 38º N lat.	S. 36º N lat.	10-100	10-100
Starry rockfish	*Sebastes constellatus*	S. 38º N lat.	S. 37º N lat.	13-150	13-150
Stripetail rockfish	*Sebastes saxicola*	Coastwide	Coastwide	5-230	5-190
Swordspine rockfish	*Sebastes ensifer*	S. 38º N lat.	S. 38º N lat.	38-237	38-237
Tiger rockfish	*Sebastes nigrocinctus*	N 35º N lat.	N 35º N lat.	30-170	35-170
Treefish	*Sebastes serriceps*	S. 38º N lat.	S. 34º27' N lat.	0-25	3-16
Vermilion rockfish	*Sebastes miniatus*	Coastwide	Coastwide	0-150	4-130
Widow rockfish	*Sebastes entomelas*	Coastwide	N 37º N lat.	13-200	55-160
Yelloweye rockfish	*Sebastes ruberrimus*	Coastwide	N 36º N lat.	25-300	27-220
Yellowmouth rockfish	*Sebastes reedi*	N 40º N lat.	N 40º N lat.	77-200	150-200
Yellowtail rockfish	*Sebastes flavidus*	Coastwide	N 37º N lat.	27-300	27-160
Roundfish Species					
Cabezon	*Scorpaenichthys marmoratus*	Coastwide	Coastwide	0-42	0-27
Kelp greenling	*Hexagrammos decagrammus*	Coastwide	N 40º N lat.	0-25	0-10
Lingcod	*Ophiodon elongatus*	Coastwide	Coastwide	0-233	0-40
Pacific cod	*Gadus macrocephalus*	N 34º N lat.	N 40º N lat.	7-300	27-160
Pacific whiting	*Merluccius productus*	Coastwide	Coastwide	20-500	27-270
Sablefish	*Anoplopoma fimbria*	Coastwide	Coastwide	27->1,000	110-550
Shark and Skate Species					
Big skate	*Raja binoculata*	Coastwide	S. 46º N lat.	2-110	27-110
California skate	*Raja inornata*	Coastwide	S. 39º N lat.	0-367	0-10
Leopard shark	*Triakis semifasciata*	S. 46º N lat.	S. 46º N lat.	0-50	0-2
Longnose skate	*Raja rhina*	Coastwide	N 46º N lat.	30-410	30-340
Soupfin shark	*Galeorhinus zyopterus*	Coastwide	Coastwide	0-225	0-225
Spiny dogfish	*Squalus acanthias*	Coastwide	Coastwide	0->640	0-190

Common name	Scientific name	Latitudinal Distribution		Depth Distribution (fm)	
		Overall	Highest Density	Overall	Highest Density
Other Species					
Finescale codling	*Antimora microlepis*	Coastwide	N 38º N lat.	190-1,588	190-470
Pacific rattail	*Coryphaenoides acrolepis*	Coastwide	N 38º N lat.	85-1,350	500-1,350
Ratfish	Hydrolagus colliei	Coastwide	Coastwide	0-499	55-82

a/ Data from (Casillas, *et al.* 1998), (Eschmeyer, *et al.* 1983), (Hart 1988), (Miller and Lea 1972), (Love, *et al.* 2002), and NMFS survey data. Depth distributions refer to offshore distributions, not vertical distributions in the water column.
b/ The category "rockfish" includes all genera and species of the family Scorpaenidae, even if not listed, that occur in the Washington, Oregon, and California area.
c/ Only the southern stock of bocaccio south of 40º 10' N lat. is listed as overfished.
d/ Only two occurrences of harlequin rockfish south of 51º N lat. (off Newport, OR and La Push, WA; (Casillas, *et al.* 1998)).

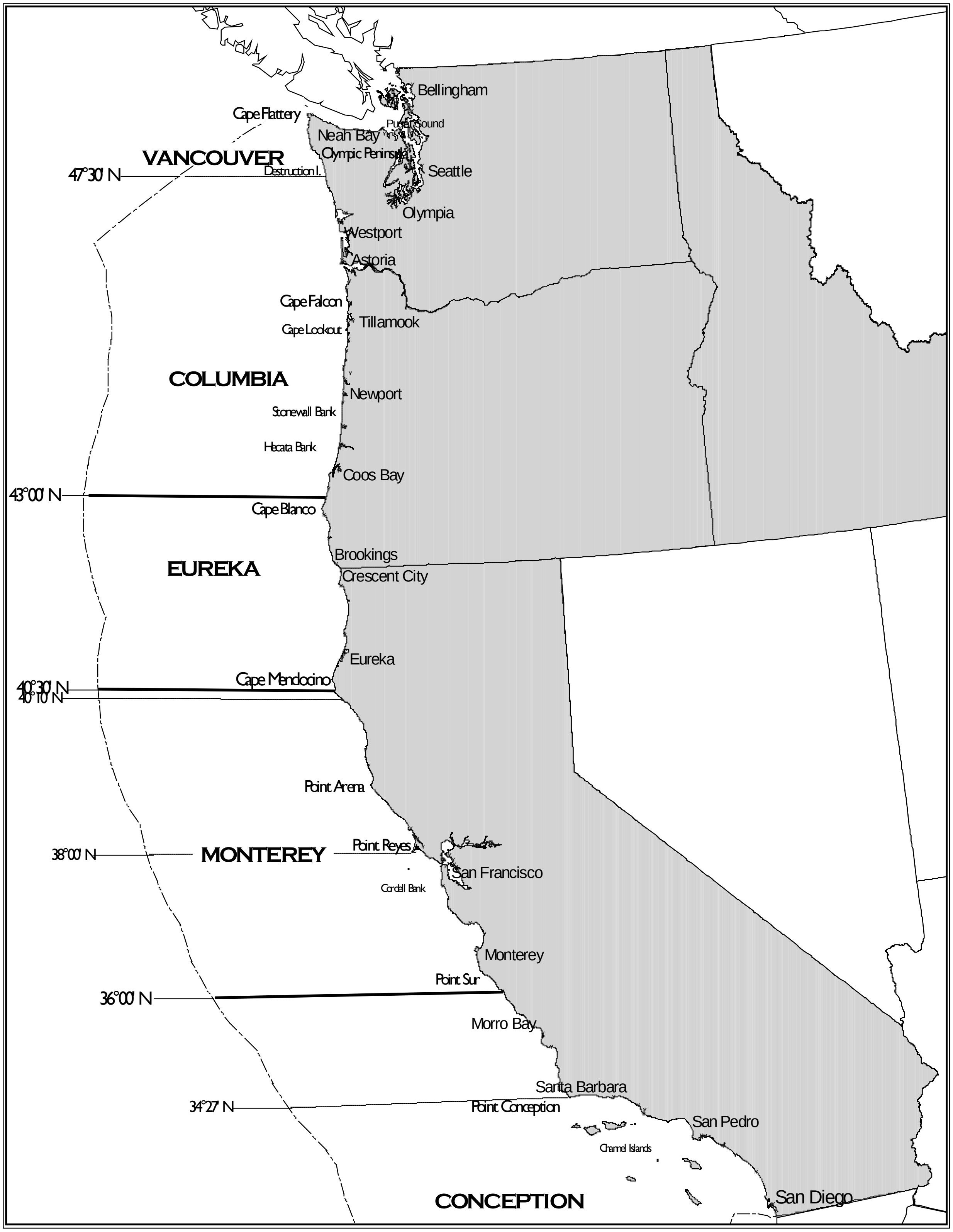

Figure 1. Fishery management lines on the U.S. west coast.

The passage of the Sustainable Fisheries Act in 1996 and the reauthorization of the MSA in 2006[1] incorporated the current conservation and rebuilding mandates into the MSA. These mandates—including abundance-based standard reference points for declaring the status of a stock (overfished; in a "precautionary" status; or at levels that can support maximum sustainable yield (MSY) (healthy or "rebuilt"))—were subsequently incorporated in the groundfish FMP with adoption of Amendments 11, 12, and 23. These reference points are determined relative to an estimate of "virgin" or unexploited spawning biomass of the stock, denoted as $B_{0,}$ which is defined as the average equilibrium abundance of a stock's spawning biomass before it is affected by fishing-related mortality.[2] B_0 is then used to estimate MSY, as identified in the MSA and National Standard Guidelines. MSY represents a theoretical maximum surplus production from a population of constant size; National Standard Guidelines define it as "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions." For a given population and set of ecological conditions, there is a biomass that produces MSY (denoted as B_{MSY}), which is less than the equilibrium size in the absence of fishing (B_0). (Generally, population sizes above B_{MSY} are assumed to be less productive because of competition for resources or other density dependent factors.) The harvest rate used to achieve or sustain B_{MSY} is referred to as the Maximum Fishing Mortality Threshold (MFMT, denoted as F_{MSY}). Three harvest specification reference points, defined in the groundfish FMP, provide guidance in setting the harvest rate: an overfishing limit (OFL), an acceptable biological catch (ABC), and an annual catch limit (ACL) (see section 1.2 for more information on harvest specifications). The Council identifies the ACL as the management target for each species or species complex. When the stock biomass is determined to be lower than $B_{MSY,}$ the ACL is set to an adequately low level to rebuild the stock to a healthy level in a timely fashion.

The biomass level that produces MSY (i.e., B_{MSY}) is generally unknown and assumed to be variable over time due to long-term fluctuations in ocean conditions, so that no single value is appropriate. Furthermore, F_{MSY} is tightly linked to an assumed level of density dependence in recruitment, and there is insufficient information to determine that level for many west coast groundfish stocks. Therefore, the use of approximations or proxies is necessary; absent a more accurate determination of $F_{MSY,}$ the Council applies default MSY proxies (see section 1.1.1 for more details). The Council adopts management actions aimed to maintain abundance of each stock at or above the specified B_{MSY} target. The threshold for declaring a stock overfished is when the stock's spawning biomass declines to less than the specified Minimum Stock Size Threshold or MSST (i.e., 12.5% of B_0 or $B_{12.5\%}$ for assessed flatfish stocks and $B_{25\%}$ for all other groundfish stocks). A rebuilding plan that specifies how total fishing-related mortality is constrained to achieve an MSY abundance level within the legally allowed time is required by the MSA and groundfish FMP when a stock is declared overfished.

Of the more than 90 species managed under the groundfish FMP, only a portion are individually managed. Thus, the remaining species are managed and accounted for in groupings or stock complexes (see section 1.1.5) because individually they comprise a small part of the landed catch and, in general, insufficient information exists to develop the stock assessments necessary to set harvest specifications based on yield estimates. The Council has also decided to continue to manage some assessed stocks in complexes to avoid management complications such as disruption to the trawl rationalization program. Catch-based methods described in section 1.1.1 are used to set OFLs for unassessed stocks. Additionally, there is a category of stocks that are incidentally caught in groundfish fisheries for which

[1] The Magnuson-Stevens Act is again up for reauthorization in 2014.

[2] The current abundance of a stock relative to its unfished level is commonly written as a percentage or a proportion; this value represents the stock's depletion level. In addition to using a comparison between current spawning biomass and unfished spawning biomass to determine this reference point, some stock assessment authors compare current and unfished levels of spawning output or of total stock biomass, depending on the information that is available.

no harvest limits are specified. This category of stocks, termed Ecosystem Component (EC) species, are not considered to be in the fishery and are neither targeted nor generally retained for sale or personal use. EC species are determined not to likely become subject to overfishing or to be overfished in the absence of conservation and management measures. There is a monitoring requirement for species designated as EC to the extent that any new pertinent scientific information becomes available (e.g., catch trends, vulnerability, etc.) to determine changes in their status or their vulnerability to the fishery. The Council is proposing an EC designation for some species currently managed in the FMP, as well as other non-FMP species (see section 1.1.6).

1.1.1 Productivity and Susceptibility Assessment of Stocks to Overfishing

The vulnerability to potential overfishing of a stock to the fishery for each groundfish stock in the FMP was defined as a first step in assisting with two specific tasks set forth in the FMP: 1) to define species as either "in the fishery" or as an "ecosystem component," and 2) identify stock complexes. In addition, the vulnerability scores were considered when prioritizing stock assessments and determining data collection needs.

The Productivity-Susceptibility Assessment (PSA) approach of Patrick et al. (2009) was used to characterize vulnerability and has two components: 1) productivity as defined by life histories traits, and 2) susceptibility to current fishing practices. Each vulnerability component is comprised of several attributes (10 productivity and 12 susceptibility attributes) and the weighted mean score of all attributes defines the overall productivity and susceptibility score. Table 2 includes the vulnerability scores for all species in the FMP relative to the current fishery. Table 2 shows the vulnerability scores for currently overfished rockfish species relative to the fishery circa 1998. Scores are presented in two-dimensions, with productivity on the x-axis and susceptibility on the y-axis (Figure 2). Cope et al. (2011) established vulnerability reference points of unassessed west coast groundfish stocks to determine vulnerability groups as follows:

- V ≥2.2 indicate species of major concern.
- 2.0≤V<2.2 indicate species of high concern.
- 1.8≤V<2.0 indicate species of medium concern.
- V <1.8 indicate species of low concern.

Rockfish and elasmobranches showed the highest vulnerabilities (>2.0), with the deepest-residing members of those groups often the most vulnerable, though there were several species of nearshore rockfish (China, quillback, and copper rockfish) with some of the highest scored vulnerabilities. Flatfishes in general showed the lowest vulnerabilities.

In addition to scoring each productivity and susceptibility attribute, the quality of the data used for each score was also recorded (Table 2, Table 3, and Figure 3). Data quality is scored for each productivity and susceptibility attribute, with the overall data quality score calculated as the weighted mean of all attributes. A scoring scale of 1-5 was used, with the best data score being 5.

Recording the data quality can highlight vulnerability scores that can be improved with additional data or that should be interpreted with caution because of questionable data contribution. Data quality scores can also be used to justify future data collection on particular attributes.

In general, susceptibility was harder to score (lower data quality) than productivity. Flatfishes as a group had the least informed species, but elasmobranches and several rockfish species also showed low-quality data informing vulnerability scores (Table 2).

PSA analyses are anticipated to be re-done every biennial specifications cycle. Productivity scores are not expected to vary much over time since they are based on life history traits. However, susceptibility scores may vary based on changes in fishing practices and/or management, and an updated understanding of the stock's interaction with the fishery. As susceptibility scores change, so do the vulnerability scores.

Table 2. Overall scores and results of the Productivity and Susceptibility Assessment (PSA) ranked from most to least vulnerable to overfishing relative to the current west coast fishery based on the GMT's scoring.

Stock ID	Stock Name	Productivity	Susceptibility	Vulnerability
21	Copper rockfish	1.95	1.60	2.27
67	Rougheye rockfish	1.17	2.33	2.27
72	Shortraker rockfish	1.22	2.38	2.25
20	China rockfish	1.33	2.29	2.23
58	Quillback rockfish	1.31	2.43	2.22
61	Redstripe rockfish	1.31	2.33	2.16
22	Cowcod	1.25	2.00	2.13
77	Spiny dogfish	1.11	1.98	2.13
10	Bronzespotted rockfish	1.37	2.14	2.12
16	California skate	1.33	2.00	2.12
35	Greenblotched rockfish	1.28	2.24	2.12
2	Aurora rockfish	1.89	2.29	2.10
76	Speckled rockfish	1.33	2.29	2.10
65	Rosethorn rockfish	1.19	2.05	2.09
81	Starry rockfish	1.25	2.14	2.09
7	Blackgill rockfish	1.22	2.08	2.08
84	Tiger rockfish	1.25	2.10	2.06
70	Sharpchin rockfish	1.36	2.24	2.05
86	Vermilion rockfish	1.22	2.02	2.05
87	Widow rockfish	1.31	2.16	2.05
18	Chameleon rockfish	1.39	2.20	2.03
3	Bank rockfish	1.28	1.88	2.02
55	Pink rockfish	1.33	2.14	2.02
60	Redbanded rockfish	1.28	2.05	2.02
74	Silvergray rockfish	1.22	1.95	2.02
75	Soupfin shark	1.11	1.71	2.02
8	Blue rockfish	1.22	2.16	2.01
17	Canary rockfish	1.61	2.43	2.01
43	Leopard shark	1.26	2.00	2.00
88	Yelloweye rockfish	1.22	1.92	2.00
4	Big skate	2.45	2.05	1.99
11	Brown rockfish	1.72	2.08	1.99
26	Dusky rockfish	1.75	1.76	1.99
36	Greenspotted rockfish	1.39	2.14	1.98

Stock ID	Stock Name	Productivity	Susceptibility	Vulnerability
30	Flag rockfish	1.83	1.80	1.97
40	Honeycomb rockfish	1.36	2.10	1.97
89	Yellowmouth rockfish	1.61	2.38	1.96
5	Black rockfish	1.21	2.14	1.94
39	Harlequin rockfish	1.31	1.95	1.94
54	Petrale sole	1.70	2.44	1.94
83	Swordspine rockfish	1.33	2.00	1.94
9	Bocaccio	1.28	2.04	1.93
24	Darkblotched rockfish	1.39	2.24	1.92
34	Grass rockfish	1.61	2.29	1.89
66	Rosy rockfish	1.61	2.29	1.89
37	Greenstriped rockfish	1.28	1.76	1.88
90	Yellowtail rockfish	1.33	1.88	1.88
48	Olive rockfish	1.69	2.33	1.87
79	Squarespot rockfish	1.61	2.24	1.86
51	Pacific grenadier	1.44	1.95	1.82
56	Pinkrose rockfish	1.31	1.67	1.82
78	Splitnose rockfish	1.28	1.60	1.82
47	Mexican rockfish	1.50	2.00	1.80
73	Shortspine thornyhead	1.33	1.68	1.80
82	Stripetail rockfish	1.39	1.81	1.80
63	Rock greenling	1.78	2.29	1.77
33	Gopher rockfish	1.56	2.00	1.76
85	Treefish	1.67	2.10	1.73
59	Ratfish	1.63	2.05	1.72
6	Black-and-yellow rockfish	1.83	1.68	1.70
50	Pacific ocean perch	1.44	1.67	1.69
53	Pacific whiting	2.00	2.36	1.69
13	Cabezon	1.33	2.48	1.68
45	Longnose skate	1.53	1.80	1.68
68	Sablefish	1.61	1.88	1.64
42	Kelp rockfish	1.83	2.12	1.62
41	Kelp greenling	1.83	2.04	1.56
44	Lingcod	1.75	1.92	1.55
25	Dover sole	1.36	2.57	1.54
27	Dwarf-red rockfish	1.06	1.88	1.54
46	Longspine thornyhead	1.47	1.16	1.54
29	Finescale codling	2.45	2.10	1.48
14	Calico rockfish	1.39	2.04	1.46
32	Freckled rockfish	1.80	1.96	1.44
57	Pygmy rockfish	1.78	1.71	1.42
64	Rock sole	1.95	1.95	1.42
15	California scorpionfish	1.28	0.00	1.41
19	Chilipepper	1.83	0.00	1.35

Stock ID	Stock Name	Productivity	Susceptibility	Vulnerability
49	Pacific cod	2.11	2.00	1.34
62	Rex sole	2.05	1.86	1.28
31	Flathead sole	2.25	1.92	1.26
38	Halfbanded rockfish	2.00	1.76	1.26
52	Pacific sanddab	2.40	2.10	1.25
23	Curlfin sole	1.72	1.75	1.23
69	Sand sole	2.35	2.05	1.23
1	Arrowtooth flounder	1.33	2.05	1.21
28	English sole	2.30	2.05	1.19
12	Butter sole	1.78	1.76	1.18
71	Shortbelly rockfish	1.94	1.40	1.13
80	Starry flounder	2.15	1.60	1.04

Table 3. Retrospective Productivity and Susceptibility Assessment (PSA) vulnerability scores of currently overfished rockfish species ranked from most to least vulnerable to overfishing relative to stock status and the fishery circa 1998, based on the GMT's scoring.

Stock Name	Stock ID	Susceptibility	Vulnerability
Bocaccio	25_H	2.72	2.43
Canary	23_H	2.84	2.52
Cowcod	10_H	2.68	2.57
Darkblotched	51_H	2.76	2.39
POP	92_H	2.32	2.08
Yelloweye	18_H	2.80	2.53

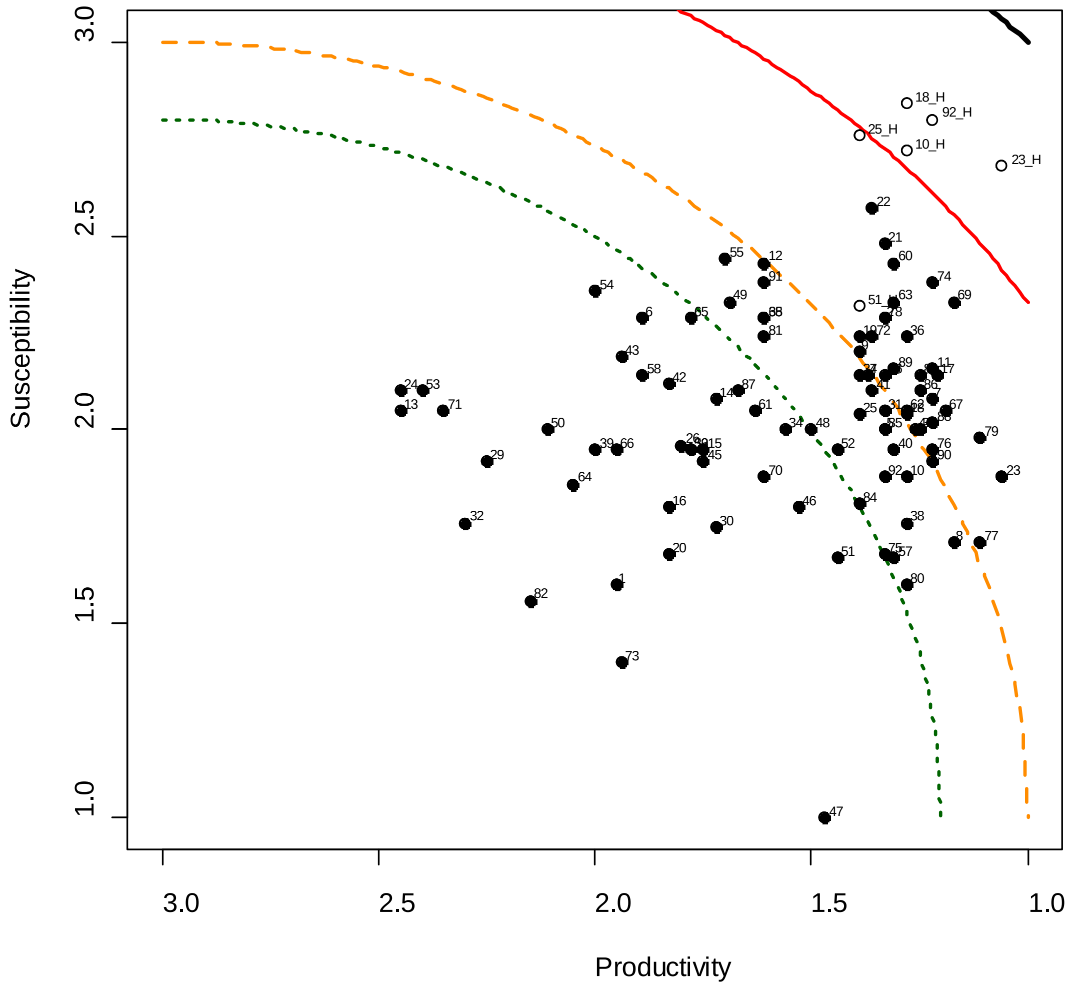

Figure 2. Productivity and Susceptibility Analysis (PSA) plot for species in the west coast groundfish FMP. Contours delineate areas of relative vulnerability (V, i.e. distance from the origin), with the highest vulnerability stocks above the solid red line (V = 2.2), high vulnerability above the orange broken line (V=2), medium vulnerability above the green dotted line (V=1.8) and the lowest vulnerability below the green dotted line. The maximum vulnerability (V=2.8) is indicated with the solid black line. Solid circles are based on current PSA scores. Open circles are based on PSA scores circa 1998. Numbers refer to the Stock ID in Table 2 and Table 3.

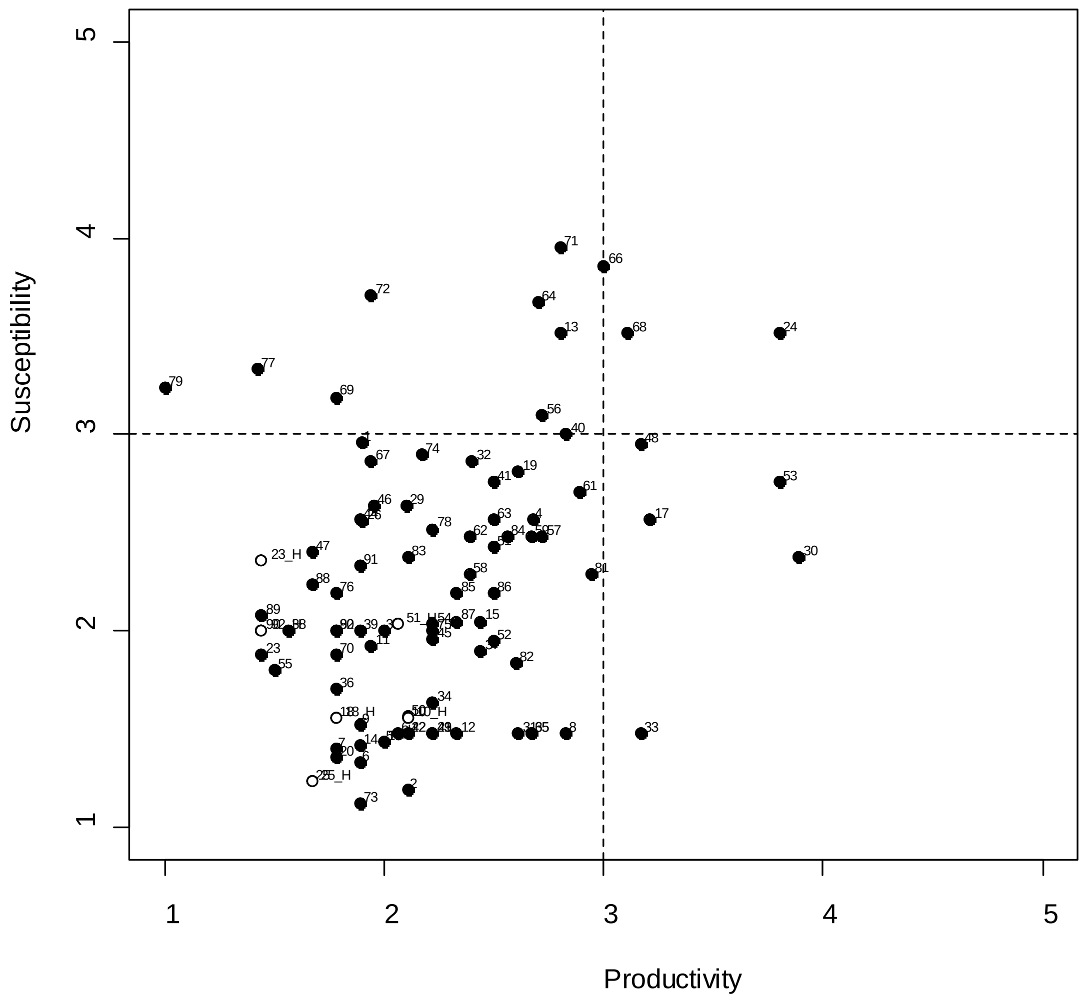

Figure 3. Data quality plots for the productivity and susceptibility scores in the PSA for each species (represented numerically in Table 2 and Table 3) in the west coast groundfish FMP. Higher scores indicate less data quality. Vertical and horizontal lines provide a general guide to relative data quality with values above 3 on either axis considered data-poor.

1.1.2 Stock Assessments and Rebuilding Analyses Used to Estimate Stock Status and Inform Management Decisions

Stock assessments are used for setting harvest specifications by providing estimates of MSY, OFL, the MFMT, the MSST, ABC, OY, and ACLs. Stock assessments are also used to determine the status of a fish population or subpopulation (stock) terms of estimating population size, reproductive status, fishing mortality, and sustainability. In the terms of the Groundfish FMP, stock assessments provide: 1) an estimate of the current biomass and reproductive potential, 2) an estimate of F_{MSY} (the harvest rate estimated to produce MSY) or proxy thereof translated into exploitation rate or spawning potential ratio (SPR; *cite section describing SPR*), 3) the estimated MSY biomass (B_{MSY}), or proxy thereof, 4) estimated unfished biomass (B_0), and 5) the estimated variance (e.g., confidence interval) for the current biomass estimate. With the exception of Pacific whiting, which is assessed annually as specified in the Agreement with Canada on Pacific Hake/Whiting, groundfish stock assessments are conducted on a two-year cycle. Given the large number of groundfish species and limited state and Federal resources, a subset of all groundfish stocks are assessed in each stock assessment cycle. Overfished species' stock assessments are typically conducted every two years, although a catch report can be substituted for an assessment to monitor compliance with adopted rebuilding plans. The process for setting groundfish specifications involves the adoption of new and updated stock assessments. During the biennial specification process, the SSC reviews stock assessments and rebuilding analyses for overfished species and makes recommendations to the Council relative to the standards of the best available science and the soundness of the scientific information relative to management decisions. The Council then approves all or a portion of the stock assessments, or recommends further analysis.

The perception of stock status and productivity for many stocks may change substantially between stock assessments. Such changes can result from technical changes in the model, including how a given assessment model is structured, the assumptions used to fix or estimate key parameters (i.e., whether parameters such as natural mortality and steepness are fixed, estimated freely, or estimated with an informative prior), and the evolution of methods for developing time series and estimates of uncertainty from different sources of raw data. The population dynamics of target species themselves are responsive to a mix of complex (and often poorly-understood) biological, oceanographic, and interspecies interactions. New data sources (e.g., new data, extensions of existing data sets, incorporation of environmental factors into assessments) can result in changes in parameter estimates and model outputs.

All stock assessments are subject to a peer review process, consistent with the MSA (§302(g)(1)(E)). The process considers components of the assessments starting with data collection and continuing through to scientific recommendations and information presented to the Council and its advisors. The terms of reference for the groundfish stock assessment process defines the expectations and responsibilities for various participants in the groundfish stock assessment review (STAR) process, and outlines the guidelines and procedures for a peer review process. The STAR process is a key element in an overall process designed to review the technical merits of stock assessments and other scientific information used by the SSC. This process allows the Council to make timely use of new fishery and survey data, to analyze and understand these data as completely as possible, to provide opportunity for public comment, and to assure that the results are as accurate and error-free as possible.

Harvest specifications, and the science used as the basis for management decision-making are derived from the most recent assessments and/or rebuilding analyses prepared for those stocks informed by an assessment. The newest assessments were those prepared and adopted in 2013 and the oldest assessments informing management decisions for fisheries in 2015 and beyond were prepared and adopted in 2005. Table 4 presents a summary of the management quantities estimated by base models of the most recent assessments informing management in 2015 and beyond. Table 5 lists life history parameters from the stocks assessed since 2005, excluding those done using XDB-SRA; steepness of the spawner-recruitment curve (h), recruitment variability (sigma-r), the von Bertalanffy Equation growth constant (k), and natural mortality (M) are each important contributors to the understanding of the productivity and resiliency of these stocks. Table 6 lists life history parameters from the stocks assessed in 2013 using XDB-SRA; B_{MSY}, F_{MSY}, M, B_{MSY}/B_0, and F_{MSY}/M inform the relative productivity and resiliency of these stocks.

All stock assessments, STAR panel reports, and rebuilding analyses used to inform management decisions on west coast groundfish stocks and fisheries can be found on the Council's web site at http://www.pcouncil.org/groundfish/stock-assessments/.

1.1.2.1 Types of Assessments Used in Managing Groundfish Stocks

The Council uses various types of assessments that range from data-rich full assessments (also known as benchmark assessments) to data-poor catch-based models used to only estimate an OFL. The Council decides which groundfish stocks will be assessed and, based on SSC recommendations, what type of assessment will be used (i.e., full, update, data-moderate) each cycle. These stock assessment priorities are decided in even years and assessments are conducted, reviewed, and adopted in odd years. Results from these assessments are used to inform management decisions for the following biennial cycle, which begins in the next odd year. The SSC reviews all assessments and recommends to the Council if they represent the best available science for the stock and whether and how they can be used to inform Council decisions.

The SSC categorizes stocks based on the type of assessment and the quality of data informing that assessment. The FMP harvest specification framework calls for increasing uncertainty buffers translated into lower ABCs (and ACLs) for stocks informed by less certain assessments (see section 1.2.2). Stock categories range from category 1, characterized by stocks informed by full assessments with reasonably good estimates of year class strength, to unassessed category 3 stocks where there is only a data-poor estimate of the OFL. A more detailed description of the assessment models used in current groundfish management follows.

Data-Poor Assessments

Data-poor assessments employ catch-based statistics to estimate an OFL for a stock. Since there are no survey or other abundance indices used in a data-poor assessment, stock status cannot be determined using these types of assessment. The most rudimentary data-poor assessment is simply average historical catch to estimate an OFL. However, there is great uncertainty whether that is a "true" OFL since the historical catch used to compute the average could have been unsustainably high. Therefore, the SSC categorizes stocks informed by a data-poor OFL as category 3 stocks, thus mandating a higher buffer to determine the ABC. While this category of data-poor methods are being characterized as "assessments" here, stocks with OFLs informed with data-poor methods are considered unassessed since there is no estimate of relative depletion or status. Other approved data-poor methods (DCAC and DB-SRA) more sophisticated than average catch are described below.

Depletion-Corrected Average Catch

The Depletion-Corrected Average Catch (DCAC) method provides an estimate of sustainable yield (the OFL) for data-poor stocks of uncertain status (MacCall 2009). DCAC adjusts historical average catch to account for one-time "windfall" catches that are the result of stock depletion, producing an estimate of yield that was likely to be sustainable over the same time period. Advantages of the DCAC approach for determining sustainable yield for data-poor stocks include: 1) minimal data requirements, 2) biologically-based adjustment to catch-based yield proxies with transparent assumptions about relative changes in abundance, and 3) simplicity in computing.

Depletion-Based Stock Reduction Analysis

The Depletion-Based Stock Reduction Analysis (DB-SRA) method extends the DCAC method by 1) restoring the temporal link between production and biomass, and 2) evaluating and integrating alternative hypotheses regarding changes in abundance during the historical catch period (Dick and MacCall 2011). This method combines DCAC's distributional assumptions regarding life history characteristics and stock status with the dynamic models and simulation approach of stochastic stock reduction analysis.

Data-Moderate Assessments

Data-moderate assessments are less complicated than full assessments and can therefore be reviewed more expeditiously. Unlike a full assessment, which is reviewed by a STAR panel and the SSC, only the SSC reviews a data-moderate assessment.

Data-moderate assessments combine catch-based methods with a time series of relative abundance estimates from one or more surveys or other types of abundance indices (e.g., CPUE time series). This type of assessment represents the minimal structure of an assessment used to determine stock status according to the NMFS National Stock Assessment Improvement plan (Mace, *et al.* 2001). These assessments exclude compositional age and length data, which are used to determine survey and/or fishery selectivities and to estimate other parameters in a full assessment model. The addition of compositional data complicates an assessment requiring more review time to understand what data are driving model results. Data-moderate assessments were therefore developed to increase the number of groundfish stocks assessed given the resources available to conduct and review assessments each cycle. There are two data-moderate assessment models in current use that have been reviewed and recommended by the SSC: Extended Simple Stock Synthesis (exSSS) and Extended Depletion-based Stock Reduction Analysis (XDB-SRA). These are described in more detail below.

Since data-moderate assessments are less informative than full assessments, the SSC categorizes stocks informed with such assessment as category 2 stocks.

Extended Simple Stock Synthesis

Extended Simple Stock Synthesis (exSSS) is based on sampling parameters (steepness, natural mortality and depletion) from prior distributions and using Stock Synthesis to solve for virgin recruitment (R0) given inputs for selectivity, growth, and fecundity. ExSSS extends Simple Stock Synthesis, originally a data-poor method reviewed by the SSC, by allowing index data (and potentially length and age data) to be used for parameter estimation using the Stock Synthesis platform. Parameter estimation for exSSS is either based on maximum likelihood or Bayesian (Markov chain Monte Carlo (MCMC)) methods. ExSSS assumes that recruitment is related deterministically to the stock-recruitment relationship. The outputs from exSSS include biomass trajectories, as well as estimates of (and measures of uncertainty for) the OFL. The prior for depletion is based on the results of a regression of depletion on the PSA vulnerability score (see section 1.1.1).

Extended Depletion-Based Stock Reduction Analysis

Extended Depletion-Based Stock Reduction Analysis (XDB-SRA), an extension of DB-SRA, is another model approved by the SSC for use in data-moderate assessments. XDB-SRA can be implemented within a Bayesian framework, with the priors for the parameters updated based on index data. The additional parameters in XDB-SRA compared with DB-SRA include the catchability coefficient (q), and the extent of observation variance additional to that inferred from sampling error (a). The priors for these parameters are a weakly informative log-normal and a uniform distribution, respectively.

Full Stock Assessments

Full, or benchmark, stock assessments are those where Stock Assessment Teams (STATs) can propose new models and explore new data to determine the status and dynamics of a fish stock. The Council has a rigorous process for first determining those stocks that will be assessed and, once determined, how they will be reviewed (the process is codified in the Stock Assessment and Review Terms of Reference, which is updated every other year; available at http://www.pcouncil.org/groundfish/stock-assessments/terms-of-reference/). Full assessments are more vigorously reviewed than other types of assessments since they are inherently more complicated. A week-long Stock Assessment Review (STAR) panel meeting occurs with STATs presenting assessment models to a panel of experts (typically comprised of one SSC Groundfish Subcommittee member who chairs the meeting, one west coast groundfish assessment expert, two independent reviewers from the Center of Independent Experts, one Groundfish Management Team advisor, one Groundfish Advisory Subpanel advisor, and a member of the Council staff). The STAR panel prepares a report recommending whether the assessment is robust enough to be used in management, along with other detailed recommendations on how to interpret assessment results and how to improve the assessment next time it is conducted. STAR panel reports also detail the model and data explorations that occurred during the review. The draft assessment and STAR panel report are then reviewed by the SSC. The assessment is only adopted for use in management decision-making if recommended by the SSC.

Stocks assessed with SSC-endorsed assessments are categorized either as category 1, category 2, or assigned a stock-specific category depending on the quality of data informing the assessment, relative uncertainty of model estimates, and/or whether individual year class strength (i.e., recruitment) is estimated.

Stock Synthesis

Most of the groundfish assessments on the U.S. west coast used to currently inform management decisions have been done in Stock Synthesis (SS). Stock Synthesis provides a statistical framework for calibration of a population dynamics model using a diversity of fishery and survey data. It is designed to accommodate both age and size structure in the population and with multiple stock sub-areas. Selectivity can be cast as age specific only, size-specific in the observations only, or size-specific with the ability to capture the major effect of size-specific survivorship. The overall model contains subcomponents which simulate the population dynamics of the stock and fisheries, derive the expected values for the various observed data, and quantify the magnitude of difference between observed and expected data. Some SS features include ageing error, growth estimation, spawner-recruitment relationship, movement between areas. SS is most flexible in its ability to utilize a wide diversity of age, size, and aggregate data from fisheries and surveys. The ADMB C++ software in which SS is written searches for the set of parameter values that maximize the goodness-of-fit, then calculates the variance of these parameters using inverse Hessian and MCMC methods. A management layer is also included in the model allowing uncertainty in estimated parameters to be propagated to the management quantities, thus facilitating a description of the risk of various possible management scenarios, including forecasts of possible annual catch limits. The structure of Stock Synthesis allows for building of simple to complex models depending upon the data available. The latest version of SS used in most of the assessments done in 2013 is version 3.24f (download available at http://nft.nefsc.noaa.gov/SS3.html).

Extended Depletion-Based Stock Reduction Analysis

XDB-SRA, described above, was used in the 2013 full assessment of cowcod in the Southern California Bight (see section 1.1.3.3). While XDB-SRA is an approved data-moderate assessment model, it can also be parameterized to incorporate compositional data[3].

Updated Assessments

An update assessment uses the model structure of the stock's last full, SSC-endorsed assessment, but is generally restricted to the addition of new data that have become available since the last full assessment. It must carry forward the fundamental structure of the last full assessment reviewed and endorsed by a STAR panel, the SSC, and the Council. Assessment structure here refers to the population dynamics model, data sources used as inputs to the model, the statistical platform used to fit model to the data, and how the management quantities used to set harvest specifications are calculated. Particularly, when an update assessment is developed, no substantial changes should be made to 1) the particular sources of data used, 2) the software used in programming the assessment, 3) the assumptions and structure of the population dynamics model underlying the stock assessment, 4) the statistical framework for fitting the model to the data and determining goodness of fit, and 5) the analytical treatment of model outputs in determining management reference points.

Major changes to the assessment should be postponed until the next full assessment. Minor alterations to the input data and the assessment can be considered as long as the update assessment clearly documents and justifies the need for such changes. A step-by-step transition (via sensitivity analysis) from the last full assessment to an update assessment under review should be provided. Minor alterations can be considered under only two circumstances: first, when the addition of new data reveals an unanticipated sensitivity of the model, and second, when there are clear and straightforward improvements in the input data and how it is processed and analyzed for use in the model. Examples of minor alterations include: 1) changes in how compositional data are pooled across sampling strata, 2) the weighting of the various data components (including the use of methods for tuning the variances of the data components), 3) changes in the time periods for the selectivity blocks, 4) correcting data entry errors, and 5) bug fixes in software programming. This list is not meant to be exhaustive, and other alterations can be considered if warranted. Ideally, improved data or methods used to process and analyze data would be reviewed by the SSC prior to being used in assessments.

The SSC reviews all updated assessments; a STAR panel review is not needed since the assessment only updates the last full, STAR panel-reviewed assessment.

1.1.2.2 Rebuilding Analyses

Rebuilding analyses use the results of stock assessments and project stock rebuilding periods under alternative harvest control rules in a stochastic fashion. In other words, a rebuilding analysis involves projecting the status of the overfished resource into the future under a variety of alternative harvest strategies to determine the probability of recovery to B_{MSY} (or its proxy) within a pre-specified time-frame. Rebuilding analyses are used to develop new rebuilding plans or in consideration for modifying existing rebuilding plans; rebuilding plans dictate the target year to rebuild a stock, the harvest control rules for rebuilding the stock, and any other special management measures designed to foster rebuilding. Rebuilding analyses also are used to determine the OFLs and ACLs for overfished stocks.

[3] Note that the 2013 cowcod assessment excluded compositional data within the model. However, the model was subject of the two-step (i.e., STAR panel and SSC) review process defined for full assessments.

The steps when conducting a rebuilding analysis are 1) estimation of B_0 (and hence B_{MSY} or its proxy), 2) selection of a method to generate future recruitment, 3) specification of the mean generation time (defined as the predicted time it would take for a mature female in the population to replace herself), 4) calculation of the minimum and maximum times to recovery, and 5) identification and analysis of alternative harvest strategies and rebuilding times. Most rebuilding analyses are done using software developed by Dr. André Punt from the University of Washington (informally termed the Puntalyzer; available at http://fish.washington.edu/people/punt/software.html).

The Puntalyzer uses "Monte Carlo simulation" to derive a probability estimate for a given rebuilding strategy. This method projects population growth many times in separate simulations. It accounts for possible variability by randomly choosing the value of a key variable, in this case total recruitment or recruits per spawner from a range of values. These values can be specified empirically, by listing some set of historical values, or by a relationship based on a model. The SSC recommends that the rebuilding analyses use historical values. Because of this variability in a key input value, each simulation will show a different pattern of population growth. As a result, a modeled population may reach the target biomass that defines a rebuilt stock (B_{MSY}) in a different year in each of the simulations.

This technique is first used to calculate minimal time to rebuild a stock given its level of depletion and productivity from the time of implementing the first rebuilding plan (T_{MIN}) in probabilistic terms, which is defined as the time needed to reach the target biomass in the absence of fishing with a 50 percent probability. In other words, in half the simulations the target biomass was reached in some year up to and including the computed T_{MIN}. Given T_{MIN}, the maximum legal time to rebuild (T_{MAX}) is computed as 10 years or by adding the value of one mean generation time to T_{MIN}, if T_{MIN} is greater than or equal to 10 years. In cases, where there is consideration for modifying an existing rebuilding plan, the shortest time to rebuild is calculated as the biological limit for the stock to rebuild in the absence of fishing beginning in the year the modified rebuilding plan is implemented; this limit is denoted, "$T_{F=0}$".

A target rebuilding year, T_{TARGET}, is set as a year at T_{MIN} (or $T_{F=0}$) or greater, which does not exceed T_{MAX} ,and which is as short as possible, taking into account the status and biology of the stock, the needs of fishing communities, and the interaction of the stock of fish within the marine ecosystem. Prior to Amendment 16-4, the Council set T_{TARGET} in part by considering the probability of rebuilding the stock by T_{MAX}. The Council may continue to review the probability of rebuilding the stock by T_{MAX} given differing harvest control rules, a reference parameter known as "P_{MAX}." The Magnuson-Stevens Act, however, simply requires that rebuilding periods be as short as possible, taking into account:

- the status and biology of any overfished stocks of fish;
- the needs of fishing communities;
- recommendations by international organizations in which the United States participates; and
- the interaction of the overfished stock of fish within the marine ecosystem (§304(e)(4)(A)(i)).

It is important to recognize that some of the terms introduced and described above represent policy decisions at the national level and the Council **does not have a choice** in setting their values. The dates for T_{MIN} and T_{MAX} are determined based on guidelines established at the national level. Mean generation time is a biological characteristic that cannot be chosen by policymakers. Thus, the Council cannot choose these values and then use them as a basis for management. Defined in national guidelines, T_{MIN} is a consequence of the productivity of the fish stock and is calculated by fishery biologists based on information they get from a particular stock. Similarly, T_{MAX}, which is calculated from T_{MIN}, does not represent a Council choice.

Policy flexibility comes into play in determining T_{TARGET}, or the time by which the stock is projected to rebuild. As explained earlier, the time to rebuild must be as short as possible, taking into account the status and biology of the stock, the needs of fishing communities, and the interaction of the stock of fish within the marine ecosystem. When developing a management strategy the Council can choose a fishing mortality rate and corresponding annual level of fishing. However, when rebuilding overfished species, the choice of the harvest control rule is based on the value of T_{TARGET}, keeping in mind that these values cannot be chosen independently of one another. In other words, the Council may choose one value and derive the other from it, but they cannot choose these values independently of the other.

The current groundfish rebuilding plan parameters are depicted in Table 7.

Table 4. Management quantities estimated from the most recent stock assessments informing management in 2015 and beyond.

Stock	Year of Most Recent Assessment	Est. Depletion a/	Initial Spawning Biomass (B_0)	Current Spawning Biomass a/	Current Total Biomass a/	Spawning Biomass at MSY	Harvest Rate at MSY	MSY	MSY Basis
Arrowtooth flounder	2007	0.79	80,313 mt	63,302 mt	85,175 mt	22,524 mt	0.162	5,833 mt	$F_{30\%}$
Aurora rockfish	2013	0.64	2,626 mt	1,673 mt	4,366 mt	1,213 mt	0.025	67 mt	$F_{50\%}$
Black rockfish (S of Cape Falcon)	2007	0.71	4,578.5 M larvae	3,227 M larvae	23,232 M larvae	1,831.4 M larvae	0.072	1,035.4 mt	$F_{50\%}$
Black rockfish (N of Cape Falcon)	2007	0.53	2,321 mt	1,239 mt	7,558 mt	928 mt	0.110	408 mt	$F_{50\%}$
Blackgill rockfish	2011	0.30	1,188 M larvae	359 M larvae	6,585 mt	543.0 M larvae	0.022	177 mt	$F_{50\%}$
Blue rockfish	2007	0.30	2,077 M larvae	622 M larvae	5,447 mt	831 mt	0.040	275 mt	$F_{50\%}$
Bocaccio	2013	0.31	8,117,510 M eggs	2,551,060 M eggs	19,077 mt	3,307,000 M eggs	0.067	1,341 mt	$F_{50\%}$
Brown rockfish	2013	0.42	1,794 mt	727 mt	1454 mt	582	0.102	149	$B_{40\%}$
Cabezon (CA)	2009	0.48	1,298 mt	627 mt	1,342 mt	515 mt	0.118	149 mt	$F_{45\%}$
Cabezon (OR)	2009	0.52	409 mt	214 mt	455 mt	157 mt	0.120	49 mt	$F_{45\%}$
California scorpionfish	2005	0.80	1,024 mt	816 mt	1,866 mt	259 mt	0.161	127 mt	est.
Canary rockfish	2011	0.23	27,846 mt	6,458 mt	16,124 mt	9,545 mt	0.033	799 mt	$F_{50\%}$
Chilipepper rockfish	2007	0.71	33,390 mt	23,827 mt	32,401 mt	15,482 mt	0.088	2,099 mt	$F_{50\%}$
China rockfish (N of 40°10’ N. lat.)	2013	0.37	243 mt	84 mt	168 mt	97 mt	0.045	9 mt	$B_{40\%}$
China rockfish (S of 40°10’ N. lat.)	2013	0.66	405 mt	264 mt	527 mt	162 mt	0.100	32 mt	$B_{40\%}$
Copper rockfish (N of Pt. Con.)	2013	0.48	1,704 mt	795 mt	1,590 mt	681 mt	0.083	114 mt	$B_{40\%}$
Copper rockfish (S of Pt. Con.)	2013	0.76	942 mt	699 mt	1,397 mt	377 mt	0.109	84 mt	$B_{40\%}$
Cowcod	2013	0.34	1,549 mt	524 mt	1,049 mt	620 mt	0.050	62 mt	$B_{40\%}$
Darkblotched rockfish	2013	0.36	3,358 M eggs	1,214 M eggs	16,613 mt	1,343 M eggs	0.040	675 mt	$B_{40\%}$
Dover sole	2011	0.84	469,866 mt	393,507 mt	684,685 mt	119,033 mt	0.128	34,743 mt	$F_{30\%}$
English sole	2013	0.89	29,349 mt	26,152 mt	46,968 mt	4,898 mt	0.618	4,136 mt	$F_{30\%}$

Stock	Year of Most Recent Assessment	Est. Depletion a/	Initial Spawning Biomass (B_0)	Current Spawning Biomass a/	Current Total Biomass a/	Spawning Biomass at MSY	Harvest Rate at MSY	MSY	MSY Basis
Gopher rockfish	2005	0.97	1,995 mt	1,931 mt	2,440 mt	798 mt	0.103	101 mt	$F_{50\%}$
Greenspotted rockfish	2011	0.35	1,357.8 B eggs	449.9 B eggs	3,110 mt	621 B eggs	.034 N; .024 S	95.6 mt	$F_{50\%}$
Greenstriped rockfish	2009	0.81	7,090 M eggs	5,736 M eggs	29,391 mt	3,101 M eggs	0.044	738 mt	$F_{50\%}$
Kelp greenling (OR)	2005	0.49	b/	b/	b/	b/	b/	b/	b/
Lingcod (WA & OR)	2009	0.62	33,075 mt	20,484 mt	32,222 mt	13,671 mt	0.082	1,710 mt	$F_{45\%}$
Lingcod (CA)	2009	0.74	25,311 mt	18,656 mt	31,266 mt	10,462 mt	0.084	1,492 mt	$F_{45\%}$
Longnose skate	2007	0.66	7,034 mt	4,634 mt	71,971 mt	844 mt	0.043	787 mt	$F_{45\%}$
Longspine thornyhead	2013	0.75	39,134 mt	29,436 mt	68,131 mt	15,654 mt	0.060	2,487 mt	$F_{50\%}$
Pacific ocean perch	2011	0.19	6,556 B eggs	1,079.4 B eggs	106,847 mt	1,311.2 B eggs	0.032	863 mt	$F_{50\%}$
Pacific sanddabs	2013	0.96	b/	b/	b/	b/	b/	b/	b/
Pacific whiting	2013	0.72	2.081 M mt	1.504 M mt	NA	.556 M mt	0.184	.243 M mt	$F_{40\%}$
Petrale sole	2013	0.22	32,426 mt	7,233 mt	15,015 mt	8,107 mt	0.170	2,750 mt	$B_{25\%}$
Rex sole	2013	0.79	8,162 mt	6,474 mt	18,497 mt	560 mt	0.560	1,956 mt	$F_{30\%}$
Rougheye/blackspotted rockfish	2013	0.47	5,394 mt	2,552 mt	8,176 mt	2,491 mt	0.027	194 mt	$F_{50\%}$
Sablefish	2011	0.33	182,136 mt	60,957 mt	205,662 mt	61,926 mt	0.050	10,021 mt	$F_{45\%}$
Sharpchin rockfish	2013	0.89	16,208 mt	14,426 mt	12,767 mt	1,944 mt	0.101	1,004 mt	$F_{50\%}$
Shortbelly rockfish	2007	0.73	c/	35,000 mt	NA	NA	NA	NA	NA
Shortspine thornyhead	2013	0.74	189,765 mt	140,753 mt	244,400 mt	75,906 mt	0.015	2,034 mt	$F_{50\%}$
Spiny dogfish	2011	0.63	70,724 K fish	44,660 K fish	215,988 K fish	28,290 K fish	0.006	831 mt	$B_{40\%}$
Splitnose rockfish	2009	0.66	12,853 M eggs	8,426 M eggs	74,772 mt	5,006 M eggs	0.033	1,244 mt	$F_{50\%}$
Starry flounder	2005	0.50	7,158 mt	3,566 mt	7,638 mt	1,830 mt	0.229	1,848 mt	$F_{30\%}$
Stripetail rockfish	2013	>0.775	b/	b/	b/	b/	b/	b/	b/

Stock	Year of Most Recent Assessment	Est. Depletion a/	Initial Spawning Biomass (B_0)	Current Spawning Biomass a/	Current Total Biomass a/	Spawning Biomass at MSY	Harvest Rate at MSY	MSY	MSY Basis
Widow rockfish	2011	0.51	71,126 mt	36,342 mt	68,238 mt	32,315 mt	0.067	4,758 mt	$F_{50\%}$
Yelloweye rockfish	2011	0.21	1,028 M eggs	219 M eggs	2,188 mt	411 M eggs	0.022	58 mt	$F_{50\%}$
Yellowtail rockfish	2013	0.69	68,887 mt	38,168 mt	143,384 mt	19,020 mt	0.163	11,172 mt	$F_{50\%}$

a/ Estimates pertain to the most recent assessment year.

b/ The assessment results were only used for informing status since the scale of the population could not be adequately determined.

c/ A dynamic B_0 was modeled with an initial biomass estimate of 187,000 mt in 1950 and a mean unfished biomass of 48,000 mt.

Table 5. Parameters estimated and/or assumed in base models in the most recent west coast groundfish stock assessments, excluding those done using XDB-SRA.

Stock	ln(R0)	Steepness (h)		Sigma-r	von-Bertalanffy Growth Coefficient (K)		Natural Mortality (M)		
		value	est.?		females	males	females	males	est.?
Arrowtooth flounder	10.26	0.90	N	0.8	0.17	0.39	0.166	0.274	N
Aurora rockfish	6.64	0.78	N	0.5	0.09	0.09	0.035	0.037	a/
Black rockfish (S of Cape Falcon)	8.97	0.60	N	0.5	0.17	0.26	0.160 < 10 yrs 0.240 > 15 yrs	0.160	N
Black rockfish (N of Cape Falcon)	8.04	0.60	N	0.35	0.164	0.194	0.200	0.160	Y
Blackgill rockfish	7.73	0.65	N	0.5	0.028	0.047	0.063	0.065	N
Blue rockfish	8.08	0.58	N	0.5	0.147	0.295	0.100	0.120	N
Bocaccio	8.55	0.61	Y	1.0	0.22	0.27	0.150	0.150	N
Cabezon (CA N of Pt. Con.)	6.78	0.70	N	0.5	0.149	0.269	0.250	0.300	N
Cabezon (CA S of Pt. Con.)	5.33	0.70	N	0.7	0.130	0.230	0.250	0.300	N
Cabezon (OR)	5.27	0.70	N	0.5	0.190	0.178	0.250	0.300	N
California scorpionfish	7.63	0.70	N	1.0	0.13	0.12	0.250	0.250	N
Canary rockfish	8.12	0.51	N	0.5	0.125	0.162	0.060 < 6 yrs 0.092 ≥ 6 yrs	0.060	Y
Chilipepper rockfish	19.45	0.57	N	1.0	0.2 - 0.32 b/	0.2 - 0.32 b/	0.160	0.200	N

Stock	ln(R0)	Steepness (h)		Sigma-r	von-Bertalanffy Growth Coefficient (K)		Natural Mortality (M)		
		value	est.?		females	males	females	males	est.?
Darkblotched rockfish	7.84	0.78	N	0.75	0.2	0.26	0.050	0.067	a/
Dover sole	12.85	0.80	N	0.35	0.150	0.171	0.117	0.142	Y
English sole	11.62	0.80	N	0.8	0.393	0.480	0.260	0.260	N
Gopher rockfish	7.92	0.65	N	0.5	0.186	0.186	0.200	0.200	N
Greenspotted rockfish (CA N of Pt. Con.)	6.15	0.76	N	0.7	0.057	0.057	0.065	0.065	N
Greenspotted rockfish (CA S of Pt. Con.)	6.65	0.76	N	0.7	0.042	0.042	0.065	0.065	N
Greenstriped rockfish	9.62	0.69	N	0.84	0.11	0.15	0.080	0.080	N
Kelp greenling (OR)	7.02	0.70	N	1.0	0.3	0.4	0.260	0.260	N
Lingcod (WA & OR)	8.06	0.80	N	0.5	0.13	0.22	0.180	0.320	N
Lingcod (CA)	8.17	0.80	N	0.5	0.11	0.23	0.180	0.320	N
Longnose skate	9.65	0.40	N	c/	0.064	0.064	0.200	0.200	N
Longspine thornyhead	11.82	0.60	N	0.6	0.109	0.109	0.111	0.111	N
Pacific ocean perch	9.14	0.40	N	0.7	0.159	0.195	0.050	0.051	N
Pacific whiting	21.71	0.82	Y	1.4	d/	d/	0.224	0.224	Y
Petrale sole	9.72	0.86	Y	0.4	0.13	0.21	0.150	0.169	Y
Rex sole	9.97	0.80	N	0.8	0.388	0.388	0.200	0.190	Y
Rougheye/blackspotted rockfish	6.19	0.78	N	0.4	0.081	0.081	0.042	0.042	Y
Sablefish	10.01	0.60	N	0.6	0.335	0.419	0.080	0.065	Y
Sharpchin rockfish	9.16	0.95	Y	0.8	0.17	0.20	0.080	0.080	N
Shortbelly rockfish	12.64	0.65	N	1.0	0.198	0.200	0.260	0.260	N
Shortspine thornyhead	10.32	0.60	N	0.5	0.018	0.018	0.051	0.051	N
Spiny dogfish	10.07	0.28	e/	0.2	0.026	0.052	0.064	0.064	N
Splitnose rockfish	9.54	0.58	N	1.0	0.156	0.165	0.048	0.048	N
Starry flounder (OR & WA)	7.96	0.80	N	1.0	0.251	0.426	0.510	0.760	N
Starry flounder (CA)	7.23	0.80	N	1.0	0.251	0.426	0.510	0.760	N
Widow rockfish	10.06	0.76	N	0.65	0.209	0.233	0.120	0.129	Y
Yelloweye rockfish	5.43	0.44	Y	b/	0.047	0.047	0.046	0.045	Y
Yellowtail rockfish	10.28	0.95	Y	0.8	0.170	0.190	0.110	0.110	Y

a/ Female M was fixed and male M was estimated as an offset to female M.

b/The base case model allowed growth for each sex to differ between blocks of time, based on freely estimating the K parameter.

Stock	ln(R0)	Steepness (h)		Sigma-r	von-Bertalanffy Growth Coefficient (K)		Natural Mortality (M)		
		value	est.?		females	males	females	males	est.?

c/ Recruitment variability (sigma-r) not estimated.

d/ The 2013 Pacific whiting assessment uses weight-at-age, thus there is no estimate of growth. Weight-at-age varies between years; therefore, growth is time-varying.

e/ Steepness was a derived quantity from the 2011 assessment, not an estimated parameter from an alternative stock-recruitment relationship modeled in the assessment.

Table 6. Parameters estimated and/or assumed in base models in 2013 west coast groundfish stock assessments using XDB-SRA.

Stock	ln(R0)	Productivity Parameters				von-Bertalanffy Growth Coefficient (K)		Natural Mortality (M)		
		B_{MSY}	F_{MSY}	B_{MSY}/B_0	F_{MSY}/M	females	males	females	males	est.?
Brown rockfish		1,387.4	0.129	0.400	0.954	0.16	0.16	0.134	0.137	Y
China rockfish (N of 40º10' N lat.)		186.1	0.053	0.395	0.918	0.192	0.194	0.057	0.055	Y
China rockfish (S of 40º10' N lat.)		417.2	0.088	0.464	1.304	0.192	0.194	0.065	0.055	Y
Copper rockfish (N of Pt. Con.)		1,103.9	0.099	0.404	1.092	0.127	0.224	0.089	0.090	Y
Copper rockfish (S of Pt. Con.)		1,058.4	0.094	0.481	1.040	0.127	0.224	0.089	0.090	Y
Cowcod		1,239.5	0.050	0.422	1.051	NA	NA	0.054	NA	Y

1.1.3 Overfished Groundfish Stocks

There are six overfished west coast rockfish stocks (i.e., bocaccio south of 40º10' N lat., canary rockfish, cowcod south of 40º10' N lat., darkblotched rockfish, Pacific ocean perch, and yelloweye rockfish) and one overfished flatfish stock (i.e., petrale sole) at the start of 2013. All seven of these stocks are rebuilding and three (i.e., bocaccio south of 40º10' N lat., darkblotched rockfish, and petrale sole) are predicted to rebuild by the start of 2015. Descriptions of these overfished groundfish stocks follows.

Stock rebuilding parameters estimated from the most recent rebuilding analyses and current rebuilding parameters specified at the start of 2013 are provided in Table 7.

Table 7. Rebuilding parameters estimated in the most recent rebuilding analyses and specified in rebuilding plans for overfished groundfish stocks at the start of the 2013-2014 management cycle.

Stock	T_{MIN}	$T_{F=0}$	T_{MAX}	T_{TARGET}	Harvest Control Rule Specification
Bocaccio	2018	2018	2031	2022	SPR 77.7%
Canary	2027	2028	2050	2030	SPR 88.7%
Cowcod	2059	2060	2097	2068	SPR 82.7%
Darkblotched	2012	2016	2037	2025	SPR 64.9%
POP	2040	2043	2071	2051	SPR 86.4%
Petrale sole	2014	2014	2021	2016	25-5 Rule
Yelloweye	2044	2047	2083	2074	SPR 76%

1.1.3.1 Bocaccio

Distribution and Life History

Bocaccio (*Sebastes paucispinis*) is a rockfish species that ranges from Stepovak Bay on the Alaskan Peninsula (as well as Kodiak Island, Alaska) to Punta Blanca, Baja California, Mexico (Hart 1988; Miller and Lea 1972). Love, et al. (2002) and Thomas and MacCall (2001) describe bocaccio distribution and life history. Bocaccio are historically most abundant in waters off central and southern California. The southern bocaccio stock is most prevalent in the 54-82 fm depth zone (Casillas, *et al.* 1998).

Bocaccio are found in a wide variety of habitats, often on or near bottom features, but sometimes over muddy bottoms. They are found both nearshore and offshore (Sakuma and Ralston 1995). Larvae and small juveniles are pelagic (Garrison and Miller 1982) and are commonly found in the upper 100 m of the water column, often far from shore (MBC 1987). Large juveniles and adults are semi-demersal and are most often found in shallow coastal waters over rocky bottoms associated with algae (Sakuma and Ralston 1995). Adults are commonly found in eelgrass beds, or congregated around floating kelp beds love (Love, *et al.* 1990; Sakuma and Ralston 1995). Young and adult bocaccio also occur around artificial structures, such as piers and oil platforms (MBC 1987). Although juveniles and adults are usually found around vertical relief, adult aggregations also occur over firm sand-mud bottoms (MBC 1987). Bocaccio move into shallow waters during their first year of life hart (Hart 1988), then move into deeper water with increased size and age (Garrison and Miller 1982).

Bocaccio are ovoviviparous (live young are produced from eggs that hatch within the female's body) (Garrison and Miller 1982; Hart 1988). Love et al. (1990) reported the spawning season to last nearly an entire year (>10 months). Parturition occurs during January to April off Washington, November to March off Northern and Central California, and October to March off Southern California (MBC 1987). Fecundity ranges from 20,000 to 2,300,000 eggs. In California, two or more broods may be born per year (Love, *et al.* 1990). The spawning season is not well known in northern waters. Males mature at three to seven years, with about half maturing in four to five years. Females mature at three to eight years, with about half maturing in four to six years (MBC 1987).

Maximum age of bocaccio was radiometrically determined to be at least 40 years, and perhaps more than 50 years. Bocaccio are difficult to age, and stock assessments used length measurement data and growth curves to estimate the age composition of the stock (Ralston and Ianelli 1998). Although recent assessments have described the true natural mortality rate as a key unknown for estimating stock status, recent assessments have used a value of 0.15 (which is associated with an 86 percent adult annual survival rate in the absence of fishing mortality).

Larval bocaccio eat diatoms, dinoflagellates, tintinnids, and cladocerans (Sumida and Moser 1984). Copepods and euphausiids of all life stages (adults, nauplii and egg masses) are common prey for juveniles (Sumida and Moser 1984). Both Phillips (1964) and Love et al. (2002) described bocaccio rockfish as almost exclusively piscivorous, and include other rockfish, Pacific whiting, sablefish, anchovy, mesopelagic fishes and squid as the key prey for large juvenile and adult bocaccio. Bocaccio are eaten by sharks, salmon, other rockfishes, lingcod, albacore, sea lions, porpoises, and whales (MBC 1987). Adult bocaccio are often caught with chilipepper rockfish and have been observed schooling with speckled, vermilion, widow, and yellowtail rockfish (Love, *et al.* 2002). As pelagic juveniles, they may compete with chilipepper, widow, yellowtail, shortbelly, and other pelagic juvenile rockfishes for both food and habitat (Reilly, *et al.* 1992).

Stock Status and Management History

Bocaccio are managed as two separate west coast populations. The southern stock exists south of Cape Mendocino and the northern stock north of Cape Mendocino (the northern stock density is limited south of 48° N lat. with increasing abundance off Cape Flattery, Washington and points north). It is unclear whether this stock separation implies stock structure. The distribution of the two populations and evidence of lack of genetic intermixing suggests stock structure, although MacCall (2002) reported some evidence for limited genetic mixing of the two populations. Nonetheless, assessment scientists and managers have treated the two populations as independent stocks north and south of Cape Mendocino.

Bocaccio have long been an important component of California rockfish fisheries. Catches increased to high levels in the 1970s and early 1980s as relatively strong year-classes recruited to the stock. The Council began to recommend increasingly restrictive regulations after an assessment of the southern stock in 1990 (Bence and Hightower 1990) indicated that fishing rates were too high. The southern stock suffered poor recruitment during the warm water conditions that prevailed off Southern California beginning in the late 1980s. The 1996 assessment (Ralston, *et al.* 1996) indicated the stock was in severe decline. NMFS formally declared the stock overfished in March 1999 after the groundfish FMP was amended to incorporate the tenets of the Sustainable Fisheries Act. MacCall et al. (1999) confirmed the overfished status of bocaccio and estimated spawning output of the southern stock to be 2.1 percent of its unfished biomass.

In the 2002 assessment (MacCall 2002) relative abundance increased slightly from the previous assessment (4.8 percent of unfished biomass), potential productivity (as evidenced from the steepness of the spawner/recruit relationship, which reflects the level of compensatory production at low stock sizes) appeared lower than previously thought, making for a more pessimistic outlook. Furthermore, the 2002 assessment revealed that although the 1999 year class was the strongest in several years, it was weak relative to the range of possibilities considered in the 1999 assessment. The 2002 rebuilding analysis (MacCall and He 2002) predicted the stock would not rebuild within maximum time legally possible (T_{MAX}) even with no fishing-related mortality. Total mortality in 2003 fisheries was restricted to less than 20 mt as a means of conserving the stock while minimizing adverse socioeconomic impacts to communities.

The 2003 bocaccio assessment (MacCall 2003b) estimated a higher stock biomass (7.4% depletion) relative to the 2002 assessment. The instantaneous rate of natural mortality was changed from 0.2 to 0.15. Additional CalCOFI data indicated an increasing abundance trend due to recruitment of the 1999 year class. This was corroborated by a dramatic increase in recreational CPUE, which was at a record high level in central California north of Pt. Conception. The 2003 rebuilding analysis suggested the stock could rebuild to B_{MSY} within 25 years while sustaining an OY of approximately 300 mt in 2004 (MacCall 2003a).

The 2003 assessment was updated in 2005 and 2007 (MacCall 2006b; MacCall 2008b) using the original 2003 base model (i.e., STATc) in SS1. These assessments were used to establish annual specifications and management measures consistent with a strategy of a higher OY than the impacts anticipated under the suite of management measures adopted. This strategy was designed to buffer the effects of a large recruitment event like that observed for the 1999 year class. Such effects include disruption to fisheries as experienced in previous years when fisheries closed early to avoid young bocaccio. This buffer strategy, which addressed the large, episodic recruitment pattern inherent in the stock's dynamics, became a tenet of the bocaccio rebuilding plan.

A bocaccio rebuilding plan was adopted by the Council in 2004 under Amendment 16-3 (PFMC 2004). The rebuilding plan established a target rebuilding year of 2023 and a harvest control rule of F = 0.0498 (with a rebuilding probability (P_{MAX}) of 70 percent). (It was later clarified in the 2005 rebuilding analysis (MacCall 2006a) that the target rebuilding year had been incorrectly stated in the rebuilding plan to be 2023 since the 2003 rebuilding analysis indicated that a 50 percent probability rebuilding would require 23 years, and that this assumed a beginning date of 2004 (the first simulated year). Therefore, the Council amended the rebuilding plan's target year to 2026.

A new rebuilding analysis was conducted in 2007 (MacCall 2008a) based on the results of the 2007 stock assessment (MacCall 2008b). The 2007 bocaccio rebuilding analysis showed a similar rebuilding trajectory to that adopted in Amendment 16-4 and the rebuilding plan was maintained for the 2009-2010 management cycle.

A new bocaccio assessment (Field, *et al.* 2009) and rebuilding analysis (Field and He 2009) were prepared in 2009. Field et al. (2009) extended the assessment north of Cape Mendocino to Cape Blanco, Oregon; the U.S. west coast stock north of this point has not been assessed. Indications of strong 2009 and 2010 year classes were projected to result in increased abundance. Depletion in 2011 was estimated at 26 percent (18.7 -33.1 percent), with the stock projected to be rebuilt by 2019. Based on these analyses, the Council changed the target year for rebuilding bocaccio from 2026 to 2022; the amended rebuilding plan was implemented in 2011.

A bocaccio stock assessment update (Field 2011b) and rebuilding analysis (Field 2011a) were prepared in 2011. The 2011 bocaccio assessment was originally scheduled to be an update of the 2009 full assessment; however, the STAT some limited changes in the 2009 model structure since a strict update estimated that the 2010 year class was extraordinarily and unrealistically strong, based on length frequency data collected in the 2010 NMFS trawl survey. The modified update was ultimately reviewed, endorsed by the SSC, and adopted for use in management decision-making. The 2011 bocaccio rebuilding analysis indicated rebuilding progress was well ahead of schedule with a predicted median year to rebuild of 2021 or one year earlier than the target rebuilding year (Field 2011a). The Council elected to maintain the revised rebuilding plan implemented in 2011.

An update of the 2011 bocaccio assessment model was prepared in 2013, which confirmed the 2009 and 2010 year classes were indeed strong (Field 2013). The assessment estimated a depletion of 31.4 percent at the start of 2013 (Figure 4) and predicted the stock would rebuild by 2015. The SSC recommended maintaining the current rebuilding plan for the 2015-2016 management cycle and a full assessment be done in 2015 to confirm this prediction. The SSC further recommended against preparing a rebuilding analysis in 2013.

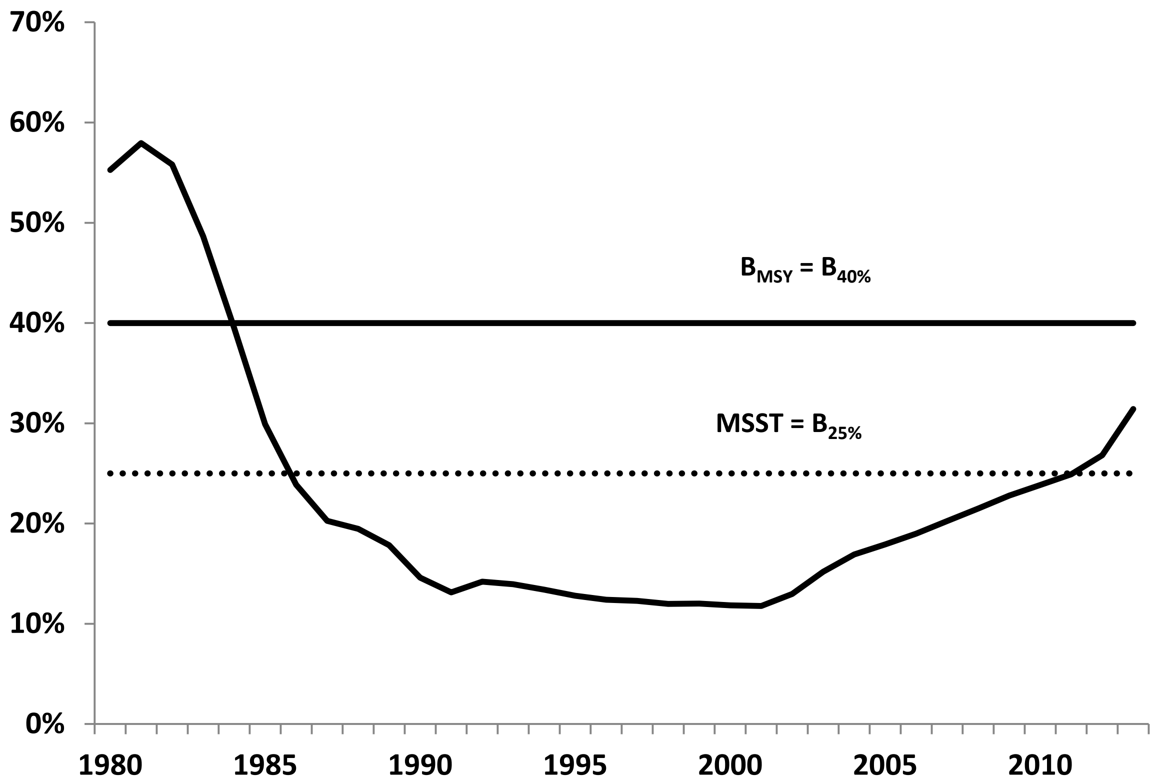

Figure 4. Relative depletion of bocaccio south of 40º10' N lat. from 1980 to 2013 based on the 2013 stock assessment update.

Stock Productivity Relative to Rebuilding Success

The 2013 bocaccio assessment produced a (very slightly) more optimistic estimation of steepness (from 0.595 to 0.614) relative to the 2011 model (the 2009 model had a point estimate of 0.573). Despite these modest changes, the overall trajectory of spawning output, relative spawning output, total biomass and recruitment are barely distinguishable as changed from the 2011 model, with the most important change being the relative strength of the 2010 year class. The strength of the 2010 year class is estimated with less uncertainty in the 2013 assessment.

Recruitment for bocaccio is highly variable, with a small number of year classes tending to dominate the catch in any given fishery or region. Adult abundance is highly variable even in the absence of fishing

(MacCall 2002). Recruitment appears to have been at very low levels throughout most of the 1990s, but the 1999 year class was the highest since 1988, and led to a substantive increase in abundance during the early 2000s. Several year classes of moderate strength (2003, 2005) occurred in the mid-2000s, and two recent very strong year classes (2009 and 2010) are now estimated to be comparable to (2009) and roughly double (2010) the size of the 1999 year class (Figure 5). These year classes were strongly evident in recreational length frequency data, in the NWFSC hook and line survey data (and length comps), and in the power plant impingement dataset modeled by Field (2013), as well as in an index (not included in the 2013 assessment update) of recreational CPUE. These strong year classes are already estimated to have resulted in an increase in abundance and spawning output, and should propel the stock spawning output to target levels by approximately 2015 as the 2010 year class continues to grow and mature. Preliminary estimates from the juvenile rockfish survey also indicate very strong abundance of young-of-the-year rockfish of many species (including bocaccio) in 2013, suggesting anecdotally that 2013 will also be a strong recruitment year for bocaccio, as well as for other species. However, these data are not incorporated in the 2013 update, which only includes data through 2012. Although poorly understood, the stock assessment suggests that recovery may be taking place more rapidly in the south, and recovery in the central/northern California region may be dependent on an influx of fish from the southern area.

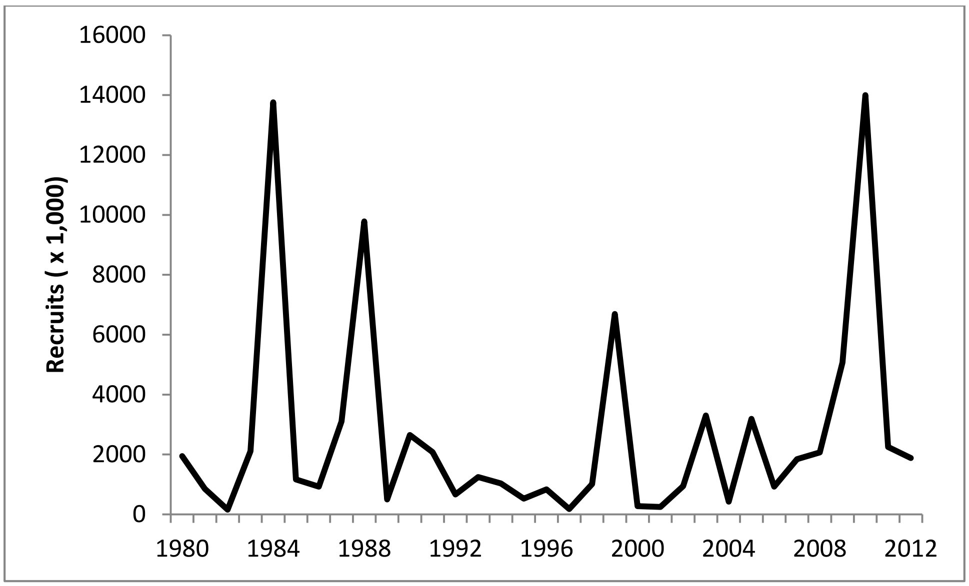

Figure 5. Estimated bocaccio recruitments, 1980-2012 (from Field 2013).

Fishing Mortality

The presence of a banner 2010 year class in the bocaccio stock is not entirely unexpected. Bocaccio stock production is characterized by high episodic recruitment and relatively rapid juvenile growth rates Field, et al. 2009. Juvenile bocaccio also recruit to shallow waters and are consequently caught in nearshore recreational fisheries as evidenced by dramatic spikes in both catch rates and the percentage of the total southern California rockfish catch that is bocaccio following strong recruitment events. Unlike most rockfish species where recruitment to fisheries usually takes several years due to low growth rates, juvenile bocaccio can recruit to nearshore fisheries in California within a year or two of parturition. Recruitment of the strong 1999 year class complicated management of California fisheries in 2001-2003, as this unpredictable event could not be reacted to in time given the lag in reconciling recreational catch estimates. Most species' rebuilding analyses are able to project recruitment into affected fisheries in time to decide and implement responsive management measures that will not compromise rebuilding plans.

However, the fast growth and unpredictable recruitment of bocaccio poses the unique problem of having to react to a large recruitment event in real time. This experience has led the Council to a strategy of adopting higher bocaccio OYs/ACLs and more conservative management measures that are predicted to result in catches much lower than these harvest limits. The rebuilding strategy has been formalized by deciding OYs/ACLs to determine rebuilding objectives and more stringent HGs for California. The buffer between the ACL (formerly the OY) and the HG accommodates the management uncertainty of an unforeseen recruitment event disrupting fisheries. Unlike an ACL, fisheries do not need to close upon attainment of an HG. The difference between the projected catch and the HG or ACL provides managers time to react to a strong recruitment to minimize mortality on bocaccio while minimizing disruptions to ongoing fisheries. This strategy has worked well to enhance bocaccio rebuilding while minimizing harm to California fishing communities.

Catch monitoring uncertainty is relatively high given the fact that a substantial amount of the total fishing mortality of bocaccio now occurs in the California recreational fishery, the sector with the largest bocaccio take in recent years. Recent recreational catch is estimated using the new California Recreational Fishing Survey (CRFS) program, which has been in existence since 2004. Prior to 2004, all recreational catch was estimated using the Marine Recreational Fisheries Statistical Survey (MRFSS) program, a survey methodology designed to understand long-term national trends in marine recreational catch and participation. The higher uncertainty in monitoring California recreational catches also translates into higher uncertainty in projecting recreational total mortalities. The fact that a substantial portion of the current take of bocaccio is in the California recreational fishery is another consideration for a relatively larger buffer between the predicted mortalities of bocaccio and the preferred ACLs.

Insert text and figure showing annual SPRs rel. to SPR of 77.7%

Rebuilding Duration and Probabilities

There is a high probability of successful bocaccio rebuilding by 2015 given the strength of recent year classes currently recruiting into the spawning population. The SSC has recommended a full assessment in 2015 to confirm this prediction.

1.1.3.2 Canary Rockfish

Distribution and Life History

Canary rockfish (*Sebastes pinniger*) are distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California; however, the species is most abundant from British Columbia to central California (Hart 1988; Love, *et al.* 2002; Miller and Lea 1972). Adults are primarily found along the continental shelf shallower than 300 m, although they are occasionally observed in deeper waters. Juvenile canary rockfish are found in shallow and intertidal areas (Love, *et al.* 2002).

Canary rockfish spawn in the winter, producing pelagic larvae and juveniles that remain in the upper water column for 3-4 months (Love, *et al.* 2002). These juveniles settle in shallow water around nearshore rocky reefs, where they may congregate for up to three years (Boehlert 1980; Sampson 1996) before moving into deeper water. The mean size of individuals captured in the trawl survey shows a characteristic ontogenetic shift to deeper water with increasing body size. The degree to which this ontogenetic shift may be accompanied by a component of latitudinal dispersal from shallow rocky reefs is unknown. Canary rockfish are a medium to large-bodied rockfish; achieving a maximum size of around 70 cm. Female canary rockfish reach slightly larger sizes than males.

Adult canary rockfish primarily inhabit areas in and around rocky habitat. They form very dense schools, leading to an extremely patchy population distribution that is reflected in both fishery and survey encounter rates.

Canary rockfish are relatively long-lived, with a maximum observed age of 95 years, however only males are commonly observed above the age of 50, while females tend to be rare above age 30. The degree to which this pattern reflects behavioral differences translating to reduced availability to fishery and survey fishing gear, or an increase in relative mortality for older females has been the focus of much discussion and remains unclear. A similar pattern has been observed for yellowtail rockfish (*Sebastes flavidus*), a closely related, but more pelagic species with a similar distribution (Wallace and Lai 2006).

Canary rockfish off the west coast exhibit a protracted spawning period from September through March, probably peaking in December and January off Washington and Oregon (Hart 1988; Johnson, *et al.* 1982). Female canary rockfish reach sexual maturity at roughly eight years of age. Like many members of Sebastes, canary rockfish are ovoviviparous, whereby eggs are internally fertilized within females, and hatched eggs are released as live young bond 1979 (Bond 1979; Golden and Demory 1984; Kendall and Lenarz 1986). Canary rockfish are a relatively fecund species, with egg production being correlated with size (e.g., a 49-cm female can produce roughly 0.8 million eggs, and a female that has realized maximum length (approximately 60 cm) produces approximately 1.5 million eggs (Gunderson 1971).

Very little is known about the early life history strategies of canary rockfish. The limited research that has been conducted indicates that larvae are strictly pelagic (near the ocean surface) for a short period of time and begin to migrate to demersal waters during the summer of their first year of life. Larvae develop into juveniles around nearshore rocky reefs, where they may congregate for up to three years (Boehlert 1980; Sampson 1996) . Evaluations of length distributions by depth demonstrate an increasing trend in mean size of fish with depth (Methot and Stewart 2006). Since 1990, stock assessments have assumed a base natural mortality rate of 0.06 (94 percent adult annual survival when there is no fishing mortality). Due to the rarity of old females in both survey and catch data, female canary rockfish have long been assumed to have increasing natural mortality rates with age (Golden and Wood 1990).

Little is known about ecological relationships between canary rockfish and other organisms. Adult canary rockfish are often caught with bocaccio, sharpchin, yelloweye, and yellowtail rockfishes, and lingcod. Researchers have also observed canary rockfish associated with silvergray and widow rockfish. Young-of-the-year feed on copepods, amphipods, and young stages of euphausiids. Adult canary rockfish feed primarily on euphausiids, as well as pelagic shrimp, cephalopods, mesopelagic fishes and other prey (Brodeur and Percy 1984; Lee 2002; Phillips 1964). Small canary rockfish are consumed by seabirds, Chinook salmon, lingcod, and marine mammals.

Stock Status and Management History

Canary rockfish have long been an important component of rockfish fisheries. The Council began to recommend increasingly restrictive regulations after an assessment in 1994 (Sampson and Stewart 1994) indicated that fishing rates were too high. Wallace and Cope (2011) estimated that the abundance of the canary rockfish stock dropped below B_{MSY} ($B_{40\%}$) in 1983 and below the MSST in 1990, at which time the annual catch was more than double the current estimate of the MSY level. Harvest rates in excess of the current fishing mortality target for rockfish (SPR = 50%) is estimated to have begun in the late 1970s and persisted through 1999. Recent management actions appear to have curtailed the rate of removal such that overfishing has not occurred since 1999, and recent SPR values are in excess of 90 percent.

A 1999 stock assessment showed the stock had declined to 6.6 percent of unfished biomass in the northern area (Columbia and U.S. Vancouver management areas) (Crone, *et al.* 1999) and in the southern area (Conception, Monterey, and Eureka areas) (Williams, *et al.* 1999). The stock was declared overfished in January 2000. The first rebuilding analysis (Methot 2000) used results from the northern area assessment to project rates of potential stock recovery. The stock was found to have extremely low productivity, defined as production of recruits in excess of the level necessary to maintain the stock at its current, low level. Rates of recovery were highly dependent upon the level of recent recruitment, which could not be estimated with high certainty. The initial rebuilding OY for 2001 and 2002 was set at 93 mt based upon a 50 percent probability of rebuilding by the year 2057, a medium level for these recent recruitments, and maintaining a constant annual catch of 93 mt through 2002.

A coastwide 2002 canary rockfish assessment estimated stock depletion to be 7.9 percent at the start of 2002 (Methot and Piner 2002b). A canary rockfish rebuilding plan was adopted in 2003 under Amendment 16-2 based on the results of the 2002 rebuilding analysis (Methot and Piner 2002a). The rebuilding plan established a target rebuilding year of 2074 and the harvest control rule of F = 0.022 (with a P_{MAX} of 60 percent).

A full canary rockfish assessment was done in 2005 indicating a stock depletion of 9.0 percent at the start of 2005 (Methot and Stewart 2006). The assessment was based on two equally plausible models; one with differential male and female gear selectivities and one without gender-specific selectivities. A critical uncertainty in canary rockfish assessments was the lack of older, mature females in surveys and other assessment indices. There were two competing explanations for this observation. Older females could have a higher natural mortality rate, resulting in their disproportionate disappearance from the population. Alternatively, survey and fishing gears may be less effective at catching them, perhaps because older females are associated with habitat inaccessible to most trawl gear. If this is the case, then these fish (which, because of their higher spawning output, may make an important contribution to future recruitment) are part of the population, but remain poorly sampled. Methot and Stewart (2006) assumed a linear increase in female natural mortality from 0.06 at age 6 to approximately 0.09 at age 14. In the base model (differential male-female selectivity) B_0 was estimated to be 34,798 mt, resulting in a depletion level of 5.7 percent. In the alternate model (no difference in selectivity) B_0 was estimated to be 33,872 mt, with a depletion level of 11.3 percent. The steepness of the spawner-recruitment relationship, which largely determines the rate of increase in recruitment as the stock rebuilds, was estimated to be 0.33 in the base model, and 0.45 in the alternate model. The approved canary rockfish rebuilding analysis (Methot 2006) blended the two models by alternately re-sampling between the two input parameter sets.

The 2005 canary rebuilding analysis (Methot 2006) was used to inform the revised canary rebuilding plan adopted under Amendment 16-4, which specified a target rebuilding year of 2063 and a constant harvest strategy (SPR = 88.7%). Amendment 16-4 rebuilding plans were implemented in 2007.

The 2007 canary assessment estimated relative depletion level was 32.4 percent at the start of 2007 (Stewart 2008b). This was a significant departure from the previous assessment and largely driven by a higher assumed steepness (h = 0.51) relative to past assessments. The 2007 canary rebuilding analysis (Stewart 2008a) predicted the SPR harvest rate in the rebuilding plan (88.7%) would rebuild 42 years earlier (2021) than the originally estimated rebuilding schedule (2063). A modification of the Amendment 16-4 canary rockfish rebuilding plan specifying a target rebuilding year of 2021 while maintaining the SPR harvest rate of 88.7% was implemented in 2009.

The 2009 canary assessment (Stewart 2009c), an update of the 2007 assessment, estimated stock depletion at 23.7% at the start of 2009. This change in stock status was due to a lower estimate of initial, unfished biomass (B_0) largely attributable to the inclusion of revised historical California catches from a formal reconstruction of 1916-1980 California catch data (Ralston, *et al.* 2010). The 2009 canary rebuilding analysis (Stewart 2009a) predicted the stock would not rebuild to the target year of 2021 with at least a 50% probability even in the absence of fishing-related mortality starting in 2011 ($T_{F=0}$). The rebuilding plan was revised by changing the target to rebuild the stock to 2027 while maintaining the 88.7% SPR harvest rate; the revised rebuilding plan was implemented in 2011.

Another update assessment was prepared in 2011 (Wallace and Cope 2011), which estimated stock depletion was 23.2 percent at the start of 2011 (Figure 6). This change in stock status was due to a lower estimate of initial, unfished biomass (B_0) largely attributable to the inclusion of revised historical Oregon catches from a formal reconstruction of Oregon catch data. For the period 2000-2011, the spawning biomass was estimated to have increased from 11.2 percent to 23.2 percent of the unfished biomass level.

The 2011 canary rebuilding analysis (Wallace 2011) predicted the stock would not rebuild to the target year of 2027 with at least a 50% probability. The rebuilding plan was revised slightly by changing the target to rebuild the stock to 2030 while maintaining the 88.7% SPR harvest rate; the revised rebuilding plan was implemented in 2013.

A canary catch report was provided in 2013 (Agenda Item F.5.a, Attachment 9, June 2013), which indicated 2010-2012 total catches were below specified ACLs/OYs.

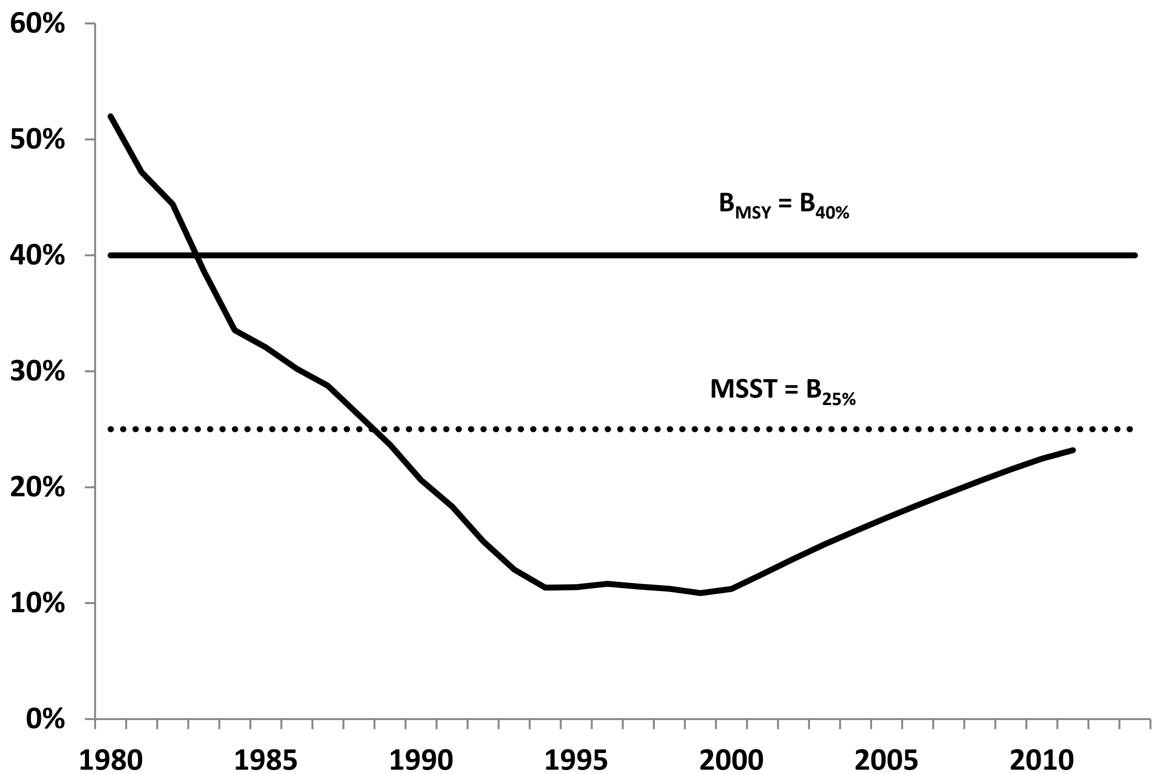

Figure 6. Relative depletion of canary rockfish from 1980 to 2011 based on the 2011 stock assessment update.

Stock Productivity Relative to Rebuilding Success

Steepness is assumed to be 0.511 in the latest full assessment (Stewart 2008b) and the subsequent updates to that assessment (Stewart 2009c; Wallace and Cope 2011). This is a moderate to relatively low value of steepness for rockfish, as compares to the prior mean steepness (0.779) derived from meta-analysis of west coast rockfish stocks used in 2013 assessments (e.g., darkblotched rockfish, see section 1.1.3.4).

Lower steepness implies a greater dependence on the size of the spawning population. The projected increase in the canary rockfish biomass from the 2011 assessment is very sensitive to the value for steepness and was projected to slow as below average recruitments begin to contribute to the spawning biomass.

Steepness is a difficult parameter to estimate and canary rockfish assessments are especially uninformative of steepness. The assumed canary steepness of 0.511 used in the last three assessments was based on the Dorn (2002a; Dorn 2002b) meta-analysis of west coast rockfish stocks The value used in many 2013 assessments was based on an update of the Dorn (2002a) analysis (J. Thorson, pers. comm.).

Wallace and Cope (2011) estimated canary rockfish recruitment deviations based on the data. After a period of above average recruitments, recent year-class strengths (1997-2010) have generally been low, with only 2 of the 10 years (2001 and 2007) producing large estimated recruitments (Figure 7). The strength of the 2007 year class is subject to greater uncertainty than other strong recruitment events in the last 30 years because of the limited number of years in which it has been observed. As the larger recruitments from the late 1980s and early 1990s move through the population in future projections, the effects of recent poor recruitment may tend to slow the rate of recovery.

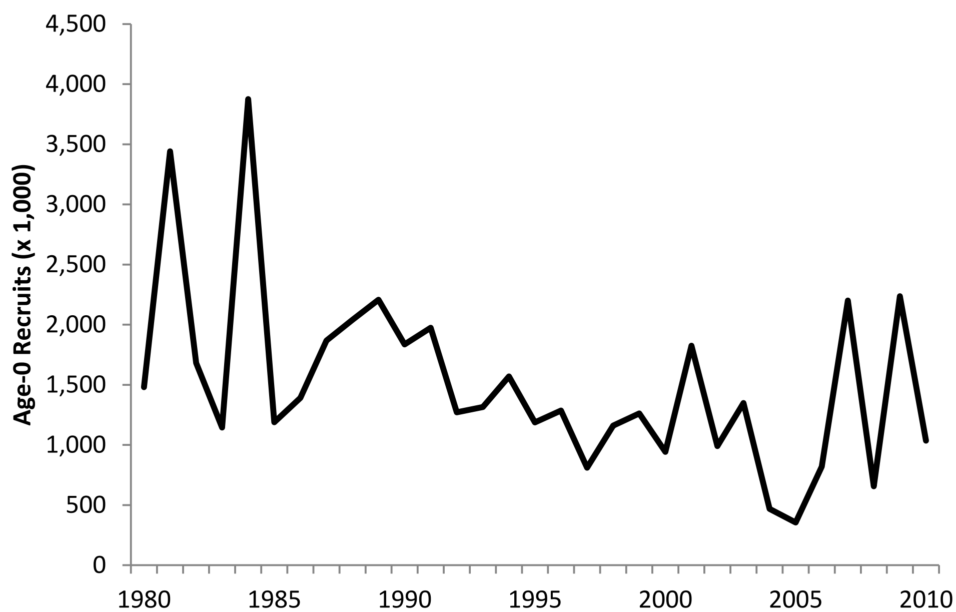

Figure 7. Estimated canary rockfish recruitments, 1980-2010 (from Wallace and Cope 2011).

Fishing Mortality

Fishing mortality rates for canary rockfish in excess of the current proxy F_{MSY} harvest rates for rockfish (SPR = 50%) are estimated to have begun in the late 1970s and persisted through 1999. Figure 8 depicts estimated annual harvest rates relative to the overfishing limit (F_{MSY}) and the current SPR harvest rate limit specified in the rebuilding plan. Recent management actions appear to have curtailed the rate of removal such that overfishing has not occurred since before 1999 and maintained harvest rates below the current rebuilding SPR since 2005. Relative exploitation rates (catch/biomass of age-5 and older fish) are estimated to have been less than 1% since 2001.

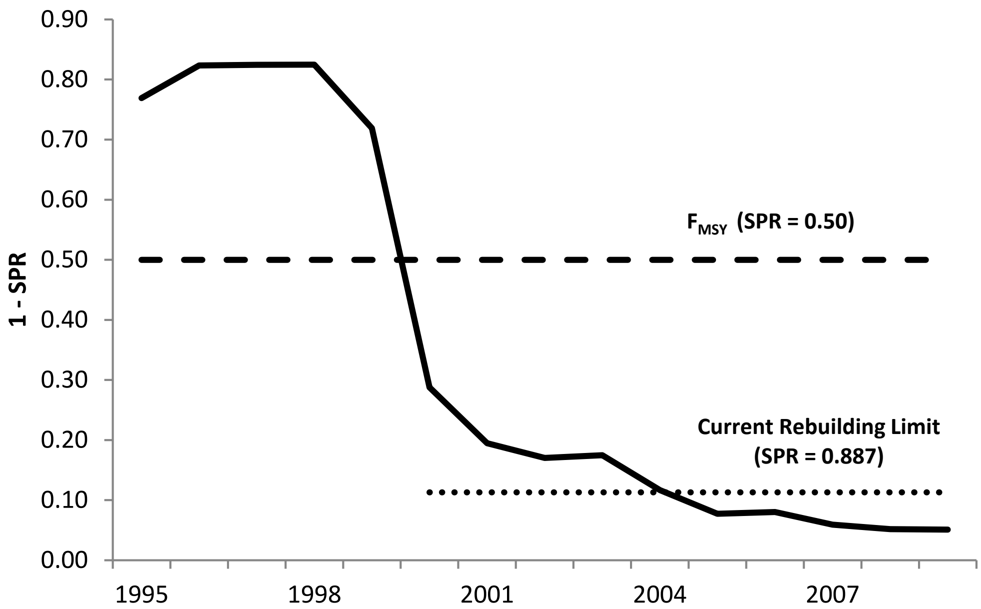

Figure 8. Estimated spawning potential ratio (SPR) of canary rockfish relative to the current F_{MSY} and rebuilding harvest rates, 1995-2010. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis.

Rebuilding Duration and Probabilities

Wallace 2013 estimated the canary rebuilding probability (P_{MAX}) under the current SPR harvest rate of 88.7% is 75 percent. There is a 50 percent probability of recovering by the current target year of 2030.

1.1.3.3 Cowcod

Distribution and Life History

Cowcod (*Sebastes levis*) is a species of large rockfish with a distribution from Newport, Oregon, to central Baja California, Mexico (Love et al., 2002). They are most common from Cape Mendocino (California) to northern Baja California, in depths from 50-300 m. Hess et al. (submitted) recently used genetic and otolith microchemistry tools to study cowcod population structure from California to Oregon. Specifically, they tested the hypothesis that a phylogeographic boundary exists at Point Conception. Their results supported a hypothesis of two primary lineages with a geographic boundary falling south of, rather than at Point Conception. Both lineages co-occur in the Southern California Bight (SCB), with no clear pattern of depth stratification or spatial structure within the Bight. Within lineages, there is evidence for considerable gene flow across the Point Conception boundary. Cowcod found north of Point Conception consist primarily of a single lineage, also found in northern areas of the SCB.

Cowcod are easily identified at all life stages, including larvae. Adults are piscivorous, with a diet consisting mainly of fishes, squids, and octopi. Cowcod are considered to be parademersal (transitional between a midwater pelagic and benthic species). Larvae develop into a pelagic juvenile stage, settling to benthic habitats after about 3 months. Juvenile cowcod were once thought to associate primarily with soft sediments, but Love and Yoklavich (Love and Yoklavich 2008), using visual surveys, found juveniles mainly associate with low-relief, hard substrate. Young-of-the-year were observed over a wide depth range (52-277 m), with juveniles slightly deeper, and adults mainly deeper than 150 m. Larger juveniles increasingly associate with high-relief, complex rocky substrate, the primary habitat for adult cowcod. Adult cowcod are generally solitary, but occasionally aggregate (Love, *et al.* 1990). Although cowcod are generally not migratory, they may move, to some extent, to follow food (Love 1996).

Cowcod are a long-lived, slow-growing species that require a decade or more to reach sexual maturity. Fertilization is internal, with females giving birth to planktonic larvae mainly during winter months. Spawning peaks in January in the Southern California Bight (MacGregor 1986) and large females may produce up to three broods per season (Love, *et al.* 1990). Larvae emerge at about 5.0 mm (MacGregor 1986).

Cowcod are a highly fecund species, with large females producing 2 million eggs (fecundity is dependent on size and ranges from 181,000 to 1,925,000 eggs) (Love, *et al.* 2002). Dick et al. (2009) found no evidence of increasing weight-specific fecundity (i.e., spawning output is roughly proportional to spawning biomass).

Maximum observed age for cowcod is 55 years (Love, *et al.* 2002). Dick et al. (2007) estimated the natural mortality rate (M) using three methods, reporting a range of values from 0.027 to 0.064 based on Beverton's (1992) method, a range of total mortality (Z) estimates from 0.038 to 0.072 based on catch curve analysis, and Hoenig's geometric mean regression. Females reach 90 percent of their maximum expected size by 42 years.

Little is known about ecological relationships between cowcod and other organisms. Small cowcod feed on planktonic organisms such as copepods. Juveniles eat shrimp and crabs, and adults eat fish, octopus, and squid (Allen 1982). Adults consume a wide range of prey items, but are primarily piscivorous (Love, *et al.* 2002).

Stock Status and Management History

While cowcod are not a major component of the groundfish fishery, they are highly desired by both recreational and commercial fishers because of their bright color and large size. The cowcod stock in the Conception area was first assessed in 1998 (Butler, *et al.* 1999b). Abundance indices decreased approximately tenfold between the 1960s and the 1990s, based on commercial passenger fishing vessel (CPFV) logs (Butler, *et al.* 1999b). Recreational and commercial catch also declined substantially from peaks in the 1970s and 1980s, respectively.

NMFS declared cowcod in the Conception and Monterey management areas overfished in January 2000, after Butler et al. (1999b) estimated the 1998 spawning biomass to be at 7 percent of B_0, well below the 25 percent overfishing threshold. Because cowcod is a fairly sedentary species, closed areas were established in 2002 to reduce cowcod mortality. Two Cowcod Conservation Areas (CCAs), in the Southern California Bight, were selected due to their high density of cowcod. The larger of the two areas (CCA West) is a 4200 square mile area west of Santa Catalina and San Clemente Islands. A smaller area (CCA East) is about 40 miles offshore of San Diego, and covers about 100 square miles. Bottom fishing is prohibited deeper than 20 fm within the CCAs.

A cowcod rebuilding analysis was completed in 2003 which validated the assumption that non-retention regulations and area closures had been effective in constraining cowcod fishing mortality (Butler, *et al.* 2003). These encouraging results were based on cowcod fishery-related landings in recreational and commercial fisheries, although the assessment included discard information only with respect to CPFV observations (which indicated negligible discards in that sector). This rebuilding review pointed out a common problem among the analyses of overfished species: reliance on landings (fishery-dependent) data for providing relative abundance values becomes increasingly difficult as the allowable catch is decreased and fishery observer data remains low. Monitoring stock status and recovery thus becomes increasingly difficult in the absence of fishery-independent surveys.

As in the 1999 assessment, the 2005 cowcod assessment (Piner, *et al.* 2006) considered only the cowcod population in Southern California Bight (from the US-Mexico border north to Point Conception) population, as this is the area in which cowcod are most abundant, adult habitat is most common, and catches are highest.. The 2005 assessment used only two data sources, the CPFV time series and the visual survey estimate data (Yoklavich, *et al.* 2007). The model was developed in Stock Synthesis 2, and although the base model estimated only three parameters (two of which were "nuisance parameters," the other was equilibrium recruitment), the STAR Panel determined that this simplicity was appropriate given the paucity of data. The assessment provided a set of results corresponding to three different values for assumed steepness (h), the key parameter in the stock-recruitment relationship (h=0.4, 0.5, and 0.6) and one the key uncertainties in the assessment. The assessment estimated that the 2005 spawning biomass was 18 percent of unfished levels and within a range of 14 to 21 percent depending on the value assumed for steepness, a considerably more optimistic result than the 1999 assessment. The corresponding 2005 cowcod rebuilding analysis (Piner 2006) was used to develop the cowcod rebuilding plan adopted in the groundfish FMP under Amendment 16-4. The rebuilding plan established a target rebuilding year of 2039 and an SPR of 90%.

A full cowcod assessment was conducted in 2007, which estimated spawning biomass to be 3.8 percent of its unfished level at the start of 2007 (Dick, *et al.* 2007). The 2007 cowcod assessment was an age-structured production model assuming a Beverton-Holt stock-recruitment function with deterministic recruitment, fit to the aggregated CPFV logbook index and the 2002 visual survey biomass estimate (Yoklavich, *et al.* 2007). Productivity parameters were fixed (steepness = 0.6, natural mortality = 0.055), leaving only virgin recruitment (R_0) to be estimated. Spawning biomass in 2007 was estimated to be between 3.4 percent and 16.3 percent of the unfished level. The poor precision of this estimate was due to 1) a lack of data to inform estimates of stock productivity, and 2) conflicting information from fishery-dependent and fishery–independent data. However, even the most optimistic model, which assumed a high-productivity stock and ignored declines in CPFV catch rates, suggested that spawning biomass was below 25 percent since 1980. Since retention of cowcod was prohibited and bycatch was thought to be minimal, it was considered unlikely that overfishing was an issue. It is likely that the 2007 base model underestimated the uncertainty about stock status given steepness and the natural mortality rate were treated as fixed and known in the model.

The 2007 assessment was originally prepared as an "update" stock assessment; however, while preparing the update, an error was discovered in the previous assessment's specification of the selectivity curve. Several revisions were proposed, including new estimates of historical landings, a corrected growth curve, and a two-fishery model. The 2007 assessment used Stock Synthesis 2, revised estimates of historical commercial catch, contained corrections to gear selectivity curves, utilized a revised growth curve, and separated the catch into commercial (all gears) and recreational fisheries rather than a single fishery. Recreational catches in the 2007 assessment were identical to those in the previous assessment, but estimates of commercial catches had been updated to reflect three additional data sources: 1) recovered port samples from Southern California (1983-1985), 2) regional summaries of total rockfish landings (1928-1968) provided by the NMFS SWFSC Environmental Research Division, and 3) California rockfish landings by region (1916-1927), published in CDF&G Fish Bulletin No. 105 (1958).

The 2007 rebuilding analysis (Dick and Ralston 2007) estimated a new T_{MAX} of 2098, 24 years later than the date estimated by Piner (2006), due in part to the corrections described above, but only 1 year earlier than the 2099 date estimated previously (Butler, *et al.* 2003). It was noted in the rebuilding analysis that rebuilding scenarios were extremely uncertain for this data-poor species, particularly with respect to steepness. Moreover, there was widespread concern about the ability to monitor the stock, and consequently to evaluate progress towards rebuilding in the future. The 2007 rebuilding analysis projections indicated that it would not be possible to rebuild the cowcod stock by 2039, even if all the catches are eliminated, and the estimated time to rebuild under the current harvest rate (SPR = 90%) was 26 years greater than the target year of 2039 adopted under Amendment 16-4. Therefore, a modification of the Amendment 16-4 cowcod rebuilding plan was implemented in 2007 which prescribed a target year of 2072 and an SPR harvest rate of 82.1%.

The 2007 cowcod assessment was updated in 2009, with stock depletion estimated to be 4.5 percent of its unfished level at the start of 2009 (Dick, *et al.* 2009). Estimates of female spawning stock biomass in 2009 were highly uncertain. Spawning biomass had declined from an unfished biomass of 2,101-2,461 mt to 93-441 mt in 2009. The 2009 cowcod rebuilding analysis (Dick, *et al.* 2009) was used to reconsider the cowcod rebuilding plan adopted under Amendment 16-4 as mandated in a legal challenge (*NRDC v. Locke*). The revised rebuilding plan, implemented in 2011, prescribed a target year of 2068 and an SPR harvest rate 82.7%.

A new cowcod assessment of the stock in the Southern California Bight was conducted in 2013 (Dick and MacCall 2013b), which estimated stock depletion to be 33.9 percent of unfished spawning biomass at the start of 2013 (Figure 9). The 2013 assessment suggested that cowcod in the Southern California Bight constitute a smaller, but more productive stock than was estimated from previous assessments. Median unfished and 2013 spawning biomasses were estimated to be 1,549 mt and 524 mt, respectively (Table 4).

The 2013 assessment used the XDB-SRA modeling platform to estimate stock status, scale, and productivity. Dick et al. (2013b) fit five fishery-independent data sources: four time series of relative abundance (CalCOFI larval abundance survey, Sanitation District trawl surveys, NWFSC trawl survey, and NWFSC hook-and-line survey), and the 2002 Yoklavich et al. (2007) visual survey estimate of absolute abundance.

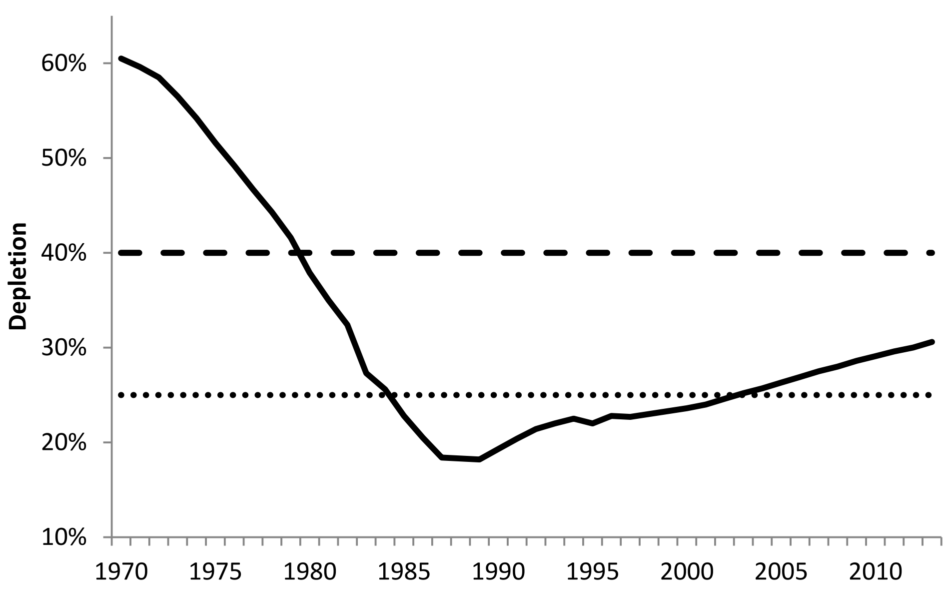

Figure 9. Relative depletion of cowcod south of 40°10’ N lat. from 1970 to 2013 based on the 2013 stock assessment. *Data from Table 38 – NOTE: different trajectory than Figure 94*

Stock Productivity Relative to Rebuilding Success

As in the previous assessment, production in the 2013 assessment is assumed to be a deterministic function of spawning biomass. Recruitment pulses may be evident in the abundance indices, but insufficient information is available to reliably estimate the relative strength of individual year classes.

Insert figure of B_{MSY}/B_0 & F_{MSY}/M?

Fishing Mortality

Estimated harvest rates for cowcod were highest during the mid-1980s (Figure 10). Retention of cowcod was prohibited from January 2001 to present. Dick and MacCall 2013 estimated that removals of cowcod have been less than 0.2% of vulnerable biomass since 2003. The estimated harvest rate that produces long term MSY (5.5%) is nearly twice the proxy (SPR = 50%) harvest rate from the last assessment (2.7%). Unlike previous assessments, the recent increasing trends in fishery-independent surveys allow the model to estimate the rate of increase in stock size. However, the 95% posterior interval for the MSY harvest rate (2.2% - 12.6%) reflects uncertainty in the data regarding overall productivity of the stock.

Median harvest rates around 1930 were near the MSY rate, then declined due to shifts in fishing effort and WWII (Figure 10). Following the war, catch rates slowly increased until about 1970, then rose quickly to a maximum of approximately 54% of vulnerable biomass in the mid-1980s. The MSY harvest rate estimated in the 2013 assessment is 5.5%, similar to the proxy ($B_{40\%}$) harvest rate of 5%, but higher than the SPR harvest rate in the 2009 assessment (2.7%). Median harvest rates were roughly 8-10 times the median MSY harvest rate in the mid-1980s, then declined to near zero after 2000, followed by steady increases in stock biomass.

Under the current SPR harvest rate specified in the rebuilding plan (82.7%), the median time to rebuild is 2020 (Dick and MacCall 2013a). This SPR harvest rate is equivalent to an exploitation rate (catch over age 11+ biomass) of 0.007 based on the 2009 assessment.

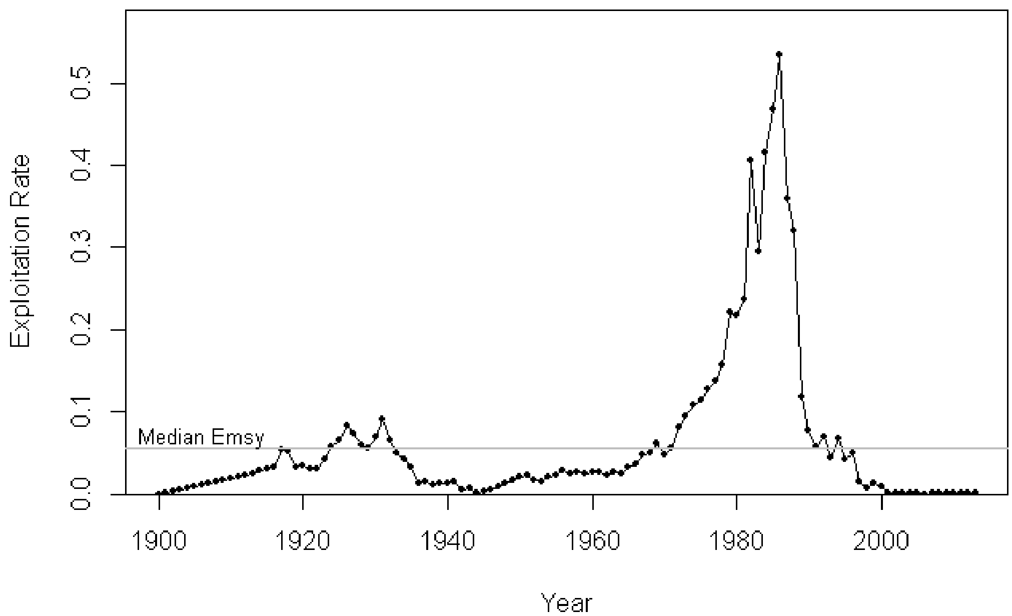

Figure 10. Time series of median harvest rates (total catch divided by age-11 and older biomass) from the base model in the 2013 cowcod assessment. The gray line is the estimated median harvest rate producing MSY.

Rebuilding Duration and Probabilities

The 2013 rebuilding analysis (Dick and MacCall 2013a) was unique in that the Punt rebuilding program (Punt 2005) was not used given its incompatibility with XDB-SRA. In each rebuilding model run, 15,000 simulated trajectories were generated using draws from the joint posterior distribution. Since the XDB-SRA platform is not compatible with spawning potential ratios, harvest control rules were translated into exploitation rates (E) calculated as catch/estimated age 11+ biomass. Similar to the previous cowcod rebuilding analysis, variability in future recruitment was expressed as a weighted set of different states of nature (parameter values), rather than random deviations from an average stock-recruitment relationship. While the previous rebuilding analysis accounted only for uncertainty in the Beverton-Holt steepness parameter, the current analysis accounts for uncertainty in all estimated model parameters. Estimates of total cowcod mortality have not exceeded the ACL (or OY) in any year since 2003. The estimate of median time to rebuild under the current harvest rate (2020) is 48 years earlier than the current target year of 2068.

1.1.3.4 Darkblotched Rockfish

Distribution and Life History

Darkblotched rockfish (*Sebastes crameri*) are found from Santa Catalina Island off Southern California to the Bering Sea (Miller and Lea 1972; Richardson and Laroche 1979). They are most abundant from Oregon to British Columbia. Darkblotched primarily occur on the outer shelf and upper slope off Oregon, Washington, and British Columbia (Richardson and Laroche 1979). Based upon genetic information and the absence of large scale gaps in catches, there are no clear stock delineations for darkblotched rockfish in U.S. waters. This does not mean there are not more fine scale groupings to be found, and in fact, darkblotched catches are characterized by infrequent large tows of larger fish. Distinct population groups have been found off the Oregon coast between 44°30' N lat. and 45°20' N lat. (Richardson and Laroche 1979). This species co-occurs with an assemblage of slope rockfish, including Pacific ocean perch (*Sebastes alutus*), splitnose rockfish (*Sebastes diploproa*), yellowmouth rockfish (*Sebastes reedi*), and sharpchin rockfish (*Sebastes zacentrus*).

Darkblotched rockfish mate from August to December, eggs are fertilized from October through March, and larvae are released from November through April love (Love, *et al.* 2002). Older larvae and pelagic juvenile darkblotched rockfish are found closer to the surface than many other rockfish species. Pelagic juvenile settle at 4 to 6 cm in length in about 55 to 200 m (Love, *et al.* 2002). As many other Sebastes, this species exhibits ontogenetic movement, with fish migrating to deeper waters as they mature and increase in size and age (Lenarz 1993; Nichol 1990).

Darkblotched rockfish are among the longer living rockfish; the data used in the most recent assessment (Gertseva and Thorson 2013) includes individuals that have been aged to be 98 years old. The maximum reported age of darkblotched rockfish is 105 years (Love, *et al.* 2002). As with many other *Sebastes* species, darkblotched rockfish exhibit sexually dimorphic growth; females reach larger sizes than males, while males attain maximum length earlier than females (Love, *et al.* 2002; Nichol 1990; Rogers, *et al.* 2000).

Darkblotched rockfish are ovoviviparous (Nichol and Pikitch 1994). Insemination of female darkblotched rockfish occurs from August to December, and fertilization and parturition occur from December to March off Oregon and California, and primarily in February off Oregon and Washington (Hart 1988; Nichol and Pikitch 1994; Richardson and Laroche 1979). Fecundity is dependent on size and ranges from 20,000 to 610,000 eggs.

Little is known about ecological relationships between darkblotched rockfish and other organisms. Pelagic juveniles feed on planktonic organisms such as copepods. Adults are often caught with other fish such as Pacific ocean perch and splitnose rockfish. Midwater animals such as euphausiids and amphipods dominate the diet of adult fish. Albacore and Chinook salmon consume pelagic juveniles (Hart 1988). Little is known about predation of adults.

Stock Status and Management History

Darkblotched rockfish are primarily with commercial trawl gear, as part of a complex of slope rockfish, which includes Pacific ocean perch (*Sebastes alutus*), splitnose rockfish (*Sebastes diploproa*), yellowmouth rockfish (*Sebastes reedi*), and sharpchin rockfish (*Sebastes zacentrus*). Catches of darkblotched rockfish first became significant in the mid-to-late 1940s due to increased demand for fish protein during World War II. During the mid-1960s to mid-1970s darkblotched rockfish were caught by both domestic and foreign fleets (Rogers 2003b). Domestic landings rose from late 1970s until the late 1980s, although limits on rockfish catch were first instituted in 1983, when darkblotched was rockfish managed as part of a group of around 50 species (designated as the Sebastes complex) (Rogers, *et al.* 2000). During the 2000s, progressive steps have been taken to reduce the catch of darkblotched rockfish, following the declaration of its overfished status in 2001.

The first full assessment of the darkblotched rockfish stock was conducted in 2000, which estimated stock depletion at 14–31 percent of its unfished level, depending on assumptions regarding the historic catch of darkblotched rockfish in the foreign fishery from 1965-1978 (Rogers, *et al.* 2000). The base model assumed 10 percent of foreign catch was comprised of darkblotched, leading to the conclusion that the spawning stock biomass was at 22 percent of its unfished level. NMFS declared darkblotched rockfish to be overfished in 2001 based on these results.

The 2001 rebuilding analysis for the stock (Methot and Rogers 2001) incorporated results of the 2000 Alaska Fishery Science Center triennial slope trawl survey and modeled a more recent time series of recruitments. Incorporating these data resulted in a downward revision of the estimated recruitment and abundance throughout the time series compared to what had been used in the Rogers et al. (2000) assessment. This led to a revised estimate of spawning stock biomass at the beginning of 2002 of 14 percent of its unfished level and a longer projected rebuilding period.

A 2003 assessment and rebuilding update for darkblotched rockfish (Rogers 2003a) estimated a lower depletion ($B_{11\%}$), but provided evidence of strong recent recruitment not yet recruited to the spawning population. This analysis was used to inform the darkblotched rockfish rebuilding plan adopted under Amendment 16-2, which established a target rebuilding year of 2030 and a fishing mortality rate of F = 0.027. A revised darkblotched rebuilding plan was implemented in 2004 that specified a higher harvest rate (F = 0.032) to avoid negative socioeconomic impacts.

The 2005 full darkblotched assessment estimated a spawning stock depletion of 16 percent of unfished biomass at the start of 2005 (Rogers 2005a). The assessment estimated strong recruitment of the 1999 and 2000 year classes. The 2005 rebuilding analysis (Rogers 2005b) was used to inform a revised rebuilding plan adopted under Amendment 16-4 and implemented in 2007. The revised rebuilding plan specified a target year of 2011 and a constant harvest rate strategy (SPR = 60.7%).

The 2007 darkblotched rockfish assessment estimated a stock depletion of 22.7 percent at the start of 2007 (Hamel 2008c). The 2007 darkblotched rebuilding analysis (Hamel 2008a) predicted the median time to rebuild would be 19 years later than the target year of 2011 under the SPR harvest rate adopted under Amendment 16-4. The Council revised the Amendment 16-4 rebuilding plan by specifying a target year to rebuild the stock of 2028 and decreasing the harvest rate (SPR = 62.1%).

The 2007 darkblotched assessment was updated in 2009 and 2011. The 2009 stock assessment update estimated a stock depletion of 27.5 percent at the start of 2009 (Wallace and Hamel 2009). The 2009 darkblotched rebuilding analysis (Wallace 2009) was used to inform a revised rebuilding plan, which was implemented in 2011 The revised rebuilding plan specified a target year to rebuild the stock of 2025 and decreased the harvest rate to SPR = 64.9%. The 2011 stock assessment update estimated a stock depletion of 30.2 percent at the start of 2009 (Stephens, *et al.* 2011). No revisions to the rebuilding plan were made based on the 2011 assessment update and accompanying rebuilding plan (Stephens 2011).

A full darkblotched stock assessment in 2013 (Gertseva and Thorson 2013) estimated a stock depletion of 36 percent at the start of 2013 (Figure 11). The assessment also predicts the stock will be rebuilt by the start of 2015. The improved stock status and rebuilding outlook were largely attributed to 1) reduced fishing mortality under the rebuilding program; 2) inferences that follow from more favorable perceptions of steepness, fecundity, and age at maturity of the stock; and 3) length and age data indicating relatively large recruitments in 1999, 2000, and 2008. The SSC recommended maintaining the current rebuilding plan for the 2015-2016 management cycle and a full assessment be done in 2015 to confirm this prediction. The SSC further recommended against preparing a rebuilding analysis in 2013.

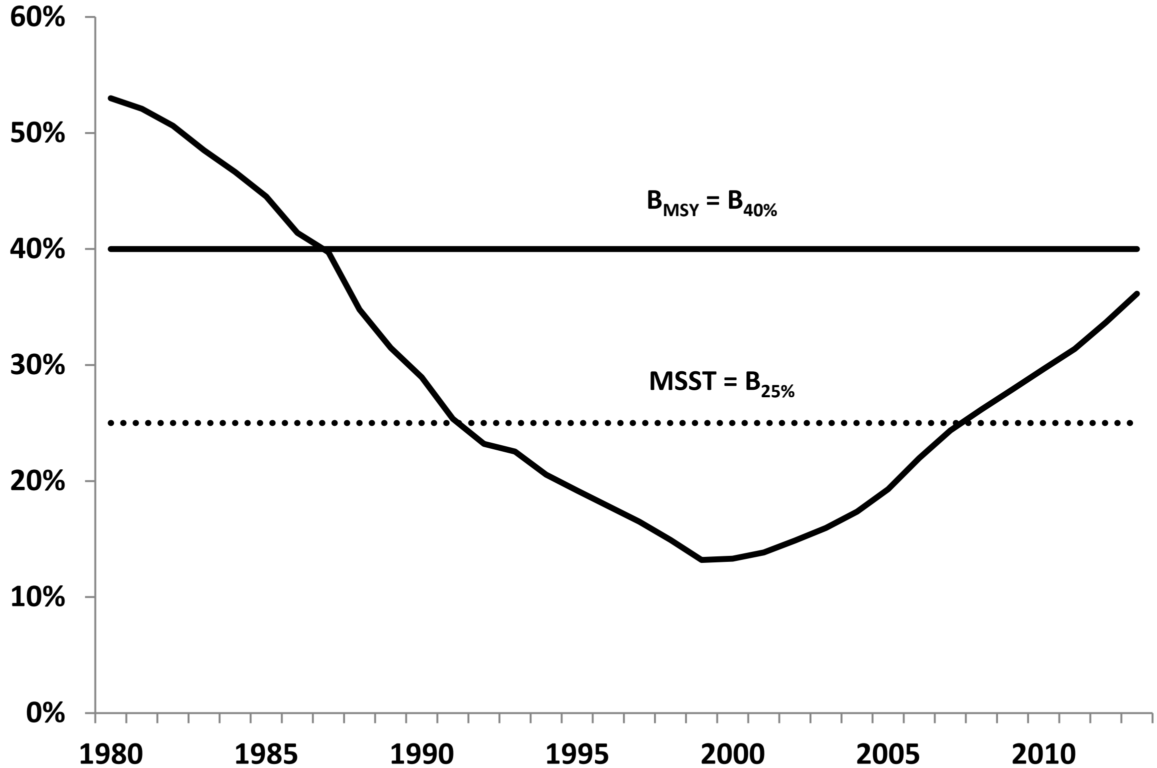

Figure 11. Relative depletion of darkblotched rockfish from 1980 to 2013 based on the 2013 stock assessment.

Stock Productivity Relative to Rebuilding Success

Gertseva and Thorson (2013) fixed steepness at its prior mean of 0.779. This prior was estimated using a likelihood profile approximation to a maximum marginal likelihood mixed-effect model for steepness from ten category 1 rockfish species off the U.S. west coast (Pacific ocean perch, bocaccio, canary, chilipepper, black, darkblotched, gopher, splitnose, widow, and yellowtail rockfish). Both northern and southern assessments of black rockfish were used, although the log-likelihood for each was given a 0.5 weighting, to ensure that the together these two assessments had an equal weighting to the other species. This likelihood profile model is intended to synthesize observation-level data from assessed species, while avoiding the use of model output and thus improving upon previous meta-analyses (Dorn 2002a; Forrest, *et al.* 2010). This methodology has been simulation tested, and has been recommended by the SSC for use in stock assessments.

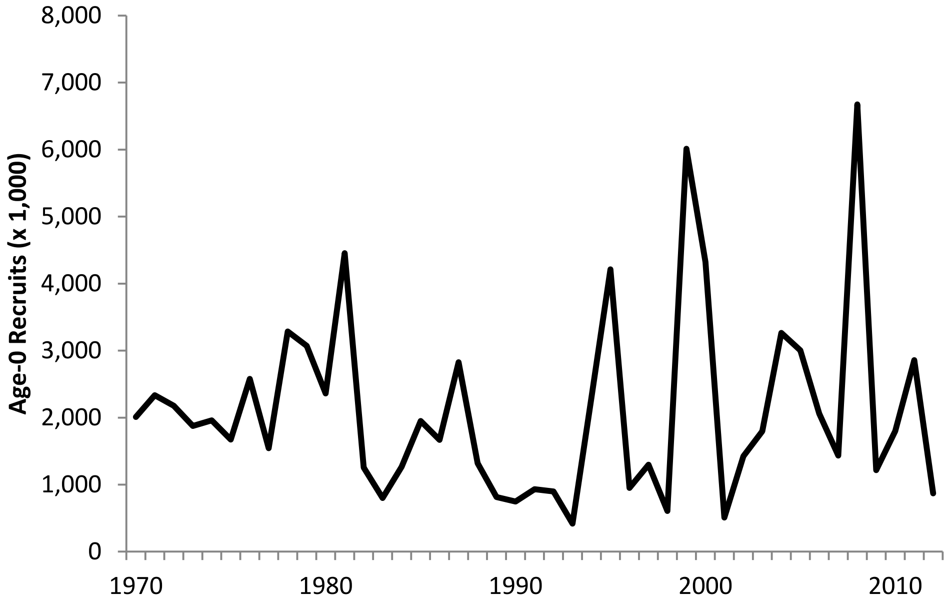

Figure 12. Estimated recruitments of darkblotched rockfish, 1970-2012.

Fishing Mortality

Historically, the spawning output of darkblotched rockfish dropped below the B_{MSY} target for the first time in 1987, as a result of intense fishing by foreign and domestic fleets. It continued to decline and reached the level of 13 percent of its unfished output in 1999. Since 2000, when the stock was declared overfished, the spawning output slowly increased primarily due to management regulations implemented for the stock.

Overfishing for darkblotched has not occurred in the last 10 years (Gertseva and Thorson 2013). Historically, the darkblotched rockfish has experienced overfishing in the 1980s and 1990s, during the peak years of the Pacific ocean perch fishery, as well as in the mid-1960s when foreign trawl fleets were targeting groundfish off the west coast. Exploitation rates were effectively decreased after the stock was declared overfished in 2000 and rebuilding measures were implemented.

Rebuilding Duration and Probabilities

The 2013 darkblotched assessment predicts the stock will be rebuilt by 2015. Therefore, rebuilding probabilities (both P_{MAX} and P_{TARGET}) are high for darkblotched under the harvest control rule in the rebuilding plan. The SSC is recommending a new assessment be done in 2015 to confirm that prediction.

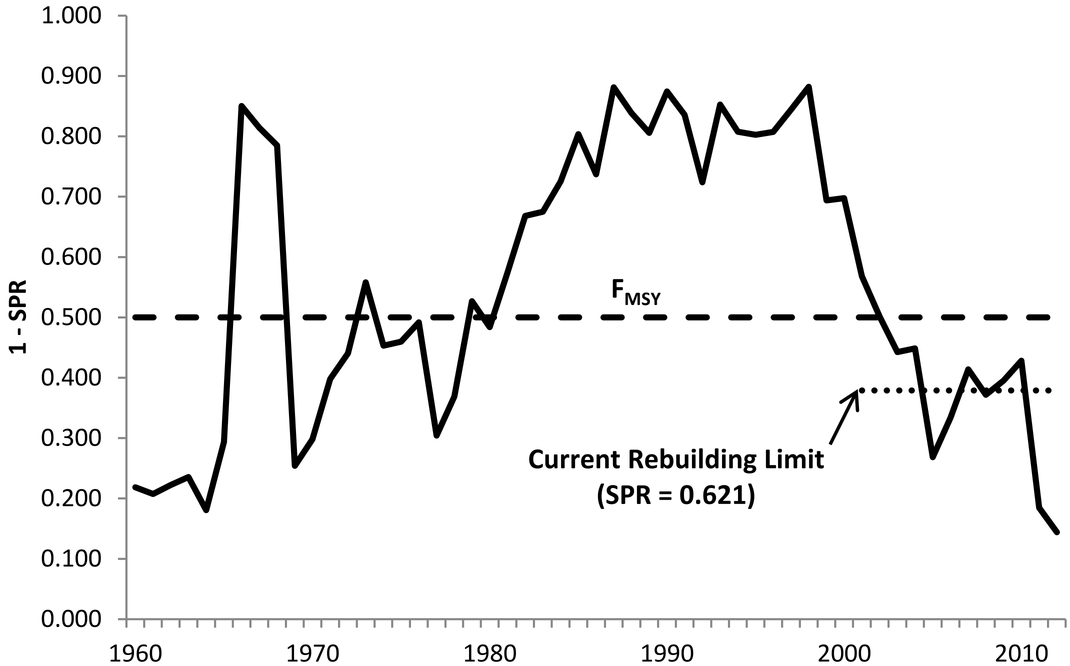

Figure 13. Time series of estimated SPR harvest rates of darkblotched rockfish, 1960-2012. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis.

1.1.3.5 Pacific Ocean Perch

Distribution and Life History

Pacific ocean perch (POP, *Sebastes alutus*) are most abundant in the Gulf of Alaska, and have been observed off of Japan, in the Bering Sea, and south to Baja California, although they are sparse south of Oregon and rare in southern California. (Eschmeyer, *et al.* 1983; Gunderson 1971; Miller and Lea 1972). They primarily inhabit waters of the upper continental slope (Dark and Wilkins 1994) and are found along the edge of the continental shelf (Archibald, *et al.* 1983). Pacific ocean perch occur as deep as 825 m, but usually are at 100 m to 450 m and along submarine canyons and depressions (NOAA 1990). Throughout their range, POP are generally associated with gravel, rocky, or boulder type substrate (Ito, *et al.* 1986). Larvae and juveniles are pelagic; subadults and adults are benthopelagic (living and feeding on the bottom and in the water column). Adults form large schools 30 m wide, to 80 m deep, and as much as 1,300 m long (NOAA 1990). They also form spawning schools (Gunderson 1971). Juvenile POP form ball-shaped schools near the surface or hide in rocks (NOAA 1990).

Pacific ocean perch winter and spawn in deeper water (>275 m). In the summer (June through August) they move to feeding grounds in shallower water (180 m to 220 m) to allow gonads to ripen (Archibald, *et al.* 1983; Gunderson 1971; NOAA 1990). They are slow-growing and long-lived; the maximum age has been estimated at about 98 years (Heifetz, *et al.* 2000). The can grow up to about 54 cm and 2 kg (Archibald, *et al.* 1983; Beamish 1979; Gunderson 1971; Ito, *et al.* 1986; Mulligan and Leaman 1992; NOAA 1990). POP are carnivorous. Larvae eat small zooplankton. Small juveniles eat copepods, and larger juveniles feed on euphausiids (krill). Adults eat euphausiids, shrimps, squids, and small fish. Immature fish feed throughout the year, but adults feed only seasonally, mostly April through August (NOAA 1990). POP predators include sablefish and Pacific halibut.

Stock Status and Management History

POP were harvested exclusively by U.S. and Canadian vessels in the Columbia and Vancouver INPFC areas prior to 1966. Large Soviet and Japanese factory trawlers began fishing for POP in 1965 in the Vancouver area and in the Columbia area a year later. Intense fishing pressure by these foreign fleets occurred from 1966 to 1975. The mandates of the MSA, passed by Congress in 1976, eventually ended foreign fishing within 200 miles of the United States coast.

The POP resource off the west coast was overfished before implementation of the groundfish FMP in 1982, and Council actions to conserve the resource likewise predate the FMP. Large removals of POP in the foreign trawl fishery, followed by significant declines in catch and abundance, led the Council to limit harvest beginning in 1979. A 20–year rebuilding plan for POP was adopted in 1981. Rebuilding under this original plan was largely influenced by a cohort analysis of 1966-1976 catch and age composition data (Gunderson 1979), updated with 1977-1980 data (Gunderson 1981), and an evaluation of trip limits as a management tool (Tagart, *et al.* 1980). This was the first time trip limits were used by the Council to discourage targeting and overharvest of an overfished stock, and it remains a management strategy in use today in the west coast groundfish fishery. In addition to trip limits, the Council significantly lowered the OY for POP. After twenty years of rebuilding under the original plan, the stock stabilized at a lower equilibrium than estimated in the pre-fishing condition. While continuing stock decline was abated, rebuilding was not achieved as the stock failed to increase in abundance to B_{MSY}.

Ianelli and Zimmerman (1998) estimated POP female spawning biomass in 1997 to be at 13 percent of its unfished level, thereby confirming that the stock was overfished. NMFS formally declared POP overfished in March 1999 after the groundfish FMP was amended to incorporate the tenets of the Sustainable Fisheries Act. The Council adopted and NMFS enacted more conservative management measures in 1999 as part of a redoubled rebuilding effort.

A 2000 POP assessment suggested the stock was more productive than originally thought (Ianelli, *et al.* 2000). A revised POP rebuilding analysis was completed and adopted by the Council in 2001 (Punt and Ianelli 2001). This analysis estimated a T_{MIN} of 12 years and a T_{MAX} of 42 years. It was noted in the rebuilding analysis that the ongoing retrospective analysis of historic foreign fleet catches was likely to change projections of POP rebuilding.

The 2003 POP assessment (Hamel, *et al.* 2003) incorporating updated survey and fishery data including the retrospective of foreign fleet catches (Rogers 2003b). The assessment covered areas from southern Oregon to the U.S. border with Canada, the southern extent of POP distribution. The overall conclusion was that the stock was relatively stable at approximately 28 percent of its unfished biomass ($B_{28\%}$). Of all the changes and additions to the data, the historical catch estimates had the greatest effect, resulting in lower estimates of both equilibrium unfished biomass (B_0) and MSY.

A POP rebuilding plan was adopted in 2003 under Amendment 16-2. The rebuilding plan was informed by a revised rebuilding analysis based on the 2000 assessment and conducted in 2001 (Punt and Ianelli 2001). The rebuilding plan established a target rebuilding year of 2027 and a harvest control rule of F = 0.0082 (with a P_{MAX} of 70 percent).

The 2003 assessment estimated a stock depletion of 28 percent at the start of 2003 (Hamel, *et al.* 2003). The 2003 rebuilding analysis (Punt, *et al.* 2003) was used to amend the harvest control rule and set annual POP OYs for the 2004-2006 period. The amended harvest control rule was F = 0.0257.

The 2003 POP assessment was updated in 2005, 2007, and 2009. The 2005 update assessment estimated a stock depletion of 23.4 percent of its unfished level at the start of 2005 (Hamel 2006b). The 2005 POP rebuilding analysis (Hamel 2006a) was used to inform revisions to the POP rebuilding plan. The revised rebuilding plan, which was adopted under Amendment 16-4, specified a target rebuilding year of 2017 and a constant harvest rate strategy (SPR = 86.4%).

The 2007 POP assessment update estimated a stock depletion of 27.5 percent at the start of 2007 (Hamel 2008d). The 2007 rebuilding analysis indicated rebuilding was progressing ahead of schedule (Hamel 2008b). No modifications to the rebuilding plan were made.

The 2009 POP assessment estimated a stock depletion of 28.6 percent at the start of 2009 (Hamel 2009b). The 2009 POP rebuilding analysis (Hamel 2009a) predicted rebuilding would not occur by the target year of 2017 with at least a 50% probability even in the absence of fishing-related mortality beginning in 2011 (i.e., $T_{F=0}$). Therefore the rebuilding plan was revised by changing the target rebuilding year to 2020 while maintaining the constant SPR harvest rate of 86.4%.

A full assessment in 2011 estimated a stock depletion of 19.1 percent at the start of 2011 (Hamel and Ono 2011). The significant decrease in the estimated depletion of the stock was largely due to a much higher estimate of initial, unfished biomass (B_0). Previous assessments assumed a large recruitment in the late 1950s provided the higher biomass to support the estimated removals by the foreign fleets without any data to support that assumption. The assumption in the 2011 assessment is that the large foreign fleet catch fished the biomass down to critical levels, thus resulting in a substantially larger B_0 estimate. The 2011 assessment also estimated a longer sequence of higher recruitment based on fitting to the data available for early years of the assessment period. The 2011 rebuilding analysis (Hamel 2011) predicted rebuilding would not occur by the target year of 2020 with at least a 50% probability even in the absence of fishing-related mortality beginning in 2013 (i.e., $T_{F=0}$). Therefore the rebuilding plan was revised by changing the target rebuilding year to 2051 while maintaining the constant SPR harvest rate of 86.4%.

A POP catch report was provided in 2013 (Agenda Item F.5.a, Attachment 10, June 2013), which indicated 2010-2012 total catches were below specified ACLs/OYs.

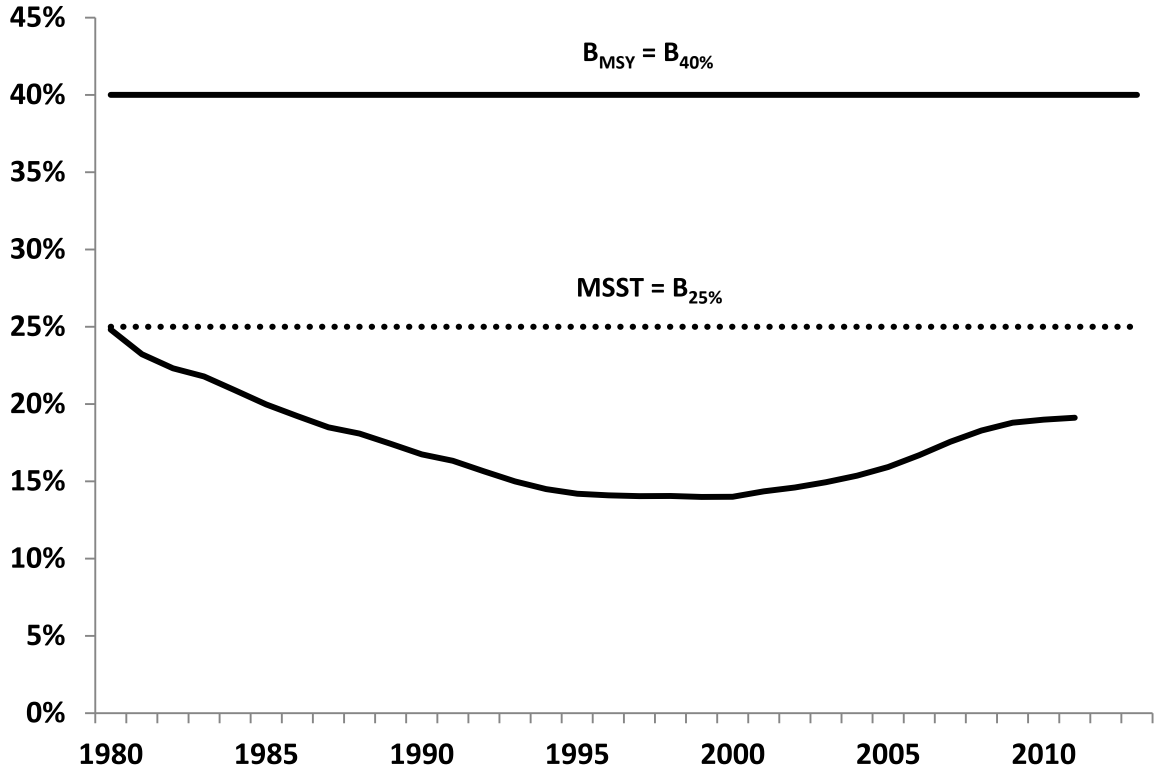

Figure 14. Relative depletion of Pacific ocean perch from 1980 to 2011 based on the 2011 stock assessment.

Stock Productivity Relative to Rebuilding Success

Stock-recruitment steepness was estimated external to the 2011 POP stock assessment base model at 0.4 (and then fixed in the model), which is low compared to steepness estimates from POP assessments conducted off Canada and Alaska. The 2011 assessment assumes no connectivity with the other assessed POP stocks in Canada and Alaska. POP off the U.S. west coast (mostly Washington and Oregon) are at the southern end of the range where there are enough POP to be commercially important, and the numbers seen are likely related to movement across the Canadian border, as well as reproductive success (recruitment) and fishing mortality north of the border. Given there is no evidence of stock structure in the meta-population of POP in the northeast Pacific and larval distribution of slope rockfish tends to be geographically widespread, this assumption of no connectivity with northern stocks is questionable. It is plausible that steepness is higher than determined in the 2011 assessment, which would tend to estimate a less depleted and more productive stock. The major axis of uncertainty in the assessment is steepness, with states of nature ranging from a low steepness of 0.35 to a higher value of 0.55. If steepness was as high as 0.55, the POP stock would be on the verge of being rebuilt at the start of 2011 (depletion = 39.9 percent) and projected to be rebuilt at the start of 2012. Under the base case model with a steepness of 0.4 and continuing to manage POP using the 86.4 percent SPR harvest rate in the current rebuilding plan, the stock is projected to be rebuilt by 2051.

Recruitment trends estimated in the 2011 POP assessment indicate that, like most assessed rockfish, recruitment has been relatively lower in the last few decades compared to the 1950s and 1960s. However, the 1999 and 2000 year classes are estimated to be above average and the 2008 year class recruitment, while uncertain, appears to be the largest in at least the past 50 years (Figure 15).

Fishing practices are unlikely to have any effect on stock productivity, given the low fishing mortality implemented under the rebuilding plan limits. There is no indication that fishing operations are likely to substantially interfere with or disturb reproductive behavior or juvenile survival.

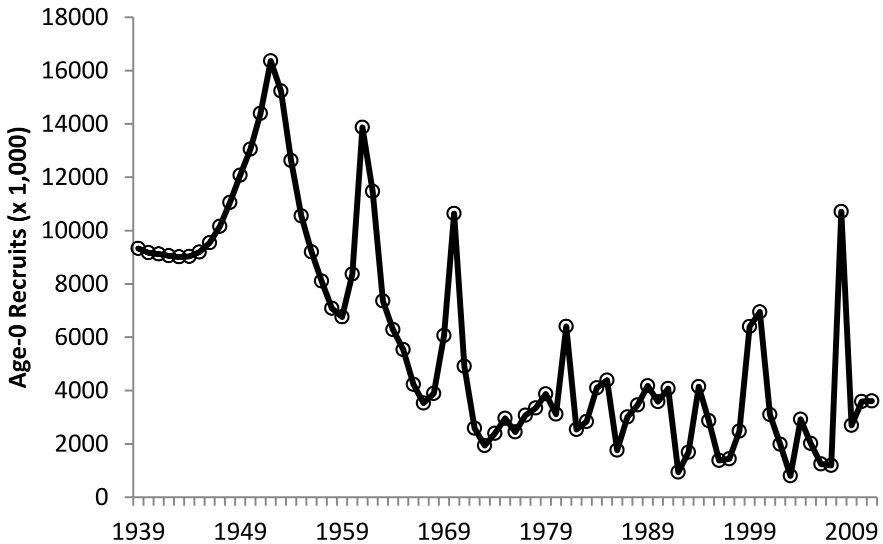

Figure 15. Time series of estimated (age-0) POP recruitments.

Fishing Mortality

POP are caught almost exclusively by groundfish trawl gear and predominantly bottom trawls operating on the outer continental shelf and slope north of 43º N lat. POP are distributed from 30-350 fm, with the core distribution between 110-220 fm.

According to the base model in the 2011 assessment, the fishing level has been below the proxy $F_{50\%}$ F_{MSY} harvest rate for the past 12 years (Figure 16), during which period the stock has begun to rebuild (Figure 14). The point estimates of summary (age 3+) biomass also show an upward trend over the past decade, increasing approximately 50 percent in that time.

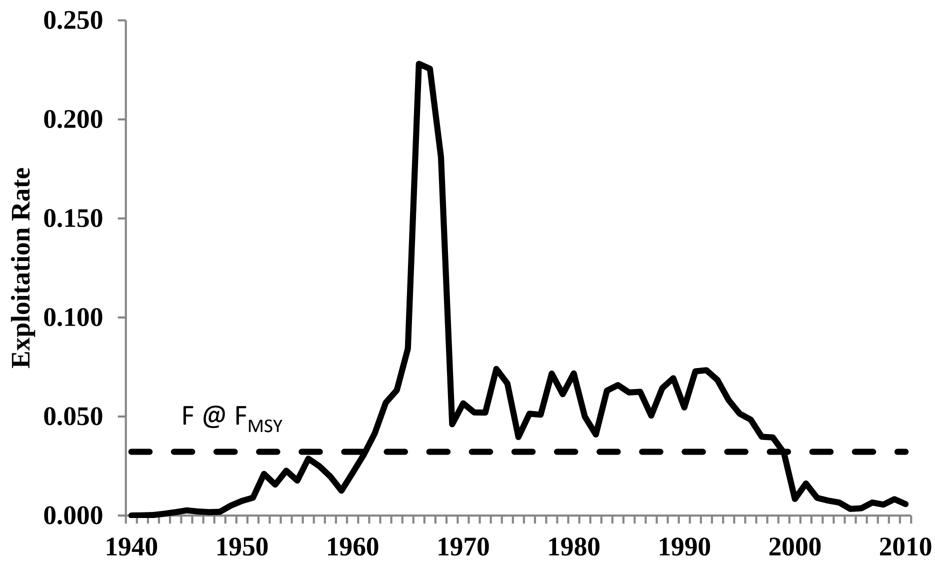

Figure 16. Time series of POP exploitation rates (catch/summary biomass), 1940-2010.

Rebuilding Duration and Probabilities

Hamel (2011) estimated a probability of rebuilding in the maximum time allowable (P_{MAX}) under the SPR harvest rate specified in the rebuilding plan of 72.3%. There is a 50% probability of rebuilding by the target year of 2051.

1.1.3.6 Petrale Sole

Distribution and Life History

Petrale sole (*Eopsetta jordani*) is a right-eyed flounder in the family Pleuronectidae ranging from the western Gulf of Alaska to the Coronado Islands, northern Baja California, (Hart 1988; Kramer and O'Connell 1995; Love, *et al.* 2002) with a preference for soft substrates at depths ranging from 0-550 m (Love, *et al.* 2002). In northern and central California petrale sole are dominant on the middle and outer continental shelf (Allen, *et al.* 2006).

There is little information regarding the stock structure of petrale sole off the U.S. Pacific coast. Tagging studies show adult petrale sole can move up to 350 - 390 miles, having the ability to be highly migratory with the possibility for homing ability (Alverson and Chatwin 1957; MBC 1987). Juveniles show little coastwide or bathymetric movement while studies suggest that adults generally move inshore and northward onto the continental shelf during the spring and summer to feeding grounds and offshore and southward during the fall and winter to deep water spawning grounds (Hart 1988; Love 1996; MBC 1987). Adult petrale sole can tolerate a wide range of bottom temperatures (Perry, *et al.* 1994).

Mixing of fish from multiple deep water spawning grounds likely occurs during the spring and summer when petrale sole are feeding on the continental shelf. Fish that were captured, tagged, and released off the northwest coast of Washington during May and September were subsequently recaptured during winter from spawning grounds off Vancouver Island (British Columbia, 1 fish), Heceta Bank (central Oregon, 2 fish), Eureka (northern California, 2 fish), and Halfmoon Bay (central California, 2 fish) (Pederson 1975). Fish tagged south of Fort Bragg (central California) during July 1964 were later recaptured off Oregon (11 fish), Washington (6 fish), and Swiftsure Bank (southwestern tip of Vancouver

Island, 1 fish) (D. Thomas, California Department of Fish and Game, Menlo Park, CA, cited by Samson and Lee (1999)).

The highest densities of spawning adults off of British Columbia, as well as of eggs, larvae and juveniles, are found in the waters around Vancouver Island. Adults may utilize nearshore areas as summer feeding grounds and non-migrating adults may stay there during winter (Starr and Fargo 2004).

Petrale sole spawn during the winter at several discrete deepwater sites (270-460 m) off the U.S. west coast, from November to April, with peak spawning taking place from December to February (Best 1960; Casillas, *et al.* 1998; Castillo 1995; Castillo, *et al.* 1993; Garrison and Miller 1982; Gregory and Jow 1976; Harry 1959; Love 1996; Moser 1996; Reilly, *et al.* 1994). Females spawn once each year and fecundity varies with fish size, with one large female laying as many as 1.5 million eggs (Porter 1964). Petrale sole eggs are planktonic, ranging in size from 1.2 to 1.3 mm, and are found in deep water habitats at water temperatures of 4–10 degrees C and salinities of 25–30 ppt (Alderdice and Forrester 1971; Best 1960; Gregory and Jow 1976; Ketchen and Forrester 1966). The duration of the egg stage can range from approximately 6 to 14 days (Alderdice and Forrester 1971; Casillas, *et al.* 1998; Hart 1988; Love 1996).

Petrale sole larvae are planktonic, ranging in size from approximately 3 to 20 mm, and are found up to 150 km offshore foraging upon copepod eggs and nauplii (Casillas, *et al.* 1998; Hart 1988; MBC 1987; Moser 1996). The larval duration, including the egg stage, spans approximately 6 months with larvae settling at about 2.2 cm in length on the inner continental shelf (Pearcy, *et al.* 1977). Juveniles are benthic and found on sandy or sand-mud bottoms (Eschmeyer, *et al.* 1983; MBC 1987) and range in size from approximately 2.2 cm to the size at maturity, 50% of the population is mature at approximately 38 cm and 41 cm for males and females, respectively (Casillas, *et al.* 1998). No specific areas have been identified as nursery grounds for juvenile petrale sole. In the waters off British Columbia, Canada larvae are usually found in the upper 50 m far offshore, juveniles at 19–82 m and large juveniles at 25–125 m (Starr and Fargo 2004).

Adult petrale sole achieve a maximum size of around 50 cm and 63 cm for males and females, respectively (Best 1963; Pedersen 1975). The maximum length reported for petrale sole is 70 cm (Eschmeyer, *et al.* 1983; Hart 1988; Love, *et al.* 2002) while the maximum observed break and burn age is 31 years (Haltuch, *et al.* 2013).

Petrale sole juveniles are carnivorous, foraging on annelid worms, clams, brittle star, mysids, sculpin, amphipods, and other juvenile flatfish (Casillas, *et al.* 1998; Ford 1965; Pearsall and Fargo 2007). Predators on juvenile petrale sole include adult petrale sole as well as other larger fish (Casillas, *et al.* 1998; Ford 1965) while adults are preyed upon by marine mammals, sharks, and larger fishes (Casillas, *et al.* 1998; Love 1996; Trumble 1995).

One of the ambushing flatfishes, adult petrale sole have diverse diets that become more piscivorous at larger sizes (Allen, *et al.* 2006). Adult petrale sole are found on sandy and sand-mud bottoms (Eschmeyer, *et al.* 1983) foraging for a variety of invertebrates including, crab, octopi, squid, euphausiids, and shrimp, as well as anchovies. hake, herring, sand lance, and other smaller rockfish and flatfish (Birtwell, *et al.* 1984; Casillas, *et al.* 1998; Ford 1965; Kravitz, *et al.* 1977; Love 1996; Pearsall and Fargo 2007; Reilly, *et al.* 1994). On the continental shelf petrale sole generally co-occur with English sole, rex sole, Pacific sanddab, and rock sole (Kravitz, *et al.* 1977).

Castillo (1992) and Castillo et al. (1995) suggest that density-independent survival of early life stages is low and show that offshore Ekman transportation of eggs and larvae may be an important source of variation in year class strength in the Columbia INPFC area. The effects of the Pacific Decadal Oscillation (PDO) on California current temperature and productivity (Mantua, *et al.* 1997) may also contribute to non-stationary recruitment dynamics for petrale sole. The prevalence of a strong late 1990s year class for many west coast groundfish species suggests that environmentally driven recruitment variation may be correlated among species with relatively diverse life history strategies.

Stock Status and Management History

Petrale sole were lightly exploited during the early 1900s. By the 1950s the petrale sole fishery was well-developed and showing clear signs of depletion and declines in catches and biomass. Haltuch et al. (2013) estimated petrale sole biomass on the U.S. west coast dropped below the $B_{25\%}$ management target during the 1960s and generally stayed there through 2013. The stock declined below the $B_{12.5\%}$ overfished threshold from the early1980s until the early 2000s (Figure 7). Since 2000 the stock has increased, reaching a peak of 14.2% of unfished biomass in 2005, followed by a decreasing trend through 2010. The petrale sole biomass currently shows an increasing trend with recent above-average year classes recruiting into the spawning biomass. The estimated relative depletion level in 2013 is 22.3 percent.

Early stock assessments only assessed petrale sole in the combined U.S.-Vancouver and Columbia INPFC areas (i.e., petrale in these areas were treated as a unit stock, using time series of data that began during the 1970s) (Demory 1984; Turnock, *et al.* 1993). The first assessment used stock reduction analysis and the second assessment used the length-based Stock Synthesis model. The third petrale sole assessment utilized the hybrid length-and-age-based Stock Synthesis 1 model, using data from 1977–1998 (Sampson and Lee 1999). Sampson and Lee (1999) estimated petrale sole stock depletion at 42 percent of unfished biomass at the start of 1999.

The 2005 petrale sole assessment (Lai, *et al.* 2006) was conducted assuming two separate stocks: the northern stock encompassing the U.S. Vancouver and Columbia INPFC areas and the southern stock including the Eureka, Monterey and Conception INPFC areas. Petrale sole in the north was estimated to be at 34 percent of unfished spawning stock biomass in 2005. In the south, the stock was estimated to be at 29 percent of unfished spawning stock biomass. Biomass trends were qualitatively similar in both areas, and also showed consistency with petrale sole trends in Canadian waters. Both stocks were estimated to have been below the Council's MSST of $B_{25\%}$[4] from the mid-1970s until very recently. Estimated harvest rates were in excess of the target fishing mortality rate of $F_{40\%}$[5] during this period as well. Petrale sole in both areas showed large recent increases in stock size, which was consistent with the strong upward trend in the shelf survey biomass index. In 2005, the STAR panel noted that the petrale sole stock trends were similar in both northern and southern areas in spite of the different modeling choices made for each area, and that a single coastwide assessment should be considered (Dorn, *et al.* 2006).

The 2009 petrale assessment estimated a stock depletion of 11.6 percent of its unfished biomass at the start of 2009 (Haltuch and Hicks 2009b). That result compelled NMFS to declare the stock overfished in 2010. The 2009 assessment treated petrale sole as a single coastwide stock, with the fleets and landings structured by state (WA, OR, CA) area of catch. Historical catches were extended back to 1876, the first year of estimated exploitation for the stock.

New proxy management reference points used to manage FMP flatfish stocks, such as petrale sole, were implemented in 2011 under FMP Amendment 16-5 (also referred to as Secretarial Amendment 1) in 2011 (PFMC and NMFS 2011). The proxy F_{MSY} harvest rate or MFMT of $F_{40\%}$, which is applied to the

[4] $B_{25\%}$ was the MSST or overfished threshold for all groundfish stocks from the implementation of Amendment 12 in 1998 through 2010.
[5] $F_{40\%}$ was the F_{MSY} proxy harvest rate for all flatfish stocks prior to 2011.

estimated exploitable biomass to determine the OFL, was changed to $F_{30\%}$; the B_{MSY} target of $B_{40\%}$ was changed to $B_{25\%}$; and the MSST of $B_{25\%}$, was changed to $B_{12.5\%}$. The SSC recommended these new proxy reference points to manage flatfish stocks based on a meta-analysis of the relative productivity of assessed west coast flatfish species and other assessed Pleuronectid species internationally. The precautionary ACL harvest control rule, referred to as the 25-5 rule and analogous to the 40-10 rule for other groundfish stocks (see Figure 36 and section 1.2.3 for more detail on these ACL harvest control rules), was also adopted for flatfish stocks under Amendment 16-5.

The 2009 rebuilding analysis (Haltuch and Hicks 2009a) was used to consider a petrale sole rebuilding plan for petrale sole, which was implemented under FMP Amendment 16-5. The rebuilding plan specified a target year of 2016 and the strategy of using the 25-5 harvest control rule after 2011 to set harvest levels (the 2011 ACL was set equal to the ABC to avoid unnecessary negative socioeconomic impacts). An emergency rule was implemented to reduce the 2010 petrale OY to 1,200 mt.

The 2011 petrale assessment estimated a stock depletion of 18 percent of its unfished biomass at the start of 2011 (Haltuch, *et al.* 2011). The assessment indicated an increasing spawning biomass trend with above average year classes recruiting into the spawning biomass. The 2011 rebuilding analysis (Haltuch 2011) indicated rebuilding was ahead of schedule and predicted spawning biomass would likely attain the B_{MSY} target of $B_{25\%}$ by the start of 2013. No modifications were made to the rebuilding plan based on this result.

The 2013 petrale assessment (Haltuch, *et al.* 2013) estimated a stock depletion of 22.3 percent of its unfished biomass at the start of 2013 and short of the prediction from the 2011 rebuilding analysis; spawning biomass is predicted to reach the B_{MSY} target by the start of 2014. The 2013 stock assessment continued with the coastwide stock assessment, but was restructured to summarize petrale sole landings by the port of landing and combined Washington and Oregon into a single fleet. The down-weighting of the trawl CPUE index used in the 2011 assessment was largely responsible for the more pessimistic result and the one year lag in rebuilding relative to the previous assessment. However, the estimation of recent recruitments indicated two very strong year classes (2007 and 2008; Figure 18) recruiting into the spawning population, which increases the likelihood of imminent success in rebuilding this stock.

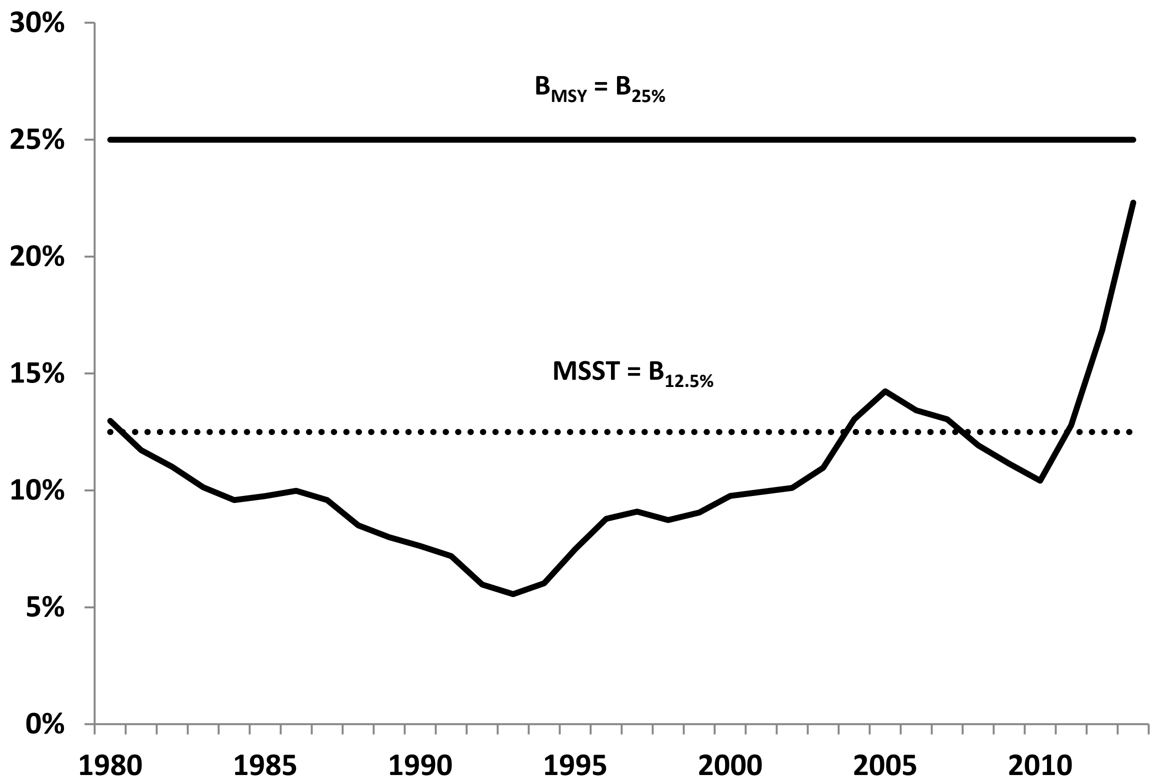

Figure 17. Relative depletion trend from 1980 to 2013 for petrale sole based on the 2013 stock assessment.

Stock Productivity Relative to Rebuilding Success

Petrale have high stock productivity with an estimated stock-recruitment steepness of 0.86 (Haltuch, *et al.* 2013); the prior for this estimate was based on a meta-analysis of flatfish species in the family *Pleuronectidae (Myers, et al. 1999)*. The time series of estimated recruitments shows a relationship with the decline in spawning biomass, punctuated by larger recruitments. The five weakest recruitments since 1934 are estimated to be from 1986, 1987, 1992, 1995, and 2001, while the five strongest recruitments since 1934 are estimated to be from 1939, 1966, 1998, 2007, and 2008. The 2007 and 2008 recruitments were the third and second largest estimated, respectively, behind only the record 1966 recruitment event (Figure 18). Until 2007, the most recent large recruitment event is estimated to be in 2006, which was smaller than the 1998 recruitment event.

The high stock productivity and the large recent recruitments contribute to a predicted quick recovery of the petrale sole stock. The 2013 petrale assessment predicts the stock will be successfully rebuilt by the start of 2014, with an estimated depletion of 26 percent.

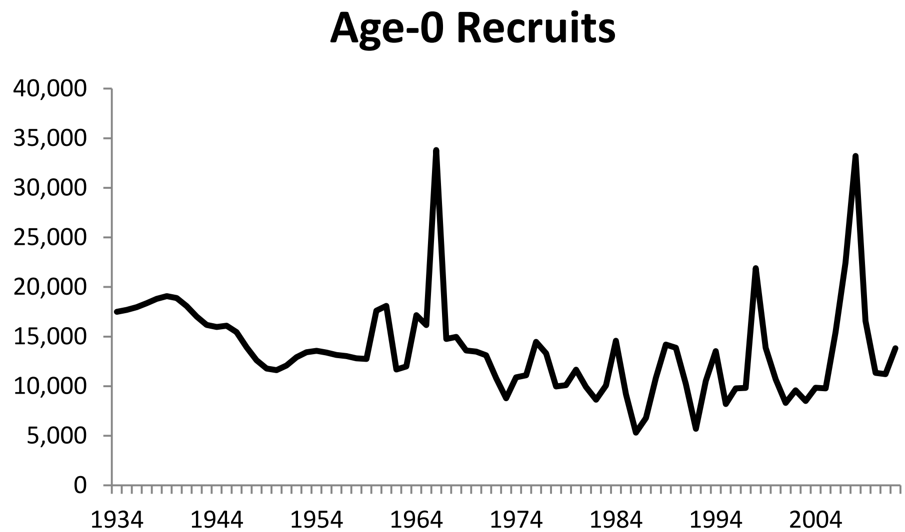

Figure 18. Time series of estimated (age 0) petrale sole recruitments, 1934-2012 (from Haltuch, *et al.* 2013).

Fishing Mortality

Most of the petrale sole catch is made by deep-water demersal trawls at depths of 164-252 fm. Recent petrale sole catch statistics exhibit marked seasonal variation, with substantial portions of the annual harvest taken from the spawning grounds in December and January. From the inception of the fishery in 1876 through the mid-1940s, the vast majority of catches occurred between March and October (the summer fishery), when the stock is dispersed over the continental shelf. The post-World War II period witnessed a steady decline in the amount and proportion of annual catches occurring during the summer months (March-October). Conversely, petrale catch during the winter season (November–February), when the fishery targets spawning aggregations, has exhibited a steadily increasing trend since the 1940s. Since the mid-1980s, catches during the winter months have been roughly equivalent to or exceeded catches throughout the remainder of the year. In 2009, catches of petrale sole began to be restricted due to declining stock size.

Petrale sole exhibit distinct seasonal depth migrations with higher abundance on the shelf during summer months and higher abundance in distinct spawning areas during winter months. Hence, RCA structures for this species could vary seasonally if RCA management is needed to control fishing mortality. The general pattern for petrale sole is a shallower depth distribution during the summer months (periods 3 and 4) and a deeper depth distribution during the winter months (periods 1 and 6). Petrale sole are typically in transition as they migrate between shallow and deeper depths during periods 2 and 5.

Petrale sole is a trawl-dominant species. Therefore, the uncertainty in catch monitoring and accounting is low, given the mandatory 100 percent observer coverage and near real-time reporting of total catches in the rationalized trawl fisheries.

Prior to 2010, when interim rebuilding measures were implemented, harvest rates were in excess of what is now considered the F_{MSY} limit of $F_{30\%}$ (i.e., SPR = 30%). Management measures implemented since 2010 have resulted in harvest rates below the F_{MSY} limit.

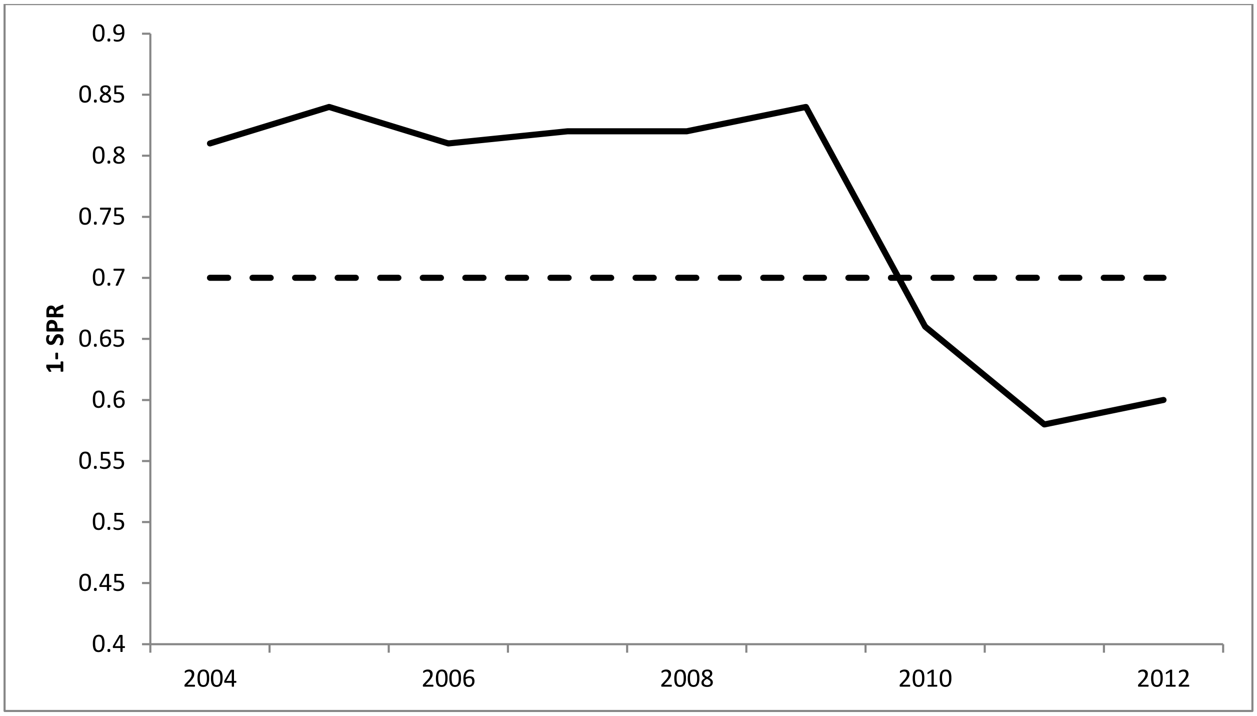

Figure 19. Estimated spawning potential ratio (SPR) of petrale sole, 2004-2012. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis. The management target is plotted as a dashed horizontal line and values above this reflect harvests in excess of the overfishing proxy based on the F_{MSY} harvest rate (SPR = 30%).

Rebuilding Duration and Probabilities

The 2013 petrale assessment predicts the stock will be rebuilt by 2014. Therefore, rebuilding probabilities (both P_{MAX} and P_{TARGET}) are high for petrale sole under the harvest control rule in the rebuilding plan. The SSC is recommending a new assessment be done in 2015 to confirm that prediction.

1.1.3.7 Yelloweye Rockfish

Distribution and Life History

Yelloweye rockfish (*Sebastes ruberrimus*) range from the Aleutian Islands, Alaska, to northern Baja California, Mexico, and are common from Central California northward to the Gulf of Alaska (Eschmeyer, *et al.* 1983; Hart 1988; Love, *et al.* 2002; Miller and Lea 1972; O'Connell and Funk 1986). Yelloweye rockfish occur in water 25 m to 550 m deep with 95 percent of survey catches occurring from 50 m to 400 m (Allen and Smith 1988). Yelloweye rockfish are bottom dwelling, generally solitary, rocky reef fish, found either on or just over reefs (Eschmeyer, *et al.* 1983; Hart 1988; Love, *et al.* 2002; Miller and Lea 1972; O'Connell and Funk 1986) . Boulder areas in deep water (>180 m) are the most densely populated habitat type, and juveniles prefer shallow-zone broken-rock habitat (O'Connell and Carlile 1993). They also reportedly occur around steep cliffs and offshore pinnacles (Rosenthal, *et al.* 1982). The presence of refuge spaces is an important factor affecting their occurrence (O'Connell and Carlile 1993).

Yelloweye rockfish are ovoviviparous and give birth to live young in June off Washington (Hart 1988). The age of first maturity is estimated at six years and all are estimated to be mature by eight years (Wyllie

Echeverria 1987). They can grow to 91 cm (Eschmeyer, *et al.* 1983; Hart 1988) and males and females probably grow at the same rates (Love 1996; O'Connell and Funk 1986). The growth rate levels off at approximately 30 years of age (O'Connell and Funk 1986) but they can live to be 118 years old (Love, *et al.* 2002). Yelloweye rockfish are a large predatory reef fish that usually feeds close to the bottom (Rosenthal, *et al.* 1982). They have a widely varied diet, including fish, crabs, shrimps and snails, rockfish, cods, sand lances, and herring (Love, *et al.* 2002). Yelloweye rockfish have been observed underwater capturing smaller rockfish with rapid bursts of speed and agility. Off Oregon the major food items of the yelloweye rockfish include cancroid crabs, cottids, righteye flounders, adult rockfishes, and pandalid shrimps (Steiner 1978). Quillback and yelloweye rockfish have many trophic features in common (Rosenthal, *et al.* 1982).

Stock Status and Management History

The first yelloweye rockfish stock assessment on the U.S. west coast was conducted in 2001 (Wallace 2002). This assessment incorporated two area assessments: one from Northern California using CPUE indices constructed from Marine Recreational Fisheries Statistical Survey (MRFSS) sample data and CDFG data collected on board commercial passenger fishing vessels, and the other from Oregon using Oregon Department of Fish and Wildlife (ODFW) sampling data. The assessment concluded yelloweye rockfish stock biomass in 2001 was at about 7 percent of unexploited biomass in Northern California and 13 percent of unexploited biomass in Oregon. The assessment revealed a thirty-year declining biomass trend in both areas with the last above average recruitment occurring in the late 1980s. The assessment's conclusion that yelloweye rockfish biomass was well below the 25 percent of unexploited biomass threshold for overfished stocks led to this stock being declared overfished in 2002. Until 2002, yelloweye rockfish were listed in the "remaining rockfish" complex on the shelf in the Vancouver, Columbia, and Eureka INPFC areas and the "other rockfish" complex on the shelf in the Monterey and Conception areas. As with the other overfished stocks, yelloweye rockfish harvest is now tracked separately and managed against a species-specific ACL.

In June 2002 the SSC recommended that managers should conduct a new assessment incorporating Washington catch and age data. This recommendation was based on evidence that the biomass distribution of yelloweye rockfish on the west coast was centered in waters off Washington and that useable data from Washington were available. Based on that testimony, the Council recommended completing a new assessment in the summer of 2002, before a final decision was made on 2003 management measures. Methot et al. (Methot, *et al.* 2003) did the assessment, which confirmed the overfished status (24 percent of unfished biomass) and provided evidence of higher stock productivity than originally assumed. The assessment also treated the stock as a coastwide assemblage. The 2002 rebuilding analysis (Methot and Piner 2002a) informed the yelloweye rockfish rebuilding plan adopted under FMP Amendment 16-3 in 2004. The rebuilding plan established a target rebuilding year of 2058 and a harvest control rule of F = 0.0153.

A coastwide 2006 yelloweye rockfish assessment estimated a stock depletion of 17.7 percent of the unfished level at the start of 2006 (Wallace, *et al.* 2006). New data sources in the assessment included WDFW 2002 submersible survey and the International Pacific Halibut Commission annual longline survey. Further revisions in the assessment included reducing natural mortality from 0.045 to 0.036 and increasing steepness from 0.437 to 0.45.

The 2006 rebuilding analysis (Tsou and Wallace 2006) was used to inform a revision of the yelloweye rebuilding plan under FMP Amendment 16-4. Given the significant negative socioeconomic impacts associated with the projected OYs under the constant harvest rate modeled in the rebuilding analysis, the Council elected to gradually ramp down the harvest rate beginning in 2007 before resuming a constant harvest rate rebuilding strategy in 2011. The harvest rate ramp-down strategy, which projected annual

OYs of 23 mt, 20 mt, 17 mt, and 14 mt, respectively in 2007-2011, was projected to extend rebuilding by less than one year relative to the more conservative constant harvest rate strategy analyzed. The ramp-down strategy afforded more time to consider new Yelloweye Rockfish Conservation Areas and other management measures designed to reduce the harvest rate to prescribed levels. Therefore, the Amendment 16-4 rebuilding plan incorporated the ramp-down strategy before resuming a constant harvest rate (SPR = 71.9%) in 2011. The rebuilding plan also specified a target rebuilding year of 2084.

The 2007 updated stock assessment for yelloweye rockfish estimated a stock depletion of 16.4 percent of initial, unfished biomass (Wallace 2008a). The long-term biomass trajectory in the 2007 updated assessment was very similar to that in the 2006 assessment. The 2007 rebuilding analysis (Wallace 2008b) indicated rebuilding progress was on track under the ramp-down strategy; therefore, no revisions were made to the rebuilding plan.

The benchmark 2009 yelloweye assessment estimated a stock depletion of 20.3 percent of initial, unfished biomass at the start of 2009 (Stewart, *et al*. 2009). The resource was modeled as a single stock, but with three explicit spatial areas: Washington, Oregon and California. Each area was modeled simultaneously with its own unique catch history and fishing fleets (recreational and commercial), with the stocks linked via a common stock-recruit relationship with negligible adult movement among areas. The assumed level of historical removals and estimated steepness were identified as the main axes of uncertainty.

The 2009 yelloweye rebuilding analysis (Stewart 2009b) was used to inform a revised rebuilding plan that was implemented under FMP Amendment 16-5. The revised rebuilding plan implemented in 2011 specified a constant harvest rate (SPR = 76%) strategy (the ramp-down strategy was abandoned) and a target year to rebuild the stock of 2074.

The 2011 yelloweye assessment (Taylor and Wetzel 2011), an update of the 2009 assessment, estimated stock depletion at 21.4 percent of initial, unfished biomass at the start of 2011 (Figure 20). The update assessment results were very similar to those in the previous assessment. The 2011 yelloweye rebuilding analysis (Taylor 2011) indicated rebuilding progress was on schedule and no revisions were made to the rebuilding plan.

A yelloweye catch report was provided in 2013 (Agenda Item F.5.a, Attachment 11, June 2013), which indicated 2010-2012 total catches were below specified ACLs/OYs.

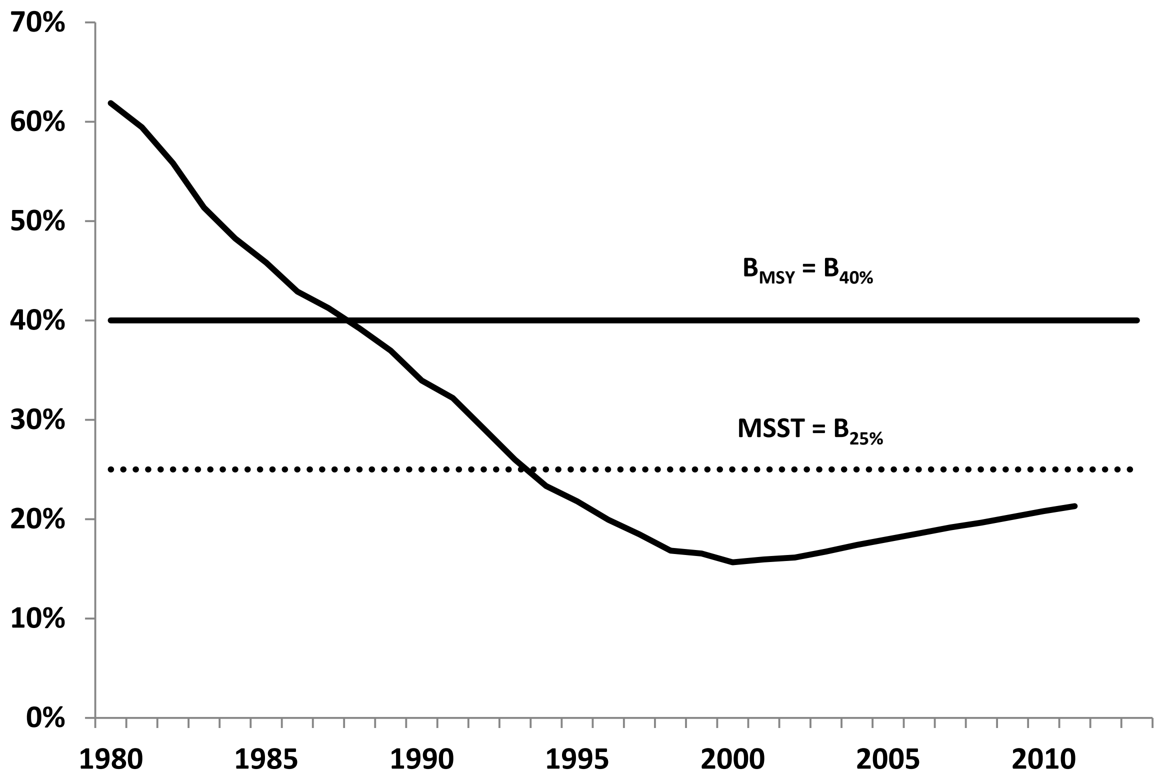

Figure 20. Relative depletion of yelloweye rockfish from 1980 to 2011 based on the 2011 stock assessment update.

Stock Productivity Relative to Rebuilding Success

Yelloweye year class strength is modeled as a deterministic process in the 2011 assessment with no estimation of the size of individual year classes. Therefore, the decline in estimated recruitment tracks closely to that of the spawning output (Figure 21). The decline is especially pronounced given the low (and likely imprecise) estimate for steepness of the stock-recruit relationship in the base-case model (0.441). The low estimated steepness in the assessment results in a prediction of very little surplus production and consequently estimates of low yields at B_{MSY} (MSY is estimated to be 58 mt under the F_{MSY} proxy SPR harvest rate of 50 percent). This relatively low stock productivity also predicts a long mean generation time of 46 years and a slow recovery rate under the very low harvest rate specified in the yelloweye rebuilding plan.

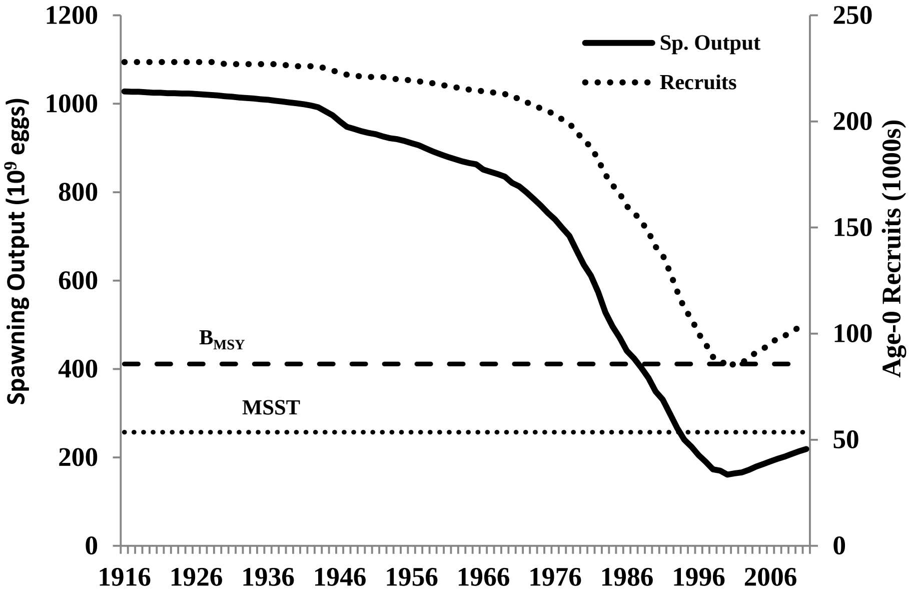

Figure 21. Time series of estimated yelloweye rockfish spawning output and recruitments for the base-case model in the 2011 assessment (Taylor and Wetzel 2011).

Fishing Mortality

Yelloweye rockfish are caught coastwide in all sectors of the fishery. Yelloweye are particularly vulnerable to hook-and-line gears, which are effective in the high relief habitats yelloweye reside. The current non-trawl RCA and the recreational depth closures are primarily configured based on yelloweye distribution and projected impacts in these hook-and-line fisheries. Small footrope trawls, including selective flatfish trawls, do not have the rollers and anti-chafing protection needed to fish in the high relief habitats yelloweye are found. Mandating these gears for trawl efforts on the shelf shoreward of the trawl RCA, the configuration of the trawl RCA, and a small IFQ allocation of yelloweye are the primary strategies currently used to minimize trawl impacts on yelloweye. Yelloweye are also a bycatch species in the Pacific halibut fishery (Love*, et al.* 2002).

Yelloweye rockfish are mostly encountered north of 36º N lat. Yelloweye occur in depths from 25 to 475 m and are most commonly found at depths from 91 to 180 m (Love*, et al.* 2002).

Fishing mortality rates estimated in the 2011 assessment have been in excess of the current F_{MSY} harvest rate for rockfish (SPR = 50 percent) from 1976 through 1999 (Figure 22). Relative exploitation rates (catch/biomass of age-8 and older fish) are estimated to have peaked at 12.7 percent in 1992, but have been at or less than 1.1 percent after 2001. The F_{MSY} exploitation rate assuming the proxy SPR of 50 percent is 2.2 percent. Annual yelloweye harvest rates in the 1976-1999 period averaged over five times the estimated F_{MSY} and spawning biomass declined rapidly during that period.

The commercial RCAs substantially reduce yelloweye impacts. North of 40º10’ N lat., the highest bycatch rates of yelloweye rockfish occur in waters less than 100 fm. Yelloweye rockfish have a patchy distribution and as such, using fleetwide bycatch rates over a large area (north and south of 40º10’ N lat.) may misrepresent actual catch rates. North of Cape Alava, yelloweye bycatch rates are lowest inside of the 60 fm line; bycatch rates would increase substantially if shoreward RCAs were moved from the 60 fm line to the 75 fm line. The seaward boundary of the non-trawl RCA extends out to 150 fm year round south of 40º10' N lat. The seaward boundary of the non-trawl RCA north of 40º10' N lat. is at 100 fm year round with a few exceptions where the seaward boundary is at 125 fm. Between 45º03.83' to 43º N lat. the seaward is at 125 fm year round.

Area closures and a prohibition on retention are the main strategies used to minimize recreational yelloweye impacts. The California recreational fishery is subject to depth restrictions that are more restrictive in the northern management areas where yelloweye are more prevalent. CDFG evaluated and has available four potential YRCAs which include habitat in both state and Federal waters where high yelloweye encounter rates have been documented. If implemented, YRCAs are anticipated to reduce yelloweye impacts during the open fishing seasons in both the Northern Groundfish Management Area and the North-Central North of Pt. Arena Groundfish Management Area, possibly allowing for a longer fishing season. To date, these YRCAs have not been implemented but would remain available management measures that can be routinely implemented inseason if needed. Depth management is the main tool used for controlling yelloweye rockfish fishing mortality in the Washington and Oregon recreational fisheries.

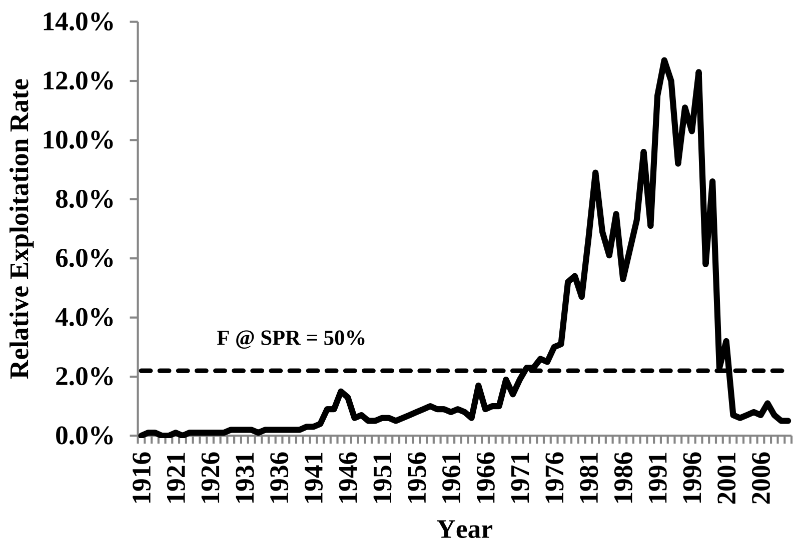

Figure 22. Time series of estimated relative exploitation rates (catch/biomass of age 8+ fish) of yelloweye rockfish, 1916-2010 (Taylor and Wetzel 2011).

Catch monitoring uncertainty is high given the relatively small contribution of yelloweye to rockfish market categories and the relatively large scale of recreational removals. In addition, since 2001, management restrictions have required nearly all yelloweye rockfish caught by recreational and commercial fishermen to be discarded at sea. Precisely tracking recreational catch inseason, especially in the California recreational fishery, has been a challenge.

Rebuilding Duration and Probabilities

Rebuilding under the SPR harvest rate specified in the rebuilding plan has a predicted P_{MAX} of 72.9 percent and a probability of rebuilding by the target year of 2074 of 62.1 percent.

1.1.4 Non-Overfished Groundfish Stocks

1.1.4.1 Arrowtooth Flounder

Distribution and Life History

Arrowtooth flounder (*Atheresthes stomias*) range from the southern coast of Kamchatka to the northwest Bering Sea and Aleutian Islands to San Simeon, California. Arrowtooth flounder is the dominant flounder species on the outer continental shelf from the western Gulf of Alaska to Oregon. They are members of the family Pleuronectidae, the right eyed flounders. Arrowtooth reach sizes of nearly 90 cm and can live to 27 years. Eggs and larvae are pelagic; juveniles and adults are demersal (Garrison and Miller 1982; NOAA 1990). Juveniles and adults are most commonly found on sand or sandy gravel substrates, but occasionally occur over low-relief rock-sponge bottoms. Arrowtooth flounder exhibit a strong migration from shallow water summer feeding grounds on the continental shelf to deep water spawning grounds over the continental slope (NOAA 1990). Depth distribution may vary from as little as 50 m in summer to more than 500 m in the winter (Garrison and Miller 1982; NOAA 1990; Rickey 1995).

Arrowtooth flounder are oviparous with external fertilization and eggs are about 2.5 mm in diameter. Spawning may occur deeper than 500 m off Washington (Rickey 1995). Arrowtooth are batch spawners (Rickey 1995). They spawn in the deeper continental shelf waters (>200 m) in the late fall through early spring and appear to move inshore during the summer (Zimmerman and Goddard 1996). The larvae spend approximately four weeks in the upper 100 m of the water column (Fargo and Starr 2001) and settle to the bottom in the late winter and early spring. Larvae eat copepods, their eggs, and copepod nauplii (Yang 1995; Yang and Livingston 1985). Juveniles and adults feed on crustaceans (mainly ocean pink shrimp and krill) and fish (mainly gadids, herring, and pollock) (Hart 1988; NOAA 1990).

Arrowtooth flounder exhibit two feeding peaks, at noon and midnight. Arrowtooth are piscivorous, but they also eat shrimp, worms, and euphausiids (Love 1996). Buckley et al. (1999) analyzed 380 arrowtooth stomachs that were collected in 1989 and 1992 from Oregon and Washington and found that hake (*Merluccius productus*) and unidentified gadids dominate their stomach contents (45 percent and 22 percent respectively) followed by herring (19 percent; *Clupea pallasi*), mesopelagics (0.5 percent), rex sole (1 percent; *Glyptocephalus zachirus*), slender sole (*Lyopsetta exilis*) and other small flatfish (3 percent), other arrowtooth (1.5 percent), other unidentified flatfish (1 percent), pandalid shrimp (~3 percent), and euphausiids (3 percent). Yang (1995) analyzed 1,144 stomachs from arrowtooth collected in the Gulf of Alaska, and found that walleye pollock (*Theragra chalcogramma*) composed 66 percent of the arrowtooth diet, although arrowtooth smaller than 40 cm primarily feed on capelin (*Mallotus villosus*), herring, and shrimp. Gotshall (1969) examined 425 arrowtooth stomachs from northern California throughout the 1960s and found that pandalid shrimp made up nearly 40 percent of the prey by volume, along with other shrimps, crabs, euphausiids, Pacific sanddabs (*Citharichthys sordidus*), and slender sole. However, Gotshall's samples were taken directly from shrimp beds, so higher concentrations of shrimp would be expected. It is clear that arrowtooth have a broad diet, consuming most of the common fish and invertebrates found on soft bottom substrate and in the water column.

Predators of juvenile arrowtooth include skates, dogfish, shortspine thornyhead, halibut, coastal sharks, orcas, toothed whales, and harbor seals (Field, *et al.* 2006). Adult arrowtooth are likely to be vulnerable only to the largest of these predators.

Female arrowtooth off Oregon reach 50 percent maturity at 8 years of age, and males at four years (Hosie 1976). Rickey (1995) found that the arrowtooth reach 50 percent maturity at lengths of 36.8 cm for females and 28 cm for males off Washington, and 44 cm for females and 29 cm for males off Oregon. As a comparison, female length at 50 percent maturity is 47 cm in the Gulf of Alaska (Turnock, *et al.* 2005) and 38 cm in British Columbia (Fargo and Starr 2001).

Stock Status and Management History

Arrowtooth are commonly caught by trawl fleets off Washington and Oregon, but they are frequently discarded due to low flesh quality. For this reason, the market for arrowtooth has been fairly limited over the last 50 years. It is likely that the stock off the U.S. west coast is linked to the population off British Columbia and, possibly, to the stock in the Gulf of Alaska. However, for assessment purposes it is assumed that the U.S. west coast population is a unit stock.

The west coast stock of arrowtooth flounder was assessed in 1993 (Rickey 1993), and a full stock assessment was done in 2007 (Kaplan and Helser 2008). Three components of the arrowtooth fishery were used in modeling: the mink food fishery in the 1950s-1970s; a targeted fillet/headed-and-gutted fishery that began around 1981; and a "bycatch fleet" that represents west coast trawl effort with arrowtooth bycatch, but no landings. Estimates of historical catch are highly uncertain. The model contains assumed fixed values for natural mortality and steepness of the stock-recruitment relationship. Likelihood profiles suggest that the estimates of biomass and depletion are not sensitive to values of steepness. Assumed values of natural mortality have a small effect on estimated depletion, but strongly influence the estimates of absolute biomass.

The base model shows a period of moderate depletion through the 1950s and 1960s, followed by a rebuilding of the stock beginning in the late 1970s. Strong year classes, in particular the 1999 year class, have led to an increase in the stock since the late 1990s. The spawning biomass at the beginning of 2007 was estimated to be 63,302 mt and 79 percent of the estimated unfished spawning biomass. Total biomass at the start of 2007 was estimated to be 85,175 mt. The 2007 stock assessment estimated that the arrowtooth stock has never fallen below the overfished threshold.

Stock Productivity

Arrowtooth flounder are a very productive stock with high growth rates, high natural mortality rates, and a high stock-recruitment steepness. A mean flatfish steepness of 0.8 was determined in a 2010 meta-analysis conducted by the SSC and described in the 2011-2012 specifications FEIS (PFMC and NMFS 2011). A steepness of 0.902 was assumed in the 2007 arrowtooth flounder assessment based on a flatfish meta-analysis conducted by Dorn (2002a). Arrowtooth received a relatively high productivity score of 1.95 in the PSA analysis (Table 2).

The 2007 assessment estimated strong recruitments for most years between 1998 and 2007, with a particularly strong recruitment of the 1999 year class. That year class has dominated the population and fishery for the last ten years but is now diminished through high natural mortality. However, the 2007 assessment projects a very healthy stock through 2018 under catch streams much higher than has been realized since then.

Fishing Mortality

The target F_{MSY} SPR harvest rate for arrowtooth is 30 percent. The 2007 assessment estimated annual SPR harvest rates between 1997 and 2006 of 49-75 percent, substantially lower than the target. The arrowtooth ACL/OY has never been exceeded.

Arrowtooth flounder are a trawl-dominant species and are not particularly valuable. Given that arrowtooth are caught on the northern shelf where Pacific halibut, darkblotched rockfish, and yelloweye rockfish are caught incidentally to arrowtooth, this is not a species with a high attainment since valuable quota for these highly constraining species would have to be invested to target arrowtooth. About 20 percent of the arrowtooth quota was attained in the 2012 fishery (cite). Management uncertainty is low with the 100 percent observer coverage for the trawl fleet under trawl rationalization. The PSA vulnerability score of 1.21 indicates a low concern of overfishing.

1.1.4.2 Black Rockfish off California and Oregon

Distribution and Life History

Black rockfish (*Sebastes melanops*) are found from Southern California (San Miguel Island) to the Aleutian Islands (Amchitka Island) and they occur most commonly from San Francisco northward (Hart 1988; Miller and Lea 1972; Phillips 1957; Stein and Hassler 1989). Black rockfish occur from the surface to greater than 366 m; however, they are most abundant at depths less than 54 m (Stein and Hassler 1989). Off California, black rockfish are found along with the blue, olive, kelp, black-and-yellow, and gopher rockfishes (Hallacher and Roberts 1985). The abundance of black rockfish in shallow water declines in the winter and increases in the summer (Stein and Hassler 1989). Densities of black rockfish decrease with depth during both the upwelling and non-upwelling seasons (Hallacher and Roberts 1985). Off Oregon, larger fish seem to be found in deeper water (20 m to 50 m) (Stein and Hassler 1989). Black rockfish off the northern Washington coast and outer Strait of Juan de Fuca exhibit no significant movement. However, fish appear to move from the central Washington coast southward to the Columbia River, but not into waters off Oregon. Movement displayed by black rockfish off the northern Oregon coast is primarily northward to the Columbia River (Culver 1986). Black rockfish form mixed sex, midwater schools, especially in shallow water (Hart 1988; Stein and Hassler 1989). Black rockfish larvae and young juveniles (<40 mm to 50 mm) are pelagic, but are benthic at larger sizes (Laroche and Richardson 1980).

Black rockfish have internal fertilization and annual spawning (Stein and Hassler 1989). Parturition occurs from February through April off British Columbia, January through March off Oregon, and January through May off California (Stein and Hassler 1989). Spawning areas are unknown, but spawning may occur in offshore waters because gravid (egg-carrying) females have been caught well offshore (Dunn and Hitz 1969; Hart 1988; Stein and Hassler 1989). Black rockfish can live to be more than 20 years in age. The maximum length attained by the black rockfish is 60 cm (Hart 1988; Stein and Hassler 1989). Off Oregon, black rockfish primarily prey on pelagic nekton (anchovies and smelt) and zooplankton such as salps, mysids, and crab megalops. Off Central California, juveniles eat copepods and zoea, while adults prey on juvenile rockfish, euphausiids, and amphipods during upwelling periods. During periods without upwelling they primarily consume invertebrates. Black rockfish feed almost exclusively in the water column (Culver 1986). Black rockfish are known to be eaten by lingcod and yelloweye rockfish (Stein and Hassler 1989).

Stock Status and Management History

A black rockfish assessment was completed in 2003 and pertained to the portion of the coastwide stock occurring off the coasts of Oregon and California (Ralston and Dick 2003) or the southern stock unit. Alternative harvest levels in the 2003 assessment were ranged to capture the major uncertainty of historical landings prior to 1978. Black rockfish catches prior to 1945 were assumed to be zero in the assessment. Many gaps in historical landings of black rockfish since 1945 were evident, and these landings were reconstructed using a variety of data sources. The base model assumed cumulative landings of black rockfish from all fisheries was 17,100 mt from 1945 to 1977. The 2003 assessment concluded the southern California-Oregon stock of black rockfish was in healthy condition with a 2002 spawning output estimated to be at 49 percent of its unexploited level.

The southern stock of black rockfish was again assessed in 2007 (Sampson 2008) using a similar approach and structure as the 2003 assessment. The 2007 assessment estimated the southern stock was at 70 percent of its unfished level at the start of 2007. The 2007 assessment was structured into six fisheries: a set of trawl, commercial non-trawl, and recreational fisheries for Oregon and California, respectively. The fisheries for each state were based on fish capture location rather than where they were landed and therefore represented separate geographic areas. The model in the 2007 assessment did not include any underlying spatial structure in the population dynamics. Like the previous southern stock assessment, abundance indices for tuning the assessment were based on recreational CPUE data with two independent indices available for each state. The standard research trawl surveys along the U.S. west coast do not operate in shallow enough water to catch appreciable numbers of black rockfish and therefore do not provide any fishery independent index of stock biomass for black rockfish. The 2007 assessment had two additional abundance indices that were not available for the previous assessment: a black rockfish pre-recruit index for 2001-2006 and estimates from a tag-recapture study of exploitable black rockfish abundance off Newport, Oregon for 2003-2005. The 2007 assessment for the southern stock of black rockfish used the same sex- and age-specific formulation for natural mortality (M) that was used in the assessment for northern black rockfish, but there is little evidence to confirm that the assumed formulation is correct. The 2003 assessment for southern black rockfish used much smaller values for M that were more consistent with observed values for the maximum age of southern black rockfish.

Stock Productivity

The 2007 southern black rockfish assessment assumed a steepness of 0.6 based on the Dorn meta-analysis of rockfish steepness done at that time. The revised rockfish steepness meta-analysis now predicts a mean steepness of 0.779. The PSA productivity score of 1.33 indicates a stock of moderate productivity.

The 2007 assessment estimated above-average recruitments in the 1990s (with particularly strong recruitments in 1994 and 1999), 2000, 2001, and 2007; and below-average recruitments during 2002-2006. These recruitments are projected to keep the stock healthy under the 1,000 mt constant catch strategy implemented in 2009.

Fishing Mortality

The nearshore commercial and recreational fisheries that take black rockfish are managed well in California and Oregon, and ACLs/OYs have not been exceeded. The PSA vulnerability score of 1.94 indicates a stock of medium concern for overfishing.

Over most of the stock's history the fishing rate has been less than the 50% SPR target fishing rate. The estimated spawning output has been above the target level during all years except 1991 to 1998, and has never dropped below the overfished level. The southern stock of black rockfish is estimated to be well above the overfished level.

1.1.4.3 Black Rockfish off Washington

Distribution and Life History

See the description of black rockfish distribution and life history in section 1.1.4.2.

Stock Status and Management History

The black rockfish stock found between Cape Falcon, Oregon and the U.S. Canadian border was first assessed in 1994 (Wallace and Tagart 1994). Estimated biomass was 60 percent of the unfished level and female egg production was estimated to be 43 percent of the unfished level. A harvest guideline of 517 mt for this area was specified beginning in 1995 based on assessment results. Catches remained well below the harvest guideline in the years subsequent to the assessment.

The 1999 assessment of the black rockfish stock north of Cape Falcon, Oregon determined the stock was at 45 percent of the unfished level (Wallace, *et al.* 1999). The population was regarded as healthy and stock abundance was estimated to be slightly increasing after a period of low abundance in the late 1980s and early 1990s.

The most recent assessment of the northern stock was done in 2007, which estimated a depletion of 53.4 percent of the unfished level (Wallace, *et al.* 2008). The base model for the 2007 assessment assumed a female natural mortality rate to be age-specific using age at first and full maturity for inflections (10 and 15). A constant natural mortality rate of 0.16 was assumed for males and young females (< 10 years of age), and a rate of 0.2 was assumed for old females (>=15 years of age). Model sensitivity analysis showed that model configurations using higher natural mortality for older females provided better overall fits to the data. In the model, spawning biomass and age 3+ biomass reached the lowest levels in 1995, following poor recruitment and intense fishing in the late 1980s. The population trajectory remained just above minimum stock size threshold, and the model indicated that the stock is currently well above the management target of $B_{40\%}$.

Stock Productivity

The 2007 assessment assumed a steepness 0.6 in the stock-recruitment relationship of the northern black rockfish stock based on the Dorn prior (as was done in the southern black rockfish assessment). Steepness may be even higher based on the revised prior of 0.779. The PSA productivity score of 1.33 indicates a stock of moderate productivity.

The 2007 assessment estimated strong recruitments in the 1990s (including strong recruitments in 1994 and 1999 as also estimated in the southern assessment) and above-average recruitments from 2002-2006.

Fishing Mortality

Total mortality of black rockfish off Washington has consistently been well below established ACLs/OYs. The stock is targeted in the Washington recreational fishery; however, that fishery is tightly regulated to minimize canary and yelloweye rockfish impacts. There is also a relatively low tribal take of black rockfish off Washington. There are no commercial nearshore fisheries off Washington.

Exploitation of black rockfish reached a peak in 1988 of 13 percent of the age 3+ biomass and remained near that level for 7 years, dropping precipitously between 1995 and 2000. In recent years exploitation has been relatively low (4-6 percent). Exploitation rate relative to spawning biomass indicate that harvest rates exceeded management targets between the mid 1980s through the mid 1990s for the northern stock of black rockfish.

The PSA vulnerability score of 1.94 indicates a stock of medium concern for overfishing.

1.1.4.4 Cabezon off California

Distribution and Life History

Cabezon (*Scorpaenichthys marmoratus*) are distributed along the entire west coast of the continental United States. They range from central Baja California north to Sitka, Alaska (Love 1996; Miller and Lea 1972). Cabezon are primarily a nearshore species found intertidally and among jetty rocks, out to depths of greater than 100 m (Love 1996; Miller and Lea 1972).

Cabezon are known to spawn in recesses of natural and manmade objects, and males are reported to show nest-guarding behavior (Garrison and Miller 1982). Spawning is protracted, and there appears to be a seasonal progression of spawning that begins off California in winter and proceeds northward to Washington by spring. Spawning off California peaks in January and February (O'Connell 1953) while spawning in Puget Sound (Washington State) occurs for up to 10 months (November-August), peaking in March–April (Lauth 1987). Laid eggs are sticky and adhere to the surface where deposited. After hatching, the young of the year spend 3–4 months as pelagic larvae and juveniles. Settlement takes place after the young fish have attained 3–5 cm in length (Lauth 1987; O'Connell 1953). It is apparent that females lay multiple batches in different nests, but whether these eggs are temporally distinct enough to qualify for separate spawning events is not understood (Lauth 1987; O'Connell 1953).

Stock Status and Management History

Cabezon in California waters was first assessed in 2003 and it estimated a depletion of 34.7 percent at the start of 2003 (Cope, *et al.* 2004). The assessment delineated two stocks (north and south) at the Oregon-California border, a distinction based on differences in the catch history, CPUE trends and biological parameters (mainly growth) between the two areas. Due to the lack of data for the northern population, the assessment focused on only the southern population. As with most nearshore groundfish stocks, this assessment lacked a fishery-independent index of abundance, and consequently relied on recreational CPUE indices and information about larval abundance.

The 2005 assessment modeled two California substocks north and south of Point Conception (Cope and Punt 2006). Historically, the recreational fishery had been the primary source of removals of cabezon in California; however, commercial catches had become a major source of removals in the ten years preceding the assessment because of the developing live-fish fishery. Removals were reconstructed back to 1916, when the commercial fishery began. The estimated stock depletions of the northern and southern substocks of cabezon at the start of 2005 were 40.1 percent and 28.3 percent, respectively.

The most recent cabezon assessment for cabezon occurring in waters off California, done in 2009, estimated a stock depletion of 48.3 percent of unfished biomass at the start of 2009 (Cope and Key 2009). The 2009 assessment modeled two California substocks, and also evaluated the population as a coastwide California stock. The SSC recommended combining the results of the area models for the two California substocks of cabezon for use in deciding statewide harvest specifications.

Stock Productivity

The 2009 cabezon assessment assumed a steepness of 0.7 for all models. The PSA productivity score of 1.72 indicates a stock of relatively high productivity.

Recruitment deviations were estimated from 1970-2006 for both of the assessed substocks. Recruitment patterns are distinctly different for the substocks occurring north and south of Pt. Conception at 34º27’ N lat. Large recruitment events in the 1970s and 1990s in the north and the south have increased spawning biomass to healthy levels. Interannual variation in recruitment is greater in the north. The large increase in biomass in the south was driven by a large 1999 recruitment, the largest seen in the time series. Large recruitments in the southern substock were estimated immediately after major El Niño events (e.g., 1984 and 1994 recruitments). Recruitment events for the northern substock appear to lag large recruitments in the south by a year.

Fishing Mortality

Exploitation of the southern cabezon substock began in the 1960s and caused a substantial decline in stock biomass. The large recruitments discussed above and a reduction in exploitation rates in the late 1990s and 2000s caused the substock to rebound to healthy levels. Exploitation in the north also increased in the 1960s, although fishing pressure was not as great. The spawning biomass of the northern substock declined, although not as dramatically as in the south. The stock rebounded with good recruitment and a reduction in fishing pressure.

The cabezon stock(s) off California were first assessed in 2003, and OYs were first specified in 2004. Specified OYs were exceeded in each year through 2006, but a reduction in cumulative landing limits adequately reduced fishing mortality starting in 2007. The percent of OY attainment ranged from 56 to 74 percent in the 2007-2010 period.

The PSA vulnerability score of 1.68 indicates a low risk of overfishing.

1.1.4.5 Cabezon off Oregon

Distribution and Life History

See the description of cabezon distribution and life history in section 1.1.4.4.

Stock Status and Management History

The 2009 assessment of the Oregon substock of cabezon (Cope and Key 2009) was the first for cabezon in Oregon waters; the assessment indicated a healthy stock status for Oregon cabezon at 52.4 percent depletion at the start of 2009. Only one index of abundance was used for modeling the Oregon cabezon substock (the Oregon Recreational Boat Survey or ORBS CPUE index). The Oregon model was robust to almost all data and parameter manipulation trials except the removal of the ORBS survey. Removal of the only abundance index causes the population to drop sharply below the overfished level and absolute biomass to be much smaller than in the base case. Unlike the assessments for the California substocks, the assessment of the Oregon cabezon substock does not show recent increases in spawning biomass. While the uncertainty in the estimated depletion level of the Oregon substock is generally low, uncertainty in the estimated spawning biomass is high.

Stock Productivity

Steepness in the 2009 assessment of the Oregon substock of cabezon was assumed to be 0.7. Recruitment in the Oregon substock of cabezon was estimated to be less dynamic than that for the California substocks. The PSA productivity score of 1.72 indicates a stock of relatively high productivity.

The assessment estimates large recruitments in 1999 and 2004. Uncertainty in estimating recruitment for the Oregon substock is less than the uncertainty in recruitment estimation for the California substocks.

Fishing Mortality

Cabezon exploitation in Oregon started in the 1970s and caused the biomass to decline. However, exploitation was not excessive and the estimated spawning biomass has always been above the B_{MSY} target.

The PSA vulnerability score of 1.68 indicates a low risk of overfishing.

1.1.4.6 California Scorpionfish

Distribution and Life History

California scorpionfish (*Scorpaena guttata*), also known locally as sculpin, is a generally benthic species found from central California to the Gulf of California in depths between the inter-tidal and about 170 m (Eschmeyer, *et al.* 1983; Love, *et al.* 1987). California scorpionfish generally inhabits rocky reefs, but in certain areas and seasons they aggregate over sandy or muddy substrate (Frey 1971; Love, *et al.* 1987). Catch rate analysis and tagging studies show that most, but not all, California scorpionfish migrate to deeper water to spawn during May-September (Love, *et al.* 1987). Tagging data suggest that they return to the same spawning site (Love, *et al.* 1987), but information is not available on non-spawning season site fidelity. California scorpionfish are quite mobile and may not be permanently tied to a particular reef (Love, *et al.* 1987).

California scorpionfish spawn from May through August, peaking in July (Love, *et al.* 1987). The species is oviparous, producing floating, gelatinous egg masses in which the eggs are embedded in a single layer (Orton 1955). California scorpionfish utilize the “explosive breeding assemblage” reproductive mode in which fish migrate to, and aggregate at traditional spawning sites for brief periods (Love, *et al.* 1987). These spawning aggregations have been targeted by fishermen. Few California scorpionfish are mature at one year of age, but over 50 percent are mature by age two and most are mature by age three (Love, *et al.* 1987).

The species feeds on a wide variety of foods, including crabs, fishes, octopi, isopods and shrimp, but juvenile Cancer crabs are the most important prey (Limbaugh 1955; Love, *et al.* 1987).

Stock Status and Management History

California scorpionfish were assessed in 2005 (Maunder, *et al.* 2006) in the southern California Bight south of Point Conception at 34º27’ N lat. to the U.S.-Mexico border. The stock assessment indicated the California scorpionfish stock was healthy with an estimated spawning stock biomass of 79.8 percent of its initial, unfished biomass in 2005.

In most years, 99 percent or more of the landings occur in the southern California ports. The California nearshore FMP includes California scorpionfish. The stock is managed by the state under provisions for improved fishery monitoring and research data collection.

Stock Productivity

A steepness value of 0.7 was assumed for California scorpionfish in the 2005 assessment. The PSA productivity score of 1.83 indicates a stock of relatively high productivity, especially for a rockfish.

The assessment noted a high recruitment variation in the stock and recruitments in the 1990s and early 2000s were estimated to be substantially above average. Relatively large recruitment events were estimated starting in 1984.

Fishing Mortality

A substantial but unknown portion of the stock occurs in Mexican waters. The exploitation of the stock in Mexican waters is unknown and the connectivity of that stock with the U.S. stock in the Southern California Bight is also unknown.

Commercial catch records for scorpionfish were available beginning in 1928. Commercial catches were the dominant removals until the 1990s when the recreational catch became dominant. High catches and low recruitments in the 1950s and 1960s precipitated a decline in biomass. Stock biomass has been on an increasing trend since the mid 1970s.

The PSA vulnerability score of 1.41 indicates a low risk of overfishing.

1.1.4.7 Chilipepper Rockfish South of 40º10' N Lat.

Distribution and Life History

Chilipepper rockfish (*Sebastes goodei*) are found from Magdalena Bay, Baja California, Mexico, to as far north as the northwest coast of Vancouver Island, British Columbia (Allen 1982; Hart 1988; Miller and Lea 1972). The region of greatest abundance is found between Point Conception and Cape Mendocino, California. Chilipepper have been taken as deep as 425 m, but nearly all in survey catches were taken between 50 and 350 m (Allen and Smith 1988). Adults and older juveniles usually occur over the shelf and slope; larvae and small juveniles are generally found near the surface. In California, chilipepper are most commonly found associated with deep, high relief rocky areas and along cliff drop-offs (Love, *et al.* 1990), as well as on sand and mud bottoms (MBC 1987). They are occasionally found over flat, hard substrates (Love, *et al.* 1990). Love (1996) does not consider this to be a migratory species. Chilipepper may travel as far as 45 m off the bottom during the day to feed (Love 1996). Chilipepper rockfish are described as an elongate fish with reduced head spines similar in appearance to both shortbelly rockfish (at smaller sizes, although shortbelly tend to be slimmer) and bocaccio rockfish (bocaccio tend to have larger mouths).

Chilipeppers are ovoviviparous and eggs are fertilized internally (Reilly, et al. 1992). Chilipepper school by sex just prior to spawning (MBC 1987). In California, fertilization of eggs begins in October and spawning occurs from September to April (Oda 1992) with the peak occurring during December to January (Love, *et al.* 2002). Chilipepper may spawn multiple broods in a single season (Love, *et al.* 2002). Females of the species are significantly larger, reaching lengths of up to 56 cm (Hart 1988). Males are usually smaller than 40 cm (Dark and Wilkins 1994). Males mature at two years to six years of age, and 50 percent are mature at three years to four years. Females mature at two years to five years with 50 percent mature at three years to four years (MBC 1987). Females may attain an age of about 27 years, whereas the maximum age for males is about 12 years (MBC 1987).

Larval and juvenile chilipepper eat all life stages of copepods and euphausiids, and are considered to be somewhat opportunistic feeders (Reilly, *et al.* 1992). In California, adults prey on large euphausiids, squid, and small fishes such as anchovies, lanternfish, and young Pacific whiting (Hart 1988; Love, *et al.* 2002). Chilipepper are found with widow rockfish, greenspotted rockfish, and swordspine rockfish (Love, *et al.* 2002). Juvenile chilipepper compete for food with bocaccio, yellowtail rockfish, and shortbelly rockfish (Reilly, *et al.* 1992). Pelagic juveniles are preyed upon by a wide range of predators, including seabirds, salmon, lingcod and marine mammals. Larger piscivorous fishes, marine mammals, and in recent years jumbo squid are among the predators of larger adults.

Stock Status and Management History

Chilipepper have been one of the most important commercial target species in California waters since the 1880s and were historically an important recreational target in Southern California waters. With the exception of excluding foreign fishing effort from the U.S. EEZ in the late 1970s, management actions were modest (and usually general to all rockfish and other groundfish) prior to the implementation of the Groundfish FMP in 1982. When the FMP was implemented, management for the groundfish trawl fishery was based on individual vessel trip limits, which were set at 40,000 lbs per trip on the Sebastes (all rockfish species) complex. These limits were maintained until 1991, when they were reduced to 25,000; in 1993 the trip limit system was revised from daily to biweekly trip limits, which were set at 50,000 lbs (south of Cape Mendocino). The trip limit regime continued to evolve in their absolute amounts and temporal duration (monthly, bimonthly) throughout the 1990s, with a general trend towards lower limits as conservation concerns arose for other rockfish species (particularly bocaccio rockfish in the region south of Mendocino). The chilipepper catch in the bottom trawl fishery has been managed under an IFQ system since 2011.

Chilipepper rockfish were assessed in 1998 (Ralston, *et al.* 1998), at which time the stock south of 40º10' N lat. was estimated to be at 46 percent to 61 percent of unfished biomass.

A full chilipepper assessment was conducted in 2007 (Field 2008). The 2007 assessment estimated a substantial increase in the spawning biomass of chilipepper rockfish in recent years, due to a strong 1999 year class as well as greatly reduced harvest rates in commercial and recreational fisheries. The 2007 assessment's base model result suggests a spawning biomass of 23,889 tons in 2006, corresponding to approximately 70 percent of the unfished spawning biomass of 33,390 tons and representing a near tripling of spawning biomass from the estimated low of 8,696 mt (26 percent of unfished) in 1999. The strong 1999 year class represents the largest estimated historical recruitment, and is the primary cause for the current population trajectory. There are no obvious signs of strong year classes since 1999, and coastwide pelagic juvenile surveys suggested average to low recruitment in years immediately preceding the assessment, suggesting that the stock may dip slightly in the near term.

The 2007 assessment was first used in 2008 to decide 2009 and 2010 chilipepper harvest specifications. The Council consideration for 2011 and 2012 was whether or not to remove chilipepper rockfish from the Shelf Rockfish North complex and manage it coastwide. Chilipepper rockfish are predominantly found south of 40°10' N lat. Prior to 2007 they were only assessed in the area south of 40°10' N lat. To date, chilipepper rockfish have been managed with stock-specific harvest specifications south of 40°10' N lat. and within the Shelf Rockfish North complex north of 40°10' N lat. When the stock assessment area was extended for the 2007 chilipepper stock assessment, it was extended to the stock's entire west coast range through waters off Oregon (chilipepper rockfish are not believed to occur in waters off Washington). However, it was decided to continue to manage chilipepper rockfish south of 40º10' N lat. with stock-specific harvest specifications and as part of the Shelf Rockfish complex north of 40°10' N lat.

Stock Productivity

Steepness in the 2007 assessment was fixed at 0.57, which was the mean of the prior probability distribution in the base model. Since steepness was thought to be poorly specified in the model, this parameter was chosen as the major axis of uncertainty. The decision table projected outcomes for a low productivity and a high productivity model using steepness values of 0.34 and 0.81, respectively. The PSA productivity score of 1.83 indicates a stock of relatively high productivity, especially for a rockfish.

There have been strong recruitments estimated for the stock in the late 1960s, early 1970s, and very strong recruitments in 1984 and 1999. The 1999 year class was the biggest recruitment event in the assessment time series, causing spawning biomass to increase substantially in the ten years preceding the assessment.

Fishing Mortality

Chilipepper rockfish have been one of the most important commercial target species in California since the late 1800s and was also a recreational target in southern California waters. Catches and exploitation rate has declined substantially since the early 1990s. While chilipepper has always been an important target species in California, the exploitation rate has rarely exceeded the F_{MSY} target of a 50 percent SPR. Exploitation rates declined substantially since the late 1990s with the implementation of more restrictive management measures to rebuild depleted stocks.

Throughout most of the past three decades, domestic landings have ranged between approximately 2,000 and 3,000 mt; however, since 2002 landings have averaged less than 100 mt per year. The highest exploitation rates occurred from the late 1980s through the mid 1990s, when they were above target levels and the stock was approaching its lowest estimated historical levels. From the late 1990s through the present, exploitation rates have been declining significantly down to incidental levels, as a result of management measures implemented to rebuild co-occurring depleted rockfish species (particularly bocaccio, but including canary, widow, cowcod and yelloweye). Discards are assumed to be negligible in the historical period; however, regulatory discards have been substantial in recent years, more than doubling the total catch relative to landings since 2002.

The PSA vulnerability score of 1.35 indicates a low risk of overfishing.

1.1.4.8 Dover Sole

Distribution and Life History

Dover sole (*Microstomus pacificus*) are distributed from the Navarin Canyon in the northwest Bering Sea and westernmost Aleutian Islands to San Cristobal Bay, Baja California, Mexico (Hagerman 1952; Hart 1988; NOAA 1990). Dover sole are a dominant flatfish on the continental shelf and slope from Washington to Southern California. Adults are demersal and are found from 9 m to 1,450 m, with highest abundance below 200 m to 300 m (Allen and Smith 1988). Adults and juveniles show a high affinity toward soft bottoms of fine sand and mud. Juveniles are often found in deep nearshore waters. Dover sole are considered to be a migratory species. In the summer and fall, mature adults and juveniles can be found in shallow feeding grounds, as shallow as 55 m off British Columbia (Westrheim and Morgan 1963). By late fall, Dover sole begin moving offshore into deep waters (400 m or more) to spawn. Although there is an inshore-offshore seasonal migration, little north-south coastal migration occurs (Westrheim and Morgan 1963).

Spawning occurs from November through April off Oregon and California in waters 80 m to 550 m depth at or near the bottom (Hagerman 1952; Hart 1988; NOAA 1990; Pearcy, *et al.* 1977). Dover sole are oviparous and fertilization is external. Larvae are planktonic and are transported to offshore nursery areas by ocean currents and winds for up to two years. Settlement to benthic living occurs mid-autumn to early spring off Oregon, and February through July off California (Markle, *et al.* 1992). Juvenile fish move into deeper water with age and begin seasonal spawning and feeding migrations upon reaching maturity.

Dover sole larvae eat copepods, eggs, and nauplii, as well as other plankton. Juveniles and adults eat polychaetes, bivalves, brittlestars, and small benthic crustaceans. Dover sole feed diurnally by sight and smell (Dark and Wilkins 1994; Gabriel and Pearcy 1981; Hart 1988; NOAA 1990). Dover sole larvae are eaten by pelagic fishes like albacore, jack mackerel and tuna, as well as sea birds. Juveniles and adults are preyed upon by sharks, demersally feeding marine mammals, and to some extent by sablefish (NOAA 1990). Dover sole compete with various eelpout species, rex sole, English sole, and other fishes of the mixed species flatfish assemblage (NOAA 1990).

Stock Status and Management History

Dover sole have been the target of trawl operations along the west coast of North America since World War II and were almost certainly caught prior to the war as incidental take in directed fisheries for English sole and petrale sole. Almost all of the harvests have been taken by groundfish trawl, and in particular as part of the Dover sole, shortspine thornyhead, longspine thornyhead, and sablefish (DTS) trawl fishery. Annual landings from U.S. waters averaged 6,700 mt during the 1960s, 12,800 mt during the 1970s, 18,400 mt during the 1980s, 12,400 mt during the 1990s, and 7,200 mt since 2000.

The 1997 Dover sole stock assessment (Brodziak, *et al.* 1997) treated the entire population from the Monterey area through the U.S.-Vancouver area as a single stock based on research addressing the genetic structure of the population. Under a range of harvest policies and recruitment scenarios, the 1997 model projected that spawning biomass would increase from the estimated year-end level in 1997 through the year 2000 due to growth of the exceptionally large 1991 year class and to the lower catches observed in the fishery since 1991.

Dover sole were next assessed in 2001, resulting in an estimated spawning stock size of 29 percent of the unexploited biomass (Sampson and Wood 2001). Although there was no clear trend in abundance, stocks steadily declined from the 1950s until the mid-1990s. The 1991 year class was the last strong one, consistent with the 1997 assessment.

The 2005 Dover sole assessment indicated the stock was above target levels and had an increasing abundance trend (Sampson 2005). The final base model estimated the unexploited spawning stock biomass to be slightly less than 300,000 mt and spawning biomass at the start of 2005 was estimated to be about 189,000 mt, equivalent to 63 percent of the unexploited level. Spawning biomass and age 5+ biomass (roughly corresponding to the exploitable biomass) were estimated to have reached their lowest points in the mid-1990s and rose steadily since. The estimated increases in biomass since the mid-1990s was due primarily to strong year classes in 1990 and 1991, and exceptionally strong year classes in 1997 and 2000.

A new Dover sole assessment was done in 2011, which indicated the stock was healthy with a 2011 spawning stock biomass depletion of 83.7 percent of unfished biomass (Hicks and Wetzel 2011).

Stock Productivity

Steepness in the 2011 Dover sole assessment was fixed at 0.8, the mean steepness estimated in the SSC's 2010 meta-analysis of flatfish productivity (PFMC and NMFS 2011). While the 2011 assessment was considered data-rich, estimates of steepness are uncertain partly because the stock has not been fished to low levels to understand potential recruitment at low spawning biomass. The PSA productivity score of 1.8 indicates a stock of relatively high productivity.

There is little information regarding recruitment prior to 1960. Estimates of recruitment appear to oscillate between periods of low recruitment and periods of high recruitment. The five largest recruitments were predicted in the years 2000, 1992, 1988, 1965, and 1991. The five smallest recruitments were predicted in 2003, 2002, 2004, 2006, and 1974.

Larger than average recruitments in the early 1960s resulted in an increase in the Dover sole spawning biomass. A period of smaller than average recruitments in the late 1970s and early 1980s, along with the highest catches on record caused a decline in spawning biomass throughout the 1980s. More recently, spawning biomass has been increasing. However, a recent increase in Dover sole catches and low estimated recruitment in the early 2000s seem to be resulting in a slight downward trend in spawning biomass.

Fishing Mortality

The spawning biomass of Dover sole reached a low in the mid-1990s before beginning to increase throughout the last decade. The estimated depletion has remained above the 25 percent biomass target and it is unlikely that the stock has ever fallen below this threshold. Throughout the 1970s, 1980s, and 1990s the exploitation rate and SPR generally increased, but never exceeded the SPR 30 percent F_{MSY} target. Recent exploitation rates on Dover sole have been much lower than F_{MSY}, even after management increased catch levels in 2007.

Given the productivity of the stock and constraints on fishing, projections assuming a 25,000 mt constant annual catch predict the stock would remain above the target B_{MSY} level in the next ten years even under the more pessimistic and less likely low state of nature in the assessment decision table. Higher ACLs than the preferred No Action ACL were initially considered but rejected from more detailed analysis since the current market is projected to limit the take of Dover sole in the next management cycle to less than 25,000 mt. Higher ACLs are predicted to be sustainable; future mortalities as high as the OFL (above the allowable ACL maximum of the ABC) would maintain the stock above the target level of $B_{25\%}$ under the most likely base case model in the 2011 assessment. The effective limit of Dover sole in the 2013 and 2014 shorebased IFQ fishery is likely to be driven by the sablefish allocation, which is decreasing relative to No Action. Sablefish quota is needed to target Dover sole and the other DTS species using trawl gear. Sablefish IFQ quota is also used in a single-species target fishery using fixed gears. The competition and price for sablefish quota is affected by Asian sablefish demand and supply from north Pacific fisheries outside the west coast EEZ (e.g., BC and the Gulf of Alaska fisheries). It may be the case that the supply and demand of west coast Dover sole will remain limited until there is an increased harvestable surplus of sablefish above the levels provided under the No Action and preferred ACLs.

Dover sole is a trawl-dominant species managed using IFQs in the rationalized fishery. Despite Dover sole being an important target species, only 35 percent of the 2011 quota was attained in the IFQ fishery.

The PSA vulnerability score of 1.54 indicates a low risk of overfishing.

1.1.4.9 English Sole

Distribution and Life History

English sole (*Parophrys vetulus*) are found from Nunivak Island in the southeast Bering Sea and Agattu Island in the Aleutian Islands, to San Cristobal Bay, Baja California Sur, Mexico (Allen and Smith 1988). In research survey data, nearly all occurred at depths greater than 250 m (Allen and Smith 1988). Adults and juveniles prefer soft bottoms composed of fine sands and mud (Ketchen 1956), but also occur in eelgrass habitats (Pearson and Owen 1992). English sole use nearshore coastal and estuarine waters as nursery areas (Krygier and Pearcy 1986; Rogers, *et al.* 1988). Adults make limited migrations. Those off Washington show a northward post-spawning migration in the spring on their way to summer feeding grounds and a southerly movement in the fall (Garrison and Miller 1982). Tagging studies have identified separate stocks based on this species' limited movements and meristic characteristics (Jow 1969).

Spawning occurs over soft-bottom mud substrates (Ketchen 1956) from winter to early spring, depending on the stock. Eggs are neritic and buoyant, but sink just before hatching (Hart 1988); juveniles and adults are demersal (Garrison and Miller 1982). Small juveniles settle in the estuarine and shallow nearshore areas all along the coast, but are less common in southerly areas, particularly south of Point Conception. Large juveniles commonly occur up to depths of 150 m. Although many postlarvae may settle outside of estuaries, most will enter estuaries during some part of their first year of life (Gunderson, et al. 1990). Some females mature as three-year-olds (26 cm), but all females over 35 cm long are mature. Males mature at two years (21 cm).

Larvae are planktivorous. Juveniles and adults are carnivorous, eating copepods, amphipods, cumaceans, mysids, polychaetes, small bivalves, clam siphons, and other benthic invertebrates (Allen 1982; Becker 1984; Hogue and Carey 1982; Simenstad, *et al.* 1979). English sole feed primarily by day, using sight and smell, and sometimes dig for prey (Allen 1982; Hulberg and Oliver 1979). A juvenile English sole's main predators are probably piscivorous birds such as great blue heron (*Ardia herodias*), larger fishes, and marine mammals. Adults may be eaten by marine mammals, sharks, and other large fishes.

Stock Status and Management History

English sole have been captured by the bottom trawl fishery operating off the western coast of North America for over a century. Stewart (2006) found that peak catches from the southern area occurred in the 1920s with a maximum of 3,976 mt of English sole landed in 1929, and peak catches from the northern area occurred in the 1940s to the 1960s with a maximum of 4,008 mt landed in 1948. Landings from both areas have generally declined since the mid-1960s and have been at nearly historical lows in recent years

The most recent stock assessment of English sole prior the current 2005 assessment was performed in 1993 (Sampson and Stewart 1993). That assessment considered the female portion of the stock off Oregon and Washington during the years 1977-1993. The English sole spawning biomass was found to be increasing and it was concluded that the fishery was sustainable at (then) contemporary harvest levels.

The 2005 assessment of English sole (Stewart 2006) modeled a single coastwide stock, although both commercial and fishery independent data sources were treated separately for a southern (INPFC Conception and Monterey) and a northern (INPFC Eureka, Columbia and U.S. Vancouver) area. The assessment found that English sole spawning biomass had increased rapidly over the last decade after a period of poor recruitments from the mid-1970s to the mid-1990s, which left the stock at nearly historically low levels. Strong year classes were estimated for 1995, 1996, and 1999. The data indicated that the 1999 year class may be the largest in the time-series. There was substantial uncertainty related to certain parameters in the assessment, specifically biomass, recruitment, and relative depletion, as indicated by the wide confidence intervals for those parameters. Nevertheless, sensitivity analyses indicated that the conclusion that current spawning biomass exceeds the target level ($B_{40\%}$) was robust to all three of these sources of uncertainty. The spawning biomass at the beginning of 2005 was estimated to be 31,379 mt, which corresponds to 91.5 percent of the unexploited equilibrium level. Total catches for 2004 were estimated to be 1,341 mt, of which 950 mt were landed.

The 2007 update assessment (Stewart 2008c) confirmed the magnitude of increased biomass through a large quantity of age data through 2006, which became available. The 2007 assessment also included data on fishery length and age (primarily from Washington) that was previously unavailable. These new data provided substantially improved information regarding recent year class strengths and current stock status. The spawning biomass at the beginning of 2007 was estimated to be 41,906 mt, which corresponded to 116 percent of the unexploited equilibrium level.

Cope et al. (2013) assessed English sole using the data-moderate exSSS model platform.

Stock Productivity

There is little evidence for a strong stock-recruitment relationship, with some of the largest recruitments occurring at moderate levels of spawning biomass. This corresponds to the relatively high estimate of steepness of 0.80 in the assessment. In general, recruitment deviations are well-informed by the data between 1940 and 2000.

Following two decades of low recruitments, strong year classes were estimated for 1995, 1998-2000, and 2002. The data indicate that the 1999 year class was the largest in the time-series.

The PSA productivity score of 2.25 indicates a very productive stock, which is true for most nearshore and shelf flatfishes.

Fishing Mortality

The estimated SPR for English sole has never been below the proxy target of 30 percent for flatfish. Exploitation rates were highest from the late 1940s to the early 1990s. Since 1992, the intensity of exploitation has been substantially less, resulting in higher SPR levels. This corresponds to a relative exploitation rate (catch/biomass of age 3 and older fish) history that is high from the late 1940s to the early 1990s, and steadily declining to very low levels over the last 15 years.

English sole are a trawl-dominant species. Management uncertainty is low with the 100 percent observer coverage for the trawl fleet under trawl rationalization. Very small amounts of English sole were landed in the 2011 IFQ fishery with only 1 percent of the quota attained. This is due to low trawl effort on the shelf since such efforts require investment of limited quota for Pacific halibut, darkblotched rockfish, and yelloweye rockfish.

The PSA vulnerability score of 1.19 shows a very low concern of overfishing on the stock.

1.1.4.10 Lingcod North and South of 40º10' N Lat.

Distribution and Life History

Lingcod (*Ophiodon elongatus*), a top order predator of the family Hexagrammidae, ranges from Baja California, Mexico, to Kodiak Island in the Gulf of Alaska. Lingcod are demersal at all life stages (Allen and Smith 1988; NOAA 1990; Shaw and Hassler 1989). Adult lingcod prefer two main habitat types: slopes of submerged banks 10 m to 70 m below the surface with seaweed, kelp, and eelgrass beds and channels with swift currents that flow around rocky reefs (Emmett, *et al.* 1991; Giorgi and Congleton 1984; NOAA 1990; Shaw and Hassler 1989). Juveniles prefer sandy substrates in estuaries and shallow subtidal zones (Emmett, *et al.* 1991; Hart 1988; NOAA 1990). As the juveniles grow they move to deeper waters. Adult lingcod are considered a relatively sedentary species, but there are reports of migrations of greater than 100 km by sexually immature fish (Jagielo 1990; Mathews and LaRiviere 1987; Matthews 1992; Smith, *et al.* 1990).

Mature females live in deeper water than males and move from deep water to shallow water in the winter to spawn (Forrester 1969; Hart 1988; Jagielo 1990; LaRiviere, *et al.* 1980; Mathews and LaRiviere 1987;

Matthews 1992; Smith, *et al.* 1990). Mature males may live their whole lives associated with a single rock reef, possibly out of fidelity to a prime spawning or feeding area (Allen and Smith 1988; LaRiviere, *et al.* 1980; Shaw and Hassler 1989). Spawning generally occurs over rocky reefs in areas of swift current (Adams 1986; Adams and Hardwick 1992; Giorgi and Congleton 1984; LaRiviere, *et al.* 1980). After the females leave the spawning grounds, the males remain in nearshore areas to guard the nests until the eggs hatch. Hatching occurs in April off Washington, but as early as January and as late as June at the geographic extremes of the lingcod range. Males begin maturing at about two years (50 cm), whereas females mature at three plus years (76 cm). In the northern extent of their range, fish mature at an older age and larger size (Emmett, *et al.* 1991 Adams, 1992 #438; Hart 1988; Mathews and LaRiviere 1987; Miller and Geibel 1973; Shaw and Hassler 1989). The maximum age for lingcod is about 20 years (Adams and Hardwick 1992).

Lingcod are a visual predator, feeding primarily by day. Larvae are zooplanktivores (NOAA 1990). Small demersal juveniles prey upon copepods, shrimps, and other small crustaceans. Larger juveniles shift to clupeids and other small fishes (Emmett, *et al.* 1991; NOAA 1990). Adults feed primarily on demersal fishes (including smaller lingcod), squids, octopi, and crabs (Hart 1988; Miller and Geibel 1973; Shaw and Hassler 1989). Lingcod eggs are eaten by gastropods, crabs, echinoderms, spiny dogfish, and cabezon. Juveniles and adults are eaten by marine mammals, sharks, and larger lingcod (Miller and Geibel 1973; NOAA 1990).

Stock Status and Management History

Lingcod have been a target of commercial fisheries since the early 1900s in California, and since the late 1930s in Oregon and Washington waters. Recreational fishermen have targeted lingcod since the 1920s in California. A smaller recreational fishery has taken place in Washington and Oregon since at least the 1970s. Although historically the catches of lingcod have been greater in the commercial sector than in the recreational sector, this pattern has been reversed since the late 1990s.

In 1997, Jagielo, et al. (1997) assessed the size and condition of the portion of the stock in the Columbia and Vancouver areas (including the Canadian portion of the Vancouver management area), and concluded the stock had fallen to below ten percent of its unfished size at 8.8 percent of its unfished biomass. The Council responded by imposing substantial harvest reductions coastwide, reducing the harvest targets for the Eureka, Monterey, and Conception areas by the same percentage as in the north.

In 1999, Adams, et al. (1999) assessed the southern portion of the stock and concluded the condition of the southern stock was similar to the northern stock with a depletion of $B_{15\%}$, thus confirming the Council had taken appropriate action to reduce harvest coastwide. Based on these assessments, the lingcod stock was declared overfished in 1999. A rebuilding plan establishing a target year of 2009 and harvest rates of F = 0.0531 and F = 0.0610 for fisheries in the northern and southern areas, respectively was adopted and implemented in 2000.

Jagielo et al. (2000) conducted a coastwide lingcod assessment and determined the total biomass increased from 6,500 mt in the mid-1990s to about 8,900 mt in 2000. In the south, the population had also increased slightly from 5,600 mt in 1998 to 6,200 mt in 2000. In addition, the assessment concluded previous aging methods portrayed an older population; whereas new aging efforts showed the stock to be younger and more productive. Therefore, the ABC and OY were increased in 2001 on the basis of the new assessment. A revised rebuilding analysis of coastwide lingcod (Jagielo and Hastie 2001) confirmed the major conclusions of the 2000 assessment and rebuilding analysis, but slightly modified recruitment projections to stay on the rebuilding trajectory to reach target biomass in 2009.

The lingcod rebuilding plan was formally adopted by the Council and incorporated into the FMP under Amendment 16-2. The rebuilding plan established a target rebuilding year of 2009 and the harvest control rule of F = 0.0531 for fisheries in the northern areas and F = 0.0610 for fisheries in the southern areas (with a P_{MAX} of 60 percent). Depth-based restrictions and a winter season fishing closure to protect nest-guarding males were also implemented as part of the rebuilding plan.

Jagielo et al. (2004) conducted a coastwide assessment for lingcod in 2003 that indicated the lingcod stock had achieved the rebuilding objective of $B_{40\%}$ in the north with a 68 percent depletion, but was at a 31 percent depletion in the south. The Council's SSC, working in concert with the lead assessment author, recalculated the coastwide lingcod stock status in March 2004 using actual 2003 harvests (the assessment, which was completed during 2003, assumed harvest would be equal to the specified OY in 2003). Their calculations indicated that the spawning biomass at the start of 2004 was within 99.3 percent of B_{MSY} ($B_{40\%}$) on a coastwide basis. The harvest control rule was recalculated to be F = 0.17 for fisheries in the northern areas and F = 0.15 for fisheries in the southern areas.

The 2005 coastwide assessment (Jagielo and Wallace 2006) again modeled two populations of lingcod north and south of 40º10' N. lat. On a coastwide basis, the lingcod population was concluded to be fully rebuilt, with the spawning biomass in 2005 estimated to be 64 percent of its unfished level. Within the separate area models current biomass was estimated to be closer to unfished biomass in the north ($B_{87\%}$) than in the south ($B_{24\%}$). Given that the lingcod stock is managed on a coastwide basis, the Council announced the lingcod stock to be fully rebuilt in 2005, which is four years earlier than the target rebuilding year established in the rebuilding plan.

The 2009 lingcod assessment modeled two populations north and south of the California-Oregon border at 42º N. lat. (Hamel, *et al.* 2009). Both populations were healthy with stock depletion estimated at 62 and 74 percent for the north and south, respectively.

The Council and NMFS elected to maintain the management line for lingcod at 40º10' N lat. by specifying separate ACLs north and south of that line. This action was intended to not overly encumber the commercial fishing industry, which is required to fish within a single management area within one trip. Specifying the lingcod management line at 42º N lat. would create two management areas stratified at 40º10' N lat. and 42º N lat. This would especially burden vessels home ported out of Brookings, Crescent City, Eureka, and Ft. Bragg, since they would have to restructure their current fishing practices to avoid a violation of the management line crossover provisions. It is stated in the 2009 assessment that a management break at Cape Mendocino would be likely more biologically accurate than stratifying the assessment north and south of 42º N lat. In general, given the crossover provisions and the other regulations that foster area management strategies, the fewer latitudinal management lines there are, the less burdened the offshore commercial fishery will be. Two major biogeographic breaks occur on the west coast at Pt. Conception at 34º27' N lat. and Cape Mendocino approximately at 40º10' N lat., and many stocks show differences north and south of these latitudes. These biogeographic breaks are probably the more appropriate latitudes to specify management lines, given how north-south physical processes such as current patterns tend to be different, creating stock differences for species affected by these different physical processes.

The lingcod STAT evaluated the swept area biomass estimates calculated annually (2003-2010) from the NMFS NWFSC trawl survey, which indicated that 48 percent of the lingcod biomass for the stock south of 42º N lat. occurred between 40º10' N lat. and 42º N lat. Therefore, 48 percent of the 2013 and 2014 OFLs projected in the 2009 lingcod assessment for the southern lingcod stock were added to OFLs proposed for the stock north of 40º10' N lat. Likewise, 48 percent of the projected OFLs for the southern stock were subtracted from the OFLs proposed for the stock south of 40º10' N lat. Given that the trawl survey is the main fishery-independent tuning index of biomass in the assessment, using swept area biomass from the trawl survey to estimate relative biomass north and south of 40º10’ N lat. was considered appropriate.

Stock Productivity

Steepness was fixed at 0.8 in the 2009 assessment. The PSA productivity score of 1.75 indicates a stock of relatively high productivity.

Recruitments in the north were estimated from 1928-2007, with bias correction ramping in from 1950 to 1964 as data became informative. The base model indicated a very strong recruitment event in 1964, a secondary event in 1970, and recent relatively strong recruitments in 1999-2002, with fairly high recruitment in 2006 as well. Recruitments in the south were estimated from 1928-2007, with bias correction ramping in from 1960 to 1974 as data became informative. The base model indicated relatively strong recruitment events in 1976, 1983, and 1999-2003, similar to the period of increased recruitment in the north, with a very high but uncertain recruitment in 2007.

Fishing Mortality

Lingcod exploitation coastwide was above the target rate for most of the 1970s through the 1990s, driving the stock below the MSST and into an overfished condition. The stock was successfully rebuilt by 2006 based on good recruitments and very low fishing mortality rates. The SPR for northern lingcod has been above the proxy target of 45 percent since 1998, and in recent years has been far above that level. The SPR for the southern lingcod stock has been above the proxy target of 45 percent since 2001, and in recent years has been far above that level.

The PSA vulnerability score for lingcod is 1.55, indicating a low risk of overfishing of the stock.

1.1.4.11 Longnose Skate

Distribution and Life History

Skates are the largest and most widely distributed group of batoid fish with approximately 245 species ascribed to two families (Ebert and Compagno 2007; McEachran 1990). Skates are benthic fish that are found in all coastal waters but are most common in cold temperatures and polar waters (Ebert and Compagno 2007).

There are about eleven species of skates from either of three genera (Amblyraja, Bathyraja, and Raja) present in the Northeast Pacific Ocean off California, Oregon and Washington (Ebert 2003). Of that number, just three species (longnose skate *Raja rhina*, big skate *Raja binoculata*, and sandpaper skate *Bathyraja interrupta*) make up over 95 percent of survey catches in terms of biomass and numbers, with the longnose skate leading in both categories (62% of biomass and 56% of numbers). Species compositions of fishery landings also show that longnose skate are the predominant skates in commercial catches. On average, longnose skate represents 75 percent of total skate landings in Oregon for the last 20 years and 45 percent in Washington for the last 10 years. There are no species composition data available for commercial landings in California, but anecdotal evidence suggests that the majority of skates landed there are longnose skates.

The distribution of the longnose skate is limited to the eastern Pacific Ocean. It is found from the southeastern Bering Sea to just below Punta San Juanico, southern Baja California, and Gulf of California at depths of 9-1,069 m (Love, *et al.* 2005). Longnose skates do not exhibit a size-specific pattern in distribution relative to bottom depth; average fish size does not vary greatly with depth.

Currently, there is no information available that indicates the existence of multiple breeding units in the Northeast Pacific Ocean. Several tagging studies have found that elasmobranchs, such as sharks and skates, can undertake extensive migrations within their geographic range (Martin and Zorzi 1993; McFarlane and King 2003). This behavior suggests the likelihood that there is a high degree of genetic mixing within the population, across its range. As a result, the longnose skate population off California, Oregon and Washington is modeled in this assessment as a single stock.

The life history of skates is characterized by late maturity, low fecundity and slow growth to large body size (King and McFarlane 2003; Moyle and Cech 1996; Walker and Hislop 1998). Skates invest considerable energy in developing a few large, well-protected embryos. These characteristics are associated with a K-type reproductive strategy, as opposed to r-type strategy, wherein reproductive success is achieved by high productivity and early maturity (Hoenig and Gruber 1990).

The longnose skate is oviparous. After fertilization, the female forms tough, but permeable egg cases that surround eggs and then deposits these egg cases onto the sea floor at daily to weekly intervals for a period of several months or longer (Hamlett and Koob 1999). The eggs within egg cases incubate for several months in a benthic habitat. Inside the egg cases, the embryos develop with nourishment provided by yolk. The longnose skate is known to have only a single embryo per egg case (David Ebert, Moss Landing Marine Laboratories, pers. com. as cited by Gertseva and Schirripa (2008)). When the yolk is depleted and the juvenile is fully formed, it exits in the egg case. Once hatched, the young skate is similar in appearance to an adult, but smaller in size. Upon reaching maturity, skates enter the reproductive stage, which lasts for the remainder of their lives (Frisk, *et al.* 2002; Pratt and Casey 1990). On average off the continental US Pacific Coast, female longnose skates mature between 11-18 years, which corresponds to 75-125 cm in total length (Thompson 2006). The life span of the longnose skate is not well known, although individuals up to 23 years of age have been found (Thompson 2006). Longnose skates attain a maximum length of about 145 cm, although individuals as large as 180 cm have been reported off the U.S. west coast (Thompson 2006).

The reproductive cycle of oviparous skates has been observed for a few species but not for longnose skate. These studies indicate that egg production generally occurs throughout the year although there have been some instances where seasonality in egg laying was observed (Hamlett and Koob 1999). Information on fecundity of longnose skate is extremely limited. Holden (1974) found that species of the family Rajidae are the most fecund of all elasmobranches and can lay 100 egg cases per year, although eggs may not be produced every year. Frisk et al. (2002) estimated that annual fecundity for skates similar in size with longnose may be less than 50 eggs per year; however, those eggs exhibit high survival rates due to the large parental investment. Overall, little is known about breeding frequency, egg survival, hatching success and other early life history characteristics of longnose skate.

Stock Status and Management History

Longnose skate was managed in a complex of dissimilar species, the Other Fish complex, from 1982, when the Groundfish FMP was implemented through 2008. In 2009, longnose skate was removed from the Other Fish complex and managed with stock-specific harvest specifications.

Gertseva and Schirripa (2008) assessed the west coast longnose skate stock in 2007. The spawning stock biomass was estimated to be at 66 percent of its unfished biomass at the start of 2007. Based on that assessment, a constant catch strategy (OY = 1,349 mt) was implemented in 2009 based on a 50 percent increase in the average 2004-2006 landings and discard mortality. The constant catch strategy was revised in 2013 by implementing an ACL of 2,000 mt to provide greater access to the stock and to limit disruption of current fisheries. This level of harvest was projected to maintain the population at a healthy level as projected in the 10-year forecast for longnose skate in the 2007 assessment (Gertseva and Schirripa 2008).

The SSC recommended changing the proxy F_{MSY} rate for longnose skate and other elasmobranchs from an SPR of 45% to an SPR of 50% beginning in 2015. This recommendation, driven primarily by conservation concerns for spiny dogfish (see section 1.1.4.18), was heeded by the Council when they adopted 2015 and 2016 OFLs consistent with this lower harvest rate.

Stock Productivity

Steepness of the stock-recruitment curve was fixed at a value of 0.4 in the 2007 assessment to reflect the K-type reproductive strategy of the longnose skate. Recruitments were deterministically provided using this steepness value and a Beverton-Holt stock-recruitment relationship since the data in the 2007 assessment was not informative of relative year-class strength. In general, elasmobranchs have relatively low productivity given the K-type reproductive strategy of producing few eggs per female with a significant parental energy investment to increase survival of those few eggs (e.g., production of egg cases and relatively large yolk masses).

Fishing Mortality

Historically, skates in general, and longnose skate in particular, have not been high-priced fishery products. They are taken mostly as bycatch in other commercially important fisheries (Bonfil 1994). Although skates are caught in almost all demersal fisheries and areas off the U.S. west coast, the vast majority (almost 97%) are caught with trawl gear.

Landing records indicate that skates have been retained on the U.S. Pacific Coast at least since 1916 (Martin and Zorzi 1993). Little is known about the species composition of west coast skate fisheries, particularly prior to 1990. With few exceptions, longnose skate landings have been reported, along with other skate species, under the market category “unspecified skates”, until 2009 when a sorting requirement for longnose skate was required.

Historically, only the skinned pectoral fins or “wings” were sold, although a small portion of catch would be marketed in the round (whole). The wings were cut onboard the boat and the remainder discarded. Currently, west coast skates are marketed both whole and as wings. Skates wings are sold fresh or fresh-frozen, as well as dried or salted and dehydrated, for sale predominantly in Asian markets (Bonfil 1994; Martin and Zorzi 1993). It appears that the demand for whole skates did increase greatly during the mid-1990s, as evidenced by the increase in the number of trips where skates were landed. While skates were encountered predominantly as bycatch previously, landings data from this period reveal greater targeting of skates by some vessels. After a few years, the whole-skate market cooled due to downturns in Asian financial markets (Peter Leipzig, Fishermen's Marketing Association, pers. com. as cited by Gertseva and Schirripa (2008).

Historically, the exploitation rate for the longnose skate has been low. It reached its maximum level of 4.02% in 1981 (Gertseva and Schirripa 2008). An exploitation rate of 1.25% was estimated in 2006.

A vulnerability score of 1.68 indicates a low concern for overfishing the stock.

1.1.4.12 Longspine Thornyhead

Distribution and Life History

Longspine thornyhead occur from the southern tip of Baja, California, to the Aleutian Islands (Jacobson and Vetter 1996; Orr, *et al.* 1998). There appears to be no distinct geographic breaks in stock abundance along the west coast (Fay 2006; Rogers, *et al.* 1997). Adult longspine thornyhead are bottom dwellers, and inhabit the deep waters of the continental slope throughout their range.

Longspine occur at depths greater between 201 and 1,756 m, most typically between 500 and 1,300 m (Love, *et al.* 2002), and a peak in abundance and spawning biomass in the oxygen minimum zone (OMZ) at about 1,000 m depth (Jacobson and Vetter 1996; Wakefield 1990). Longspine are better adapted to deep water than shortspine (Siebenaller 1978; Siebenaller and Somero 1982). Wakefield (Wakefield 1990) estimated that in Central California, 83% of the longspine population resides within an area of the continental slope bounded by 600 and 1,000 m depth.

Unlike shortspine thornyhead, the mean size of longspines is similar throughout the depth range of the species (Jacobson and Vetter 1996). Camera sled observations indicate that longspines do not school or aggregate, and are distributed relatively evenly over soft sediments (Wakefield 1990). Differences in density of individuals at depth do occur with latitude, with higher densities of longspine in deep water (1,000-1,400 m) off Oregon than off central California (Jacobson and Vetter 1996).

The strong relationship between depth and size found in shortspine thornyhead (Jacobson and Vetter 1996 is not observed for longspines, with the distribution of longspines being relatively uniform with depth {Rogers, 1997 #271). Unlike shortspines, longspine do not undergo an ontogenetic migration to deeper waters (Wakefield 1990).

Longspine thornyheads prefer muddy or soft sand bottoms in deep-water environments characterized by high pressure and low oxygen concentrations. These are low productivity (Vetter and Lynn 1997) and low diversity (Haigh and Schnute 2003) habitats where food availability is limited. Longspines have adapted to this environment with an extremely slow metabolism that allows it to wait up to 180 days between feedings (Vetter and Lynn 1997). They are not territorial, and do not school. They have no swim bladders; instead oil in the bones and spines provides floatation. Video observations from submersibles and ROVs indicate that thornyhead are sit-and-wait predators that rest on the bottom and remain motionless for extended periods (John Butler, NOAA Fisheries, Southwest Fisheries Science Center, CA, as cited in Jacobson and Vetter (1996)).

The spawning season for longspine thornyheads appears to be extended, and occurs over several months during February, March and April (Best 1964; Moser 1974; Pearcy 1962; Wakefield and Smith 1990). Both thornyhead species produce a bi- lobed jellied egg mass that is fertilized at depth and which then floats to the surface where final development and hatching occur (Pearcy 1962). An extended larval and pelagic juvenile phase follows, which is thought to be 18-20 months long (Jacobson and Vetter 1996; Moser 1974; Wakefield 1990). Juvenile longspine settle on the continental slope at depths between 600 and 1,200 m (Wakefield 1990). Moser (1974) reports a mean length at settlement of 4.2-6.0 cm, although pelagic juveniles up to 69 mm in length have been collected in midwater trawls off Oregon (J. Siebenaller unpublished data, as cited in Wakefield and Smith (1990)).

Following settlement, longspine thornyhead are strictly benthic (Jacobson and Vetter 1996). No apparent pulse in recruitment during the year was observed by Wakefield and Smith (1990), perhaps due to the long (4-5 months) spawning season, variation in growth rates, and variation in the duration of the pelagic period (Wakefield and Smith 1990). There is potential for cannibalism because juveniles settle directly on to the adult habitat (Jacobson and Vetter 1996).

Adult females release between 20,000 and 450,000 eggs over a 4-5 month period (Best 1964; Moser 1974). Wakefield (1990) and Cooper et al. (2005) both found linear relationships between fecundity and somatic weight. The data analyzed by Cooper et al. (2005) indicated that fecundity of longspine between 20 and 30 cm in length ranged from 20,000 to 50,000 eggs.

There is considerable uncertainty regarding age and growth of thornyheads (Jacobson and Vetter 1996), although data indicate that longspine thornyhead are long lived. Age estimates of over 40 years have been obtained from otoliths using thin-section and break- and-burn techniques (Ianelli, *et al.* 1994). High frequencies of large longspine thornyheads may be due to a strongly asymptotic growth pattern, with accumulation of many age groups in the largest size-classes (Jacobson and Vetter 1996).

Size-at-age data (Ianelli, *et al.* 1994) indicate that longspine grow to a maximum size of about 30cm TL at ages of about 25-45 years, with little or no sexual dimorphism in length at age – longspines in British Columbia, Canada also display no sexual dimorphism (Starr and Haigh 2000). Orr et al. (1998) report a maximum length for longspines of 38 cm, although individuals of this size are rare in both trawl surveys and commercial landings. Growth increments on otoliths suggest that juveniles reach 80 mm after 1 year of life as demersal juveniles {Wakefield unpublished data, as cited in Wakefield and Smith, \1990 #462}, which would correspond to an age of 2.5 - 3 years old.

Longspine thornyhead are ambush predators (Jacobson and Vetter 1996). They consume fish fragments, crustaceans, bivalves, and polychaetes and occupy a tertiary consumer level in the food web. Pelagic juveniles prey largely on herbivorous euphausiids and occupy a secondary consumer level in the food web (Love 1996; Smith and Brown 1983). Cannibalism in newly settled longspine thornyhead may occur, because juveniles settle directly onto adult habitat (Jacobson and Vetter 1996). Sablefish commonly prey on longspine thornyhead. Sablefish and shortspine thornyhead commonly prey on longspine thornyhead (Buckley, *et al.* 1999).

Stock Status and Management History

Longspine thornyhead are exploited in the limited entry deep-water trawl fishery operating on the continental slope that also targets shortspine thornyhead, Dover sole and sablefish (i.e., the DTS fishery). A very small proportion of longspine landings is due to non-trawl gears (gillnets, hook and line). Longspine and shortspine thornyhead make up a single market category; however, they were managed under separate harvest specifications since 1992. Beginning in 2011, trawl catches of longspine north of 34º27’ N lat. have been managed using individual fishing quotas.

The thornyhead fishery developed in Northern California during the 1960s. The fishery then expanded north and south, and the majority of the landings of longspine thornyhead have since been in the Monterey, Eureka, and Columbia INPFC areas, with some increase in landings from the Conception (southern CA) and Vancouver (northern WA) INPFC areas in recent years (Fay 2006).

The most recent stock assessment of west coast longspine thornyhead was done in 2013. This was the fifth assessment done for longspines, but only the second in which it was assessed individually (earlier assessments were of longspine and shortspine thornyheads in combination). Previous assessments were conducted by Jacobson (Jacobson 1990; 1991), Ianelli et al. (1994), Rogers et al. (1997), and Fay (2006). The 1990 and 1991 assessments were very similar. Important features included reviews of available biological data, and analyses of trends in mean lengths from port samples and catch rates calculated from logbook data. Swept-area and video biomass estimates were used to estimate average biomass levels and exploitation rates in the Monterey to US-Vancouver management areas. The available data were used to conduct per-recruit analyses of yield, revenue, and spawning biomass, and to develop estimates of the then target level of $F_{35\%}$.

Ianelli et al. (1994) assessed the coastwide abundance of longspine and shortspine thornyheads based on slope survey data, an updated analysis of the logbook data, and fishery length-composition data to estimate the parameters of length-based Stock Synthesis models, under different assumptions regarding discarding practices.

The Rogers et al. (1997) assessment used a length-based version of Stock Synthesis 1 to fit an age-structured model to data for the Monterey, Eureka, Columbia and Vancouver INPFC areas. Models were fitted to biomass estimates and length data from the AFSC slope surveys (1988-1996), a logbook CPUE index, discarded proportions by year, and length composition data from California and Oregon. Sensitivity to discard rates based on changes in prices and minimum size were explored.

The 2005 assessment of longspine thornyhead estimated spawning biomass in 2005 was approximately 71 percent of unfished spawning biomass (Fay 2006). The model assumed one coastwide stock with one coastwide trawl fishery. Results from the base model suggested that the length compositions from the slope surveys were influencing recruitment in the model, such that the model estimated slightly higher recruitment in the early 1990s, which then declined in the mid to late 1990s.

The 2013 longspine thornyhead assessment indicated a stock depletion of 75 percent at the start of 2013 (Stephens and Taylor 2013).

Stock Productivity

Stephens and Taylor (2013) estimated annual longspine recruitment using a Beverton-Holt stock-recruitment function and assuming a steepness value of 0.6. Most 2013 rockfish assessments used a steepness prior of 0.779, estimated from a meta-analysis of rockfish assessment results. This value might be expected in the 2013 longspine assessment; however, rockfish ecology and reproduction are quite different from those of thornyheads, which (for example) do not give birth to live young but rather spawn floating egg masses.

Steepness in the shortspine thornyhead assessment was fixed at 0.6 both in the 2005 and 2013 models (Hamel 2006c; Taylor and Stephens 2013). This value was justified based on consistency between the modeling approach and management targets, in addition to being within a range of biologically reasonable values. For consistency, therefore, steepness for the longspine model was also fixed at 0.6.

Annual deviations about this stock-recruitment curve were estimated for the years 1944 through 2012. Estimated recruitments do not show high variability, and the uncertainty in each estimate is greater than the variability between estimates. The 2013 longspine assessment is relatively uninformative of relative year class strength since ages were not used in the model (thornyheads are notoriously difficult to age). Therefore, a length-based assessment with an assumed steepness is used to determine recruitment.

Fishing Mortality

The estimated exploitation rate of longspine thornyheads was above the current F_{MSY} harvest rate through much of the 1990s and, in hindsight, given the current target harvest rate, overfishing was occurring. However, stock biomass was estimated to have never dropped below the target B_{MSY} level. There is very little risk of overexploitation of longspines given their deep distribution beyond the 700 fm limit to west coast bottom trawling implemented under Amendment 19.

The PSA vulnerability score of 1.54 for longspine thornyheads also indicates a low concern for potential overfishing of the stock.

1.1.4.13 Pacific Cod

Distribution and Life History

Stock Status and Management History

The west coast population of Pacific cod has never been formally assessed. Targetable amounts of Pacific cod occur off northern Washington infrequently since the west coast EEZ is at the southern limit of their distribution. The Pacific cod OFL has been set at the highest annual historical catch observed for the stock and ACLs/OYs have been set at half that amount.

Pacific cod is the only unassessed, data-poor groundfish stock currently managed with stock-specific harvest specifications on the west coast.

Stock Productivity

The PSA vulnerability score of 1.34 for Pacific cod indicates a low concern for potential overfishing of the stock.

Fishing Mortality

1.1.4.14 Pacific Whiting

Distribution and Life History

Stock Status and Management History

Stock Productivity

Fishing Mortality

Pacific whiting is managed consistent with the Agreement with Canada on Pacific Hake/Whiting. OYs, now called TACs (total allowable catches), for Pacific whiting are adopted on an annual basis after a stock assessment is completed just prior to the Council's March meeting . The most recent assessment was conducted in 2013 Hicks 2013 and was used to determine stock status and 2013 harvest specifications.

1.1.4.15 Sablefish

Distribution and Life History

Sablefish, or black cod, (*Anoplopoma fimbria*) are distributed in the northeastern Pacific ocean from the southern tip of Baja California, northward to the north-central Bering Sea and in the Northwestern Pacific ocean from Kamchatka, southward to the northeastern coast of Japan. Although few studies have critically evaluated issues regarding the stock structure of this species, it appears there may exist at least three different stocks of sablefish along the west coast of North America: (1) a stock that exhibits relatively slow growth and small maximum size that is found south of Monterey Bay (Cailliet, *et al.* 1988; Phillips and Inamura 1954); (2) a stock that is characterized by moderately fast growth and large maximum size that occurs from northern California to Washington; and (3) a stock that grows very quickly and contains individuals that reach the largest maximum size of all sablefish in the northeastern Pacific ocean, distributed off British Columbia, Canada and in the Gulf of Alaska (Mason, *et al.* 1983; McFarlane and Beamish 1983a). Large adults are uncommon south of Point Conception (Hart 1988; Love 1996; McFarlane and Beamish 1983b; NOAA 1990). Adults are found as deep as 1,900 m, but are most abundant between 200 m and 1,000 m (Beamish and McFarlane 1988; Kendall and Matarese 1987; Mason, *et al.* 1983). Off southern California, sablefish are abundant to depths of 1,500 m (MBC 1987). Adults and large juveniles commonly occur over sand and mud (McFarlane and Beamish 1983a; NOAA 1990) in deep marine waters. They were also reported on hard-packed mud and clay bottoms in the vicinity of submarine canyons (MBC 1987).

Spawning occurs annually in the late fall through winter in waters greater than 300 m (Hart 1988; NOAA 1990). Sablefish are oviparous with external fertilization (NOAA 1990). Eggs hatch in about 15 days (Mason, *et al.* 1983; NOAA 1990) and are demersal until the yolk sac is absorbed (Mason, *et al.* 1983). Age-zero juveniles become pelagic after the yolk sac is absorbed. Older juveniles and adults are benthopelagic. Larvae and small juveniles move inshore after spawning and may rear for up to four years (Boehlert and Yoklavich 1985; Mason, *et al.* 1983). Older juveniles and adults inhabit progressively deeper waters. Estimates indicate that 50 percent of females are mature at five years to six years (24 inches) and 50 percent of males are mature at five years (20 inches).

Sablefish larvae prey on copepods and copepod nauplii. Pelagic juveniles feed on small fishes and cephalopods—mainly squids (Hart 1988; Mason, *et al.* 1983). Demersal juveniles eat small demersal fishes, amphipods, and krill (NOAA 1990). Adult sablefish feed on fishes like rockfishes and octopus (Hart 1988; McFarlane and Beamish 1983a). Larvae and pelagic juvenile sablefish are heavily preyed upon by seabirds and pelagic fishes. Juveniles are eaten by Pacific cod, Pacific halibut, lingcod, spiny dogfish, and marine mammals, such as Orca whales (Cailliet, *et al.* 1988; Hart 1988; Love 1996; Mason, *et al.* 1983; NOAA 1990). Sablefish compete with many other co-occurring species for food, mainly Pacific cod and spiny dogfish (Allen 1982).

Stock Status and Management History

Formal stock assessments of sablefish began in 1984. The first coastwide assessment established regulations on the sablefish fishery off the U.S. Pacific coast which were implemented as trip limits in October 1982. Since 1982, the sablefish fishery has been managed intensively, with limited entry and open access programs used in various manners to limit catches.

In 2001, two assessments were completed and reviewed by a STAR Panel: one by NMFS (Schirripa and Methot 2001) and one by the Pacific Groundfish Conservation Trust (Hilborn, *et al.* 2001). The two assessments were in agreement, and the Council adopted the NMFS assessment for management purposes. Schirripa and Methot (2001) focused on evaluating the sensitivity of the model and the outcomes to changes in the survey data. These changes included the combining of the AFSC slope survey data and the NWFSC Industry Co-operative Survey data using a statistical Generalized Linear Models (GLM) procedure. This analysis made it possible to extend the southern boundary of the assessment south to Point Conception at 34°27' N lat. rather than 36° N lat., used in previous assessments. The assessment indicated a normal decline in biomass since the late 1970s due to the fishing down of the unfished stock and an unexpected decline in recruitment during the early 1990s. It introduced for the first time, the possibility that sablefish recruitment may be linked to environmental factors. A seemingly meaningful relationship was demonstrated between changes in northern and southern copepod abundances and sablefish recruitment. Conditions and projections in the model considered two competing "states of nature" to calculate the mean virgin recruitment: a "density-dependent" state that used the average of 1975-1991 recruitments, and a "regime shift" state that used the 1975-2000 recruitments. To account for this uncertainty, the Council adopted a 2002 ABC based on the proxy harvest rate ($F_{45\%}$) adjusted to reflect the distribution north and south of 36° N latitude. This was done because a plan amendment would be needed to change the management area since Groundfish FMP Amendment 14 specified only the area north of 36° N lat.

The Council also wanted to verify industry reports of a large abundance of juvenile sablefish, an observation that was confirmed to some extent by preliminary results from the 2001 NMFS slope survey. Based on these considerations, the Council recommended a new expedited assessment be done in 2002. This update assessment (Schirripa 2002), by definition, sought to document changes in the estimates of the status of the stock by only considering newly available data for 2001 while not considering any new changes in the model structure or model assumptions. The expedited assessment confirmed fishermen's anecdotal reports of a large 1999 year class, which was also apparent in the preliminary results of the 2001 slope survey.

The 2005 sablefish assessment estimated stock depletion at 34.3 percent of unfished biomass (Schirripa and Colbert 2006). The assessment fit a relationship between sea level and recruitment deviations for the period 1973-2003 and used that relationship to hindcast recruitment variability back to 1925. The 2005 assessment found that spawning stock biomass had steadily declined since 1900 and suggested that there was little evidence that recruitment from 2001-2005 was as high as that for the strong 1999 and 2000 year classes. As a result, the assessment's biomass projections indicate a short-term increase, followed by a continued decline.

The 2007 updated sablefish assessment estimated spawning depletion to be 38.3 percent of unfished biomass at the start of 2007 (Schirripa 2008). This increase from 2005 was attributed in part to the continued recruitment of the strong 1999 and 2000 year classes into the spawning stock biomass. The assessment also estimated a series of poor recruitments in the mid- to late-1990s, and if fished at the full OY level, depletion was forecasted to decrease for the next five years.

The 2011 sablefish assessment estimated spawning stock biomass to be at 33 percent of its unfished biomass at the beginning of 2011 (Stewart, *et al.* 2011). The resource was modeled as a single stock; however, there is some dispersal to and from offshore seamounts and along the coastal waters of the continental U.S., Canada, Alaska, and across the Aleutian Islands to the western Pacific which was not explicitly accounted for in this analysis. Environmental time-series including both sea-surface height (used in previous sablefish assessments) and zooplankton abundance were also investigated. These environmental indices were not used in the 2011 assessment in the interest of parsimony since they did not affect results.

Stock Productivity

It was not possible to estimate the steepness parameter of the Beverton-Holt stock-recruitment relationship in the 2011 sablefish assessment, so this quantity was fixed at a value of 0.6 and explored via sensitivity analyses.

Stewart et al. (2011) estimated sablefish were exploited at a modest level through the first half of the 20th century. Following a period of above-average recruitments, the spawning stock biomass increased to nearly unexploited levels. Large harvests in the 1970s and 1980s were believed to have caused the stock biomass to decline. Estimates of the stock's productivity were highly uncertain due to lack of information on mortality, absolute stock size, and productivity. Sablefish recruitment was estimated to be variable over the historical record, with substantial uncertainty in individual recruitment events. Recruitments during the 1980s were, on average, roughly an order of magnitude higher than the very poor recent cohorts estimated between 2002 and 2007.

Fishing Mortality

The sablefish fishery has been managed with a rich history of seasons, size-limits, trip-limits, and a complex permit system. Coastwide yield targets have been divided among the different gears (hook-and-line, pot and trawl), fishery sectors (including both limited entry and open access) as well as north and south of 36º N lat. Peak catches occurred in the late 1970s just prior to the imposition of the first catch limits. Since 2001, the total estimated dead catch has been only 79 percent of the sum of the OFLs (ABCs at the time) and 87 percent of the ACLs (OYs at the time). In only one year of the last 10, 2008, did the estimated dead catch exceed the ACL (and OFL) by 5% (3%).

The PSA vulnerability score of 1.64 indicates a relatively low concern for potential overfishing.

1.1.4.16 Shortbelly Rockfish

Distribution and Life History

Shortbelly rockfish (*Sebastes jordani*) range from Punta Baja in Baja California (Klingbeil 1976) as far north as La Perouse Bank off of British Columbia, and as far west as the Cobb seamount off the southern Washington coast (Pearson, *et al.* 1993). However, they are most abundant along the continental shelf break between the northern end of Monterey Bay and Point Reyes, California (particularly in the regions of Ascension Canyon and the Farallon Islands), and around the Channel Islands in the Southern California Bight (Love, *et al.* 2002; Moser, *et al.* 2000; Pearson, *et al.* 1991; Phillips 1964). Although stock structure is poorly understood, genetic analysis of fish collected between San Diego and Cape Mendocino suggest a single coastwide stock, with slight differences in allele frequencies across Point Conception (Constable 2006). The shortbelly rockfish is one of the most abundant rockfish species in the California Current and is a key forage species for many piscivorous fish, birds, and marine mammals.

Shortbelly rockfish feed primarily on juvenile and adult euphausiids, and are an important prey item to a wide range of piscivorous fishes, seabirds and marine mammals (Chess, *et al.* 1988; Lowry and Carretta 1999; Sydeman, *et al.* 2001). Merkel (1957) reported that juvenile shortbelly rockfish were important prey of Chinook salmon along the central California coast in late spring and summer, accounting for more than 60% of those identified to species. For many breeding California seabirds, as much as 90% of their diet is comprised of pelagic stages of juvenile (age 0) rockfish during the late spring and early summer breeding seasons, and unexploited species (such as shortbelly) generally account for more than two thirds of the juvenile rockfish identified (Ainley, *et al.* 1993; Miller and Sydeman 2004; Sydeman, *et al.* 2001). However there is considerable interannual and interdecadal variability in the frequency of rockfish in seabird diets. Throughout the 1990s, foraging rates on juvenile rockfish by central California seabirds declined for both exploited and unexploited rockfish species primarily in response to changes in ocean conditions associated with poor recruitment for rockfish (Miller and Sydeman 2004; Mills, *et al.* 2007; Sydeman, *et al.* 2001). Although rockfish have rarely been identified to the species level in the diets of many California Current marine mammals (Antonelis and Fiscus 1980; Morejohn, *et al.* 1978; Perez and Bigg 1986; Stroud, *et al.* 1981), shortbelly were among the five most significant prey items for California sea lion (*Zalophus californianus*) in the Channel Islands (Lowry and Carretta 1999) and are frequently encountered in sea lion food habits samples off of Central California (Weise and Harvey 2005). Shortbelly rockfish are also described as important prey to thresher sharks (Preti, *et al.* 2004), longnose skate (Robinson, *et al.* 2007), and jumbo squid (Field, *et al.* 2007), among others. Consequently, shortbelly rockfish are an important forage species to a wide range of predators throughout the California Current ecosystem, and generally have a trophic position and life history traits more similar to forage fishes than most other *Sebastes*.

Stock Status and Management History

The expectation of eventual development of a domestic commercial fishery (Kato 1981) led to past efforts to estimate stock abundance and productivity (Lenarz 1980, Pearson et al. 1989, Pearson et al. 1991) as well as evaluations of commercial potential. The first ABC for shortbelly rockfish was set by the Council at 10,000 mt for 1983 through 1989. A stock assessment by Pearson et al. (Pearson, *et al.* 1991) estimated that allowable catches for shortbelly might range from 13,900 to 47,000 mt per year, based on life history data and hydroacoustic survey estimates of abundance. Subsequently, the Council established an ABC of 23,500 mt, which was reduced to 13,900 mt in 2001 based on observations of poor recruitment throughout the 1990s and the continued lack of a targeted fishery. Yet despite several attempts to develop a commercial fishery for shortbelly, domestic fishery landings have never exceeded 80 mt per year along the west coast.

A shortbelly rockfish assessment was done as an academic exercise in 2007 to understand the potential environmental determinants of fluctuations in the recruitment and abundance of an unexploited rockfish population in the California Current ecosystem (Field, *et al.* 2008). The results of the assessment indicated the shortbelly stock was healthy with an estimated spawning stock biomass of 67 percent of its unfished biomass in 2005.

Shortbelly rockfish is an abundant species that is not targeted in any commercial or recreational fisheries or caught in substantial amounts. However, shortbelly rockfish is a valuable forage fish species in the California Current ecosystem with fluctuations in stock recruitment and biomass driven by environmental conditions. The consequence of fisheries, including high and low estimates of plausible discards, were estimated to be negligible ($P<0.01$) in all years with the exception of the foreign fisheries of the mid-1960s (Field, *et al.* 2008). Shortbelly rockfish were initially considered for an Ecosystem Component (EC) species categorization under Amendment 23. Rather than classifying shortbelly rockfish as an EC species, the Council chose to recommend a very restrictive ACL of 50 mt for 2011 and beyond. This ACL is a level of harvest meant to accommodate unavoidable incidental bycatch of shortbelly rockfish while allowing most of the harvestable surplus of the stock to be available as forage for species in the California Current ecosystem. Such ecological considerations are made when setting ACLs for west coast groundfish species.

Stock Productivity

Field et al. (Field, *et al.* 2008) assumed a steepness of 0.65 in a Mace-Doonan stock-recruitment relationship (Mace and Doonan 1988) in the 2007 shortbelly assessment. The data in the assessment model were insufficient for estimating steepness; therefore, an assumed value was used based on the Dorn (2002b) meta-analysis of rockfish steepness available at the time the assessment was conducted.

Recruitment deviations of shortbelly from 1960-2005 were estimated in the 2007 assessment; however, there was greater confidence in relative year class strength from 1975-2005. The model suggested a long period of poor recruitment through most of the 1990s, associated with a significant decline in biomass. The interesting conclusion of the 2007 shortbelly assessment was how apparent environmental determinants of shortbelly recruitment and not fishing mortality affected biomass and stock status.

Fishing Mortality

Shortbelly rockfish are not targeted in any west coast fisheries and are incidentally caught in very small amounts. Love et al. (2002) reported that shortbelly rockfish were commonly caught incidentally with trawl gear in the San Francisco-Monterey region during the development of the trawl fishery in the 1930s and 1940s when they were often referred to as steamer rockcod, as they tended to be common in the steamer lanes south of San Francisco. However, as a result of the small size and poor marketability, only modest domestic landings (1 to 65 mt per year) have been reported in the last 25 years. Historical landings were almost certainly less. Phillips (1939) reported that *S. jordani* accounted for 1 lb out of 332,630 lbs examined in Monterey wholesale fish markets between 1937 and 1938. Nitsos (1965) reported trace amounts (approximately 1,000 lbs out of 1,920,000 lbs landed) of *S. jordani* landed in Monterey ports from trawlers in 1962-1963, but none were reported from ports other than Monterey. There was historically a short period in which large numbers of shortbelly were caught during the foreign fisheries of the 1960s and 1970s (Rogers 2003b). These landings (nearly 15,000 mt through 1976, over half of which was taken in 1966) were presumably incidental to the targeting of other rockfish and Pacific hake. Only in the early days of the foreign fisheries (the mid-1960s) were Pacific hake pursued in large numbers south of Cape Mendocino, which is when the bulk of documented historical landings of shortbelly occurred. Since the early 1970s the Pacific hake fishery has been prosecuted primarily off of Oregon and Washington, and to a lesser extent off of Northern California (generally north of Cape Mendocino).

The available data for historical bycatch rates of shortbelly rockfish are extremely sparse. Shortbelly have been caught incidentally, at times in large numbers, by trawlers targeting other semi-pelagic rockfish (usually chilipepper and widow rockfish). As large hauls of shortbelly are not marketable but occasionally foul the mesh of typical groundfish trawls, more experienced fishermen generally recognize shortbelly sign (as well as habitat preferences) on their acoustics, and work to actively avoid schools. Bycatch monitoring programs conducted north of Cape Mendocino in the mid-1980s suggested very negligible levels of bycatch, such that shortbelly were less than 0.25% of total catches in all fishing strategies (which included nearshore flatfish, bottom rockfish, midwater rockfish and whiting, shrimp and the deepwater complex), including less than 0.05% for midwater trawl whiting and rockfish (Pikitch 1988). Very little contemporary information is available for the region south of Mendocino. However, all of these data were collected far north of the usual range of shortbelly. Data processed from the West Coast Groundfish Observer Program suggests that approximately one mt of shortbelly rockfish were caught and discarded in trawl fisheries south of Mendocino. As regulatory measures have closed the vast majority of habitat optimal to adult shortbelly, such trace landings are to be expected in recent years, and comparable data prior to these closures does not exist.

Field et al. (2007) acknowledged the uncertain historical estimates of shortbelly bycatch and therefore explored higher and lower bycatch streams in the 2007 assessment. Varying the historical catch assumptions in the assessment did not result in meaningful deviations from the base model results; therefore, they concluded it was unlikely fishing mortality had any substantive impact on the stock since the days of the foreign fisheries.

1.1.4.17 Shortspine Thornyhead

Distribution and Life History

Shortspine thornyhead (*Sebastolobus alascanus*) are found in the waters off of the West Coast of the United States from northern Baja California to the Bering Sea. They are found from 20 to over 1,500 m in depth. The majority of the spawning biomass occurs in the oxygen minimum zone between 600 and 1,400 m, where longspine thornyheads are most abundant (Bradburn, *et al.* 2011; Jacobson and Vetter 1996). The distribution of the smallest shortspine thornyheads suggests that they tend to settle at around 100–400 m and are believed to have ontogenetic migration down the slope, although large individuals are found across the depth range.

Shortspine thornyhead do not appear to be distributed evenly across the west coast, with higher densities of thornyheads in shallower areas (under 500 m) off of Oregon and Washington, and higher densities in deeper areas off of California. The mean latitude of the largest shortspine is slightly further north than of the medium sizes, suggesting the possibility of either a J-shaped migration, differential patterns of recruitment, or regional differences in exploitation history.

Although their densities vary, shortspine thornyheads are present in almost all trawlable areas below 500 m. They are caught in 91% of the trawl survey hauls below 500 m and 94% of the commercial bottom trawl hauls below 500 m. In camera tows, thornyheads are seen to be spaced randomly across the sea floor (Wakefield 1990), indicating a lack both of schooling and territoriality.

Genetic studies of stock structure do not suggest separate stocks along the west coast. Siebenaller (1978) and Stepien (1995) found few genetic differences among shortspine thornyheads along the Pacific coast. Stepien (1995), however, did suggest that there may be a separate population of shortspine thornyhead in the isolated area around Cortes Bank off San Diego, California. Stepien (1995) also suggested that juvenile dispersion might be limited in the area where the Alaska and California currents split. This occurs towards the northern boundary of the assessment area, near 48° N lat.

Stepien et al. (2000), using a more discerning genetic material (mtDNA), found evidence of a pattern of genetic divergence corresponding to geographic distance. However, this study, which included samples collected from southern California to Alaska, did not identify a clear difference between stocks even at the extremes of the range. No such pattern was seen in longspine thornyhead, which suggests that the shorter pelagic stage (~1 yr vs. ~2 yrs) of shortspine may contribute to an increased genetic separation with distance.

Shortspine thornyheads along the west coast spawn pelagic, gelatinous masses between December and May (Erickson and Pikitch 1993; Pearson and Gunderson 2003; Wakefield 1990). Juveniles settle at around 1 year of age (22- 27 mm in length), likely in the range of 100-200 m (Vetter and Lynn 1997), and migrate down the slope with age and size, although large individuals are found across the depth range.

Shortspine thornyhead grow very slowly, but may continue growing throughout their lives, reaching maximum lengths of over 70 cm. Females appear to reach larger sizes than do males. Maturity in females has been estimated as occurring near 18 cm, at 8-10 years of age (Pearson and Gunderson 2003), although new information suggests that patterns of maturity may be more complex.

Shortspine and longspine thornyheads have historically been caught with each other and with Dover sole and sablefish, making up the DTS fishery. Other groundfish species that frequently co-occur in these deep waters include a complex of slope rockfishes, rex sole, longnose skate, roughtail skate, Pacific grenadier, giant grenadier, Pacific flatnose as well as non-groundfish species such as Pacific hagfish and a diverse complex of eelpouts. Shortspine thornyheads typically occur in shallower water than the shallowest longspine thornyheads, and migrate to deeper water as they age. When shortspines have reached a depth where they overlap with longspines, they are typically larger than the largest longspines. Shortspine thornyhead stomachs have been found to include longspine thornyheads, suggesting a predator-prey linkage between the two species.

Thornyheads spawn gelatinous masses of eggs which float to the surface. This may represent a significant portion of the upward movement of organic carbon from the deep ocean (Wakefield 1990). Thornyheads have been observed in towed cameras beyond the 1,280 m limit of the current fishery and survey, but their distribution, abundance, and ecosystem interactions in these deep waters are relatively unknown.

Stock Status and Management History

Beginning in 1989, both thornyhead species were managed as part of the deepwater complex with sablefish and Dover sole (DTS). In 1991, the Council first adopted separate ABC levels for thornyheads and catch limits were imposed on the thornyhead group. Harvest guidelines (HGs) were instituted in 1992 along with an increase in the minimum mesh size for bottom trawl fisheries. In 1995 separate landing limits were placed on shortspine and longspine thornyheads and trip limits became more restrictive. Trip limits (predominantly 2-month limits on cumulative vessel landings) have often been adjusted during the year since 1995 in order to not exceed the HG or OY for that year. At first, the HG for shortspine thornyhead was set higher than the ABC (1,500 vs. 1,000 mt in 1995-1997) in order to allow a greater catch of longspine thornyhead, which was considered a relatively underutilized and healthy stock. In 1999 the OY was set at less than 1,000 mt and remained close to that level through 2006. As a result of the 2005 shortspine assessment, catch limits increased to about 2,000 mt per year and have remained near that level to the present.

Since early 2011, trawl harvest of each thornyhead species has been managed under the PFMC's catch share, or individual fishing quota (IFQ), program. Whereas the trip limits previously used to limit harvest restricted only the amount of fish each vessel could land, individual vessels fishing under the catch-share program are now held accountable for all of the quota-share species they catch.

The most recent stock assessment of west coast longspine thornyhead was done in 2013. This was the fifth assessment done for longspines, but only the second in which it was assessed individually (earlier assessments were of longspine and shortspine thornyheads in combination). Previous assessments were conducted by Jacobson (Jacobson 1990; 1991), Ianelli et al. (1994), Rogers et al. (1997), and Fay (2006). The 1990 and 1991 assessments were very similar. Important features included reviews of available biological data, and analyses of trends in mean lengths from port samples and catch rates calculated from logbook data. Swept-area and video biomass estimates were used to estimate average biomass levels and exploitation rates in the Monterey to US-Vancouver management areas. The available data were used to conduct per-recruit analyses of yield, revenue, and spawning biomass, and to develop estimates of the then target level of $F_{35\%}$.

Ianelli et al. (Ianelli, *et al.* 1994) assessed the coastwide abundance of longspine and shortspine thornyheads based on slope survey data, an updated analysis of the logbook data, and fishery length-composition data to estimate the parameters of length-based Stock Synthesis models, under different assumptions regarding discarding practices.

The assessment of thornyheads in 1997 covered the area from Central California at 36° N lat. to the U.S.-Canada border (Rogers, *et al.* 1997). The STAR Panel expressed concern that management requires more detailed information on thornyheads than could be obtained from the available data. In 1998, two separate stock assessments covering the area north of 36° N lat. were prepared and accepted by the Council (NMFS and OT 1998; Rogers, *et al.* 1998). A synthesis of these two assessments was used to set the harvest specifications 1999 and 2000. Given that the synthesis estimated 1999 depletion at 32 percent of virgin biomass, the Council used the precautionary 40-10 policy to set the OYs for those two years.

There were a range of uncertainties in the 2001 assessment of shortspine thornyhead, in 2001, not the least of which was the estimated biomass (Piner and Methot 2001). The assessment was extended south to Point Conception (in contrast to past surveys, which were limited to stocks north of the 36° N latitude management area boundary). The authors concluded the 2001 spawning biomass ranged between 25 percent and 50 percent of unexploited spawning biomass. As was also the case in the 1998 assessment, the uncertainty in abundance largely revolved around the uncertainty in recruitment and survey q, or catchability, of shortspine thornyhead in slope surveys. The authors also concluded that the trend in stock biomass was increasing and the stock was not depleted. Based on estimated biomass and application of the GMT-recommended F=0.75M principle (which approximated an $F_{50\%}$ proxy harvest rate for shortspine thornyhead), the assessment authors and GMT recommended a slight increase in the ABC and OY for 2002. They also recommended that the harvest specifications be set for two areas divided by Point Conception at 34º27’ N lat., rather than the previous policy to separate the management areas at the Conception-Monterey border (36º N lat.). Despite the uncertainty in biomass estimates and determination of whether shortspine thornyhead should be treated as a “precautionary zone” stock, these recommendations did treat the stock as such by applying the 40-10 adjustment.

The 2005 stock assessment estimated the shortspine thornyhead spawning stock biomass to be at 62.9 percent of its initial, unfished biomass in 2005 (Hamel 2006c). The 2005 assessment extended the southern border of the assessment area from Point Conception to the Mexican border (32.5º N latitude). Including the entire Conception area resulted in a larger basis for unfished biomass, given that this area was estimated to contain nearly half of the stock’s total west coast biomass. It was noted that there could be regional management concerns with this stock because while the assessment OY was coastwide, there are differences in historic exploitation rates north and south of Point Conception. It was also noted the biomass estimate south of Pt. Conception was more uncertain than that in the north.

The 2013 stock assessment estimated the shortspine thornyhead spawning stock biomass to be at 74.2 percent of its initial, unfished biomass in 2013 (Taylor and Stephens 2013). A longer time series of the coastwide NWFSC trawl survey biomass estimates were included in this assessment relative to the 2005 assessment. Therefore, the STAT concluded there was no greater uncertainty in the biomass south of Pt. Conception relative to estimates for the rest of the coast. As in the previous assessment, no age data were used in the 2013 assessment and growth parameters were fixed at the same values used in 2005.

Stock Productivity

Taylor and Stephens (2013) estimated annual shortspine recruitment using a Beverton-Holt stock-recruitment function and assuming a steepness value of 0.6. Most 2013 rockfish assessments used a steepness prior of 0.779, estimated from a meta-analysis of rockfish assessment results. This value might be expected in the 2013 longspine assessment; however, rockfish ecology and reproduction are quite different from those of thornyheads, which (for example) do not give birth to live young but rather spawn floating egg masses.

Steepness in the shortspine thornyhead assessment was fixed at 0.6 both in the 2005 and 2013 models (Hamel 2006c; Taylor and Stephens 2013). This value was justified based on consistency between the modeling approach and management targets, in addition to being within a range of biologically reasonable values.

Annual deviations about this stock-recruitment curve were estimated for the years 1944 through 2012. Estimated recruitments do not show high variability, and the uncertainty in each estimate is greater than the variability between estimates. The 2013 shortspine assessment is relatively uninformative of relative year class strength since ages were not used in the model (thornyheads are notoriously difficult to age). Therefore, a length-based assessment with an assumed steepness is used to determine recruitment.

Fishing Mortality

Landings of shortspine were estimated to have risen to a peak of 4,815 mt in 1989, followed by a sharp decline during a period of trip limits and other management measures imposed in the 1990s. Since the institution of separate trip limits for shortspine and longspine thornyheads, the fishery had more moderate removals of between 1,000 and 2,000 mt per year from 1995 through 1998. Landings fell below 1,000 mt per year from 1999 through 2006, then rose to 1,531 in 2009 and have declined since that time.

Exploitation rates in terms of spawning potential ratio indicates that the exploitation slightly exceeded the F_{MSY} target for a single year in 1985 and then for the period 1989-1994. However, the stock status is estimated to have never fallen below the $B_{40\%}$ management target.

1.1.4.18 Spiny Dogfish

Distribution and Life History

In the Northeast Pacific, spiny dogfish (*Squalus suckleyi*) occur from the Gulf of Alaska, with isolated individuals found in the Bering Sea, southward to San Martin Island, in southern Baja California. They are extremely abundant in waters off British Columbia and Washington, but decline in abundance southward along the Oregon and California coasts (Ebert 2003; Ebert, *et al.* 2010).

The U.S. west coast spiny dogfish stock likely has interaction and overlap with dogfish observed off British Columbia. About 1,300 dogfish were tagged along the coast of Washington from 1942-1946, during the period of the strong directed fishery for dogfish. Only 50 of these fish were recaptured and had tags returned (4%), of which 54% were recaptured within U.S. coastal waters, while 32% were recaptured in coastal Canada and 12% in the inside waters of Puget Sound and the Strait of Georgia. One fish was recaptured in coastal Japanese waters (7 years after being tagged). Because many of the releases were close to the U.S.-Canada border, and the fractions do not take into account the relative fishing pressure within each area, this study is of limited use in providing reliable information about dogfish movement rates.

A spatial population dynamics model (Taylor 2008), which included these tagging data (along with much larger tagging experiments conducted in Canada and inside U.S. waters of Puget Sound) estimated movement rates of about 5% per year between the U.S. coastal sub-population of dogfish and that found along the west coast of Vancouver Island in Canada. The model also estimated movement rates of less than 1% per year between the U.S. coastal sub-population of dogfish and that in the Puget Sound.

These sharks appear to prefer areas in which the water temperature ranges from 5 to 15° C, often making latitudinal and depth migrations to follow this optimal temperature gradient (Brodeur, *et al.* 2009). There is also evidence of seasonal movement along the coast based on both tagging data and timing of historical fisheries (Ketchen 1986). One estimate of the seasonal movement along the Pacific coast is a North-South shift of about 600 km from winter to summer (Taylor 2008). This seasonal pattern is not as extreme as that found among spiny dogfish in Atlantic waters of the U.S., which are likely due to larger fluctuations in temperature. Dogfish have also been captured in high-seas salmon gillnets across the North Pacific between about 40° and 50° N lat. (Nakano and Nagasawa 1996), but the extent of these wide-ranging pelagic movements is poorly understood.

The biology and life history of spiny dogfish are relatively well studied (Campana, *et al.* 2009; Di Giacomo, *et al.* 2009; Taylor 2008; Tribuzio 2009; Tribuzio, *et al.* 2009; Tribuzio, *et al.* 2010; Vega, *et al.* 2009). This species is an opportunistic feeder that consumes a wide range of prey (whatever is abundant). Schooling pelagic fish, such as herring, make up the majority of its diet. They also feed on invertebrates such as shrimp, crab and squid. In turn, dogfish are preyed upon by larger cod, hake, and other spiny dogfish (Beamish, *et al.* 1992; Brodeur, *et al.* 2009; Tanasichuk, *et al.* 1991). Larger species of sharks, as well as seals and killer whales, also feed on dogfish.

Spiny dogfish have internal fertilization and ovoviviparous development. The internal development takes place over 22-24 months, the longest gestation period known for sharks. The number of pups in each litter ranges between 5 and 15 individuals depending on the size of the female (larger females bearing more pups). The size at birth is generally between 20 and 30 cm for both genders. Male spiny dogfish are reported to grow faster than females, but females reach larger sizes. This species is the latest maturing (with 50% female maturity reported at 35.5 years) and longest lived of all elasmobranchs (Cortes 2002; Saunders and McFarlane 1993; Smith, *et al.* 1998; Taylor 2008). Life history traits of spiny dogfish make the species highly susceptible to overfishing and slow to recover from stock depletion since its slow growth, late maturation, and low fecundity are directly related to recruitment and spawning stock biomass (Holden 1974; King and McFarlane 2003).

Stock Status and Management History

Spiny dogfish on the U.S. west coast have been utilized for almost a thousand years, with those in Puget Sound first used by Native Americans (Bargmann 2009). The exploitation of spiny dogfish in coastal waters, however, started in the 20th century. Even though the history of spiny dogfish utilization on the U.S. west coast included a brief but intense commercial fishery in the 1940s, in general this species is not highly prized and is mostly taken as bycatch in other fisheries.

Prior to 1936, coastal catches of spiny dogfish were extremely minimal, but in 1936, shortly after it was discovered that livers of spiny dogfish have high level of vitamin A, a large scale fishery for dogfish developed in the Pacific Northwest. Before World War II, Northeast Pacific dogfish livers could not compete with the cheaper and more potent sources of vitamin A from Europe. But when World War II started and European supplies were cut, dogfish shark livers became the major source of vitamin A in the United States, and the spiny dogfish fishery grew rapidly along the Pacific coast. The processed liver oils were used in pharmaceuticals, food processing, and animal feed (Bargmann 2009; Ketchen 1986).

During the liver fishery, dogfish were targeted by three major gear groups, including setlines, set nets, and bottom trawls. The timing of the dogfish liver fishery coincided with the development of bottom trawling in the U.S. Northwest, and though at the onset of the fishery the catches by trawl were low, by the mid-1940s trawling was the dominant type of fishing for dogfish.

In 1945, a sharp decline in spiny dogfish catches began. This decline occurred despite continued strong demand for vitamin A and high prices for dogfish livers, but because of decreased availability of the species in the Northeast Pacific (Bargmann 2009; Ketchen 1986). In 1950, with the advent of synthetic vitamins, demand for spiny dogfish livers declined and catches in the Northeast Pacific virtually ended.

Between 1950 and 1974, the landings of spiny dogfish remained minimal. By the late 1950s it was reported that species availability had increased. Also, in the late 1950s-early 1960s, dogfish earned a bad reputation among fishermen. They were blamed for driving off commercially valuable species such as herring and mackerel, while consuming large numbers of them. Spiny dogfish have also been observed biting through nets to get to their fish prey, releasing many of them and damaging fishing gear in the process. They were also reported damaging gear when become entangled in commercial nets. As a result, fishermen were trying to avoid areas with higher chances of dogfish catches (such as soft bottoms, for example) to prevent encountering dogfish and potentially damaging their gear.

A market opportunity for dogfish developed in the mid-1970s. In Europe, spiny dogfish has long been used an inexpensive source of human food, for fish and chips in particular. A decline in the European dogfish supply provided an opportunity for developing an export dogfish food fishery on the U.S. west coast. Also, during the late 1970s, shark cartilage started to be used in cancer treatment, and a portion of spiny dogfish catches have since been sold for medical research and treatment (Gregory Lippert, WDFW, pers. com. as cited by Gertseva and Taylor (2011)). As before, three types of gear were involved in catching dogfish (bottom trawl, setlines, and sunken gill nets), but since the mid-1980s catches by gillnets have been minimal.

Spiny dogfish is a common bycatch species, often caught in other fisheries and largely discarded. For instance, it has long been incidentally caught in the hake fishery, which is almost exclusively conducted with mid-water trawls. Large-scale harvesting of Pacific hake in the U.S. began in 1966, when factory trawlers from the Soviet Union and other countries began targeting this stock. After the 200-mile U.S. EEZ was declared in 1977, a joint-venture fishery was initiated between U.S. trawlers and Soviet factory trawlers acting as motherships (larger, slower ships for fish processing and storage while at sea). By 1989 the U.S. fleet capacity had grown to a level sufficient to harvest the entire quota, and no further foreign fishing was allowed. The Pacific hake fishery is currently 100% observed at sea and data on bycatch species, including spiny dogfish, is being routinely collected.

Spiny dogfish on the U.S. west coast has been managed under the Other Fish complex since implementation of the Groundfish FMP by the Council in 1982. In 2005, reduction in the Other Fish ABC was implemented due to removal of the California substock of cabezon from the Other Fish complex. The same year, a 50% precautionary OY reduction was implemented to accommodate uncertainty associated with managing unassessed stocks. In 2006, a trip limit for spiny dogfish was imposed for U.S. west coast waters which varied between 45 and 91 mt per two months for all gears. In 2009, another ABC reduction was implemented due to removal of longnose skate from the Other Fish complex and the 50% OY reduction was maintained.

In 2011, reduction in the Other Fish OFL was implemented due to removal of the Oregon substock of cabezon from the Other Fish complex. The 50% precautionary reduction to the ACL was maintained; however, a scientific uncertainty buffer was specified as an ABC of 7,742 mt under the Amendment 23 framework.

Gertseva and Taylor (2011) estimated the spawning stock output of spiny dogfish to be 44,660 thousands of fish (95% confidence interval: 8,937-80,383), which represents 63% of the unfished spawning output level. While this depletion level indicates the stock is currently healthy, fishing at the target SPR of 45% is expected to severely reduce the spawning output over the long term because of the extremely low productivity and other reproductive characteristics of the stock. The Council partially addressed this by setting a more conservative spiny dogfish ABC for 2013 by specifying a P* of 0.3.

The Council further decided to manage spiny dogfish with stock-specific harvest specifications beginning in 2015. The SSC also investigated establishing a more conservative F_{MSY} harvest rate for spiny dogfish and other elasmobranchs in recognition of their lower productivity. The SSC recommended and the Council adopted a more conservative proxy 50% SPR harvest rate as an interim measure for elasmobranchs. The 50% SPR was based on an SSC meta-analysis of Chondrichthyes species using the posterior distribution for F_{MSY}/M values as reported by Zhou et al. (2012). The SSC said they may further investigate sustainable harvest rates for Council-managed elasmobranchs as more information becomes available in the future.

Stock Productivity

Spiny dogfish have a relatively low stock productivity due to slow growth, late maturation, and low fecundity. The fecundity of dogfish in the Northeast Pacific Ocean has been well studied, with pregnant females having relatively few pups per litter (5 to 15), and with relatively little variability among individuals. Unlike fish producing millions of eggs, the low fecundity of dogfish suggests both low productivity in general and a more direct connection between spawning output and recruitment than for many species.

Gertseva and Taylor (2011) modeled the spiny dogfish spawner-recruit relationship using a new functional form that was recently added to the Stock Synthesis platform, which allowed a more explicit modeling of pre-recruit survival between the stage during which embryos can be counted in pregnant females to their recruitment as age 0 dogfish. This new method may be useful for a variety of low fecund species, as well as providing additional flexibility in the spawner-recruit relationship that may be explored for any stock. The method is an expansion and improvement on similar approaches previously applied to dogfish (Taylor 2008; Wood, *et al.* 1979), which assumed a linear decline in age 0 survival as a function of population density. While steepness was not estimated or assumed in the conventional sense of a Beverton-Holt stock-recruitment relationship, a value for steepness can be calculated using a formula provided by Gertseva and Taylor (2011). The calculated value of steepness is 0.28, indicating a great degree of compensation or density-dependent recruitment.

Fishing Mortality

During the last 10 years, relative exploitation rates (catch/summary biomass) are estimated to have hovered around 1% and SPR is estimated to be well above pre-2015 management target of SPR 45%. The 2011 assessment identified a period during the vitamin A fishery in the 1940s when the exploitation rate exceeded the current F_{MSY} proxy harvest rate.

1.1.4.19 Splitnose Rockfish South of 40°10’ N Lat.

Distribution and Life History

Splitnose rockfish (*Sebastes diploproa*) are distributed from the northern Gulf of Alaska (Prince William Sound) to central Baja California and occur at depths between 91-795 meters. Adults are the most abundant between British Columbia and southern California at depths from 215 to 350 meters (Alverson, *et al.* 1964; Gunderson and Sample 1980; Love, *et al.* 2002). The species is distinguished by having a deeply notched upper jaw, which inspired its Greek name diploproa, meaning "double prow". Splitnose rockfish are commonly seen on low-relief mud fields of the continental shelf and upper slope, often near isolated rock, cobble or shell debris. Solitary individuals are often found resting on the seafloor, although they occasionally form schools that move more than 100 meters in the water column (Love, *et al.* 2002; Rogers 1994).

Splitnose rockfish co-occur with an assemblage of slope rockfish, including Pacific ocean perch (*Sebastes alutus*), darkblotched rockfish (*Sebastes crameri*), yellowmouth rockfish (*Sebastes reedi*), and sharpchin rockfish (*Sebastes zacentrus*) off Washington and Oregon, and stripetail rockfish (*Sebastes saxicola*), darkblotched rockfish and shortspine thornyhead (*Sebastolobus alascanus*) off central California. Pacific ocean perch and darkblotched rockfish are the most abundant members of that assemblage off the coasts of Oregon and Washington, but splitnose rockfish and darkblotched rockfish dominate off the northern coast of California. Lesser amounts of splitnose have also been noted in the deepwater DTS assemblage and with shrimp catch (Rogers 1994; Rogers and Pikitch 1992; Weinberg 1994).

There are no clear stock delineations for splitnose rockfish in the U.S. waters. No molecular markers have yet been developed for this species, and no genetic data are currently available to suggest the presence of several stocks (Waples, *et al.* 2008). No distinct breaks are seen in the fishery landings and catch distributions. Survey catches imply a continuous distribution. The spatial dynamic cluster analysis of the Northwest Fisheries Science Center (NWFSC) survey abundance indices (Cope and Punt 2009) provided no evidence of spatial stock structure for splitnose rockfish off Washington, Oregon, and California.

Splitnose rockfish are documented in the literature to live to at least 86 years (Bennett, *et al.* 1982), although a fish encountered in a NMFS survey was aged at 103 years old. This is a small species – the maximum size reported in the literature is 46 cm (Love, *et al.* 2002); the vast majority of individuals caught in NMFS surveys were under 44 cm in fork length, although a few fish larger than this were caught.

Splitnose rockfish exhibit sexual dimorphism in growth. Although the males grow to their maximum lengths earlier than females, females reach larger sizes than males (Boehlert 1980; Love, *et al.* 2002). It was hypothesized that life history characteristics may vary with latitude, but that is uncertain. Boehlert and Kappenman (1980) detected greater size-at-age with increasing latitude and suggested more rapid growth of fish in the northern end of their range. Analysis of the NWFSC shelf-slope survey data did not show a distinct gradient in growth rate between north and south, although the asymptotic length (Linf) exhibits a latitudinal gradient (Gertseva, *et al.* 2009). Growth of splitnose rockfish was found to correlate with climate and environmental variables, including sea surface temperature, the El Niño Southern Oscillation (ENSO) index, and the Pacific Decadal Oscillation (PDO) (Black 2009; Black, *et al.* 2008); more information is needed to develop climate-growth relationships for stock assessment purposes.

Female splitnose rockfish off California mature at 6-9 years old (18-23 cm long) (Echeverria 1987), and their fecundity increases with size (Phillips 1964). Splitnose rockfish mature somewhat later off British Columbia - both males and females reach 50% maturity at size of 27 cm (Westrheim 1975). Like other rockfishes, splitnose utilize internal fertilization and bear live young (Love, *et al.* 2002). This species can exhibit a long reproductive season, with young larvae found in all months off southern California, from January to September off central California, from March to September in Oregon, and in July off Washington (Love, *et al.* 2002; Moser, *et al.* 2000).

Young juveniles live at the surface for several months, then go through a transitory midwater residence, and finally settle to benthic habitats near the end of their first year of life (Love, *et al.* 2002). During their first year, splitnose have been found living among drifting vegetation in Puget Sound and southern California, and under floating objects in Queen Charlotte Sound, British Columbia (Shaffer, *et al.* 1995). Pelagic juvenile splitnose feed on calanoid copepods and amphipods (Shaffer, *et al.* 1995), while benthic juveniles and adults eat krill, copepods, sergestid shrimps and amphipods. Splitnose are prey of Steller sea lions and other pinnipeds (Love, *et al.* 2002).

Size-composition data for splitnose rockfish show a strong gradient of body size with depth, with smaller fish in shallow waters, suggesting ontogenetic movements of splitnose rockfish to deeper waters with increasing size and age, a common phenomenon in the genus *Sebastes* (Boehlert 1980).

Stock Status and Management History

Limits on domestic rockfish catches were first instituted in 1983, with splitnose rockfish managed as a part of the *Sebastes* complex, which included around 50 species. The ABC for the *Sebastes* complex was estimated for each International North Pacific Fisheries Council (INPFC) area along the coast based on historic landings. In 1994, the *Sebastes* complex was divided into southern and northern management areas, and harvest guidelines were established for the complex in each area. The southern area included Conception, Monterey and Eureka INPFC areas, and the northern area included Columbia and U.S.-Vancouver INPFC areas.

In response to a concern that deepwater species off Oregon and Washington might have been overharvested, Rogers (1994) conducted a preliminary assessment of splitnose rockfish, which focused on compiling and reviewing the available data. However, since the data were sparse and no evident trends in biomass or mean size were detected, the results were inconclusive. In 1996 the status of several rockfish species, which were part of the *Sebastes* complex, were assessed (Rogers, *et al.* 1996), and ABCs for splitnose rockfish in the southern area were calculated to be 868 mt for the southern management area and 274 mt for the northern management area. These amounts were not specified individually, but included in the total ABCs for the *Sebastes* complex.

In 1998, unusually high splitnose rockfish landings drove *Sebastes* complex harvests in the southern management area sharply upward. In 1999, for the first time, splitnose rockfish were individually separated from the southern *Sebastes* complex. Individual ABCs and OYs for splitnose rockfish in that area have been specified along with splitnose-specific trip limits since then. The ABC for the southern management area was set at 868 mt, as estimated in the 1996 assessment of the remaining rockfish in the *Sebastes* complex (Rogers, *et al.* 1996).

Additionally in 1999, the general *Sebastes* complex was divided into nearshore, shelf, and slope assemblages, and the dividing line between the northern and southern management areas was shifted southward to 40º10’ N lat., near Cape Mendocino. Since that time, in the northern area, splitnose has been managed under trip limits for minor slope rockfish. In 2000, harvest specifications for splitnose rockfish were set for the Conception and Monterey areas only, and 48 mt for the Eureka area were added to the northern minor rockfish ABC. Also, a precautionary adjustment of the OY (reduced from the ABC by 25%) was specified to account for the limited nature of the assessment. In 2000, the ABC and OY for splitnose rockfish south of 40º10’ N lat. were reduced based on the revised F_{MSY} harvest rate policy. During the last 10 years, the coastwide landings and total catch of splitnose rockfish were relatively low, and the limits established for the area south of 40º10’ N lat. have not been exceeded.

Gertseva et al. (2009) assessed splitnose rockfish coastwide and determined the stock was healthy with a depletion of 66 percent at the start of 2009. Since 1999, the splitnose spawning output was estimated to have been increasing in response to below-average removals and above-average recruitment during the last decade. At the beginning of 2009 the estimated spawning stock output was 8,426 million eggs. Uncertainty in the model was explored though asymptotic variance estimates and sensitivity analyses. Asymptotic confidence intervals were estimated within the model and reported throughout the assessment for key model parameters and management quantities. Uncertainty in recent recruitment was used to define alternative states of nature and develop the decision table.

Stock Productivity

Steepness of the stock-recruitment curve was fixed at a value of 0.58 in the 2009 splitnose rockfish assessment, as estimated by a meta-analysis for unassessed rockfish. Recruitment deviations were estimated for each year between 1960 and 2006, which was the period best informed by the data based on evaluation of the variance of the recruitment deviations. Prior to 1960 and after 2006, recruits were taken deterministically from the stock-recruit curve. The model estimated above-average recruitments in the most recent years beginning 1999 (), which along with low catches during the last decade determine a population increase in recent and early forecast years. Uncertainty in recent recruitment was used to define alternative states of nature and develop the decision table.

Fishing Mortality

Splitnose rockfish have been taken incidentally in fisheries such as the trawl fisheries targeting POP, mixed slope rockfish, and other deepwater targets, but have not been a commercial target species. Splitnose rockfish were lightly exploited until the 1940s, when the trawl fishery for rockfish first became important. With the development of the POP fishery (a species with which splitnose rockfish co-occur), spawning output of splitnose rockfish began to decline. A sharp drop in the 1960s was associated with large harvests of POP by foreign trawl fleets operating in the U.S. EEZ. Another drop occurred in 1998 when the increased availability of splitnose rockfish led to high removals off California. Since 1999, the splitnose spawning output was estimated to have been increasing in response to below-average removals and above-average recruitment during the last decade.

It was decided to continue management of splitnose rockfish with stock-specific specifications south of 40°10’ N lat. and under the Slope Rockfish complex north of 40°10’ N lat. when the coastwide splitnose rockfish assessment was first used to inform management in 2011. A north-south apportionment based on the average 1916-2008 assessed area catch resulting in 64.2 percent stock-specific specification in the southern area and 35.8 percent for the contribution of splitnose rockfish to the Slope Rockfish North complex was used to apportion harvest specifications since 2011. The Council recommended continuing this management strategy largely due to the implications of determining the uncertain catch history by trawl permit to initially allocate trawl splitnose quota shares (QS) under Amendment 20. Since splitnose rockfish are not targeted and predominantly discarded at sea, little data would be available to determine catch history.

1.1.4.20 Starry Flounder

Distribution and Life History

Starry flounder (*Platichthys stellatus*) have a very broad geographic distribution around the rim of the North Pacific Ocean and have been recorded from Los Angeles to the Aleutian Islands, although they are rare south of Point Conception (Kramer and O'Connell 1995; Orcutt 1950). Off the U.S. west coast starry flounder are found commonly in nearshore waters, especially in the vicinity of estuaries (Baxter 1999; Kimmerer 2002; NOAA 1990; Orcutt 1950; Pearson 1989; Sopher 1974). It has quite a shallow bathymetric distribution, with most individuals occurring in waters less than 80 m, although specimens have been collected off the continental shelf in excess of 350 m (Kramer and O'Connell 1995; Orcutt 1950). They are most often found on gravel, clean shifting sand, hard stable sand, and mud substrates.

Spawning occurs primarily during the winter months of December and January, at least in central California (Orcutt 1950); it may occur somewhat later in the year (February-April) off British Columbia and Washington (Hart 1988; Love 1996). Egg/larval development apparently takes about 2-3 months to occur. Offspring principally remain within the estuaries until age two, when many have migrated to the adjacent ocean habitats (Baxter 1999; Kimmerer 2002; Orcutt 1950). Reproductive maturity occurs at age two years for males and age three years for females, when the fish are 28 cm and 35 cm, respectively. Tagging studies have shown that fish are relatively sedentary and move little during their adult lives (Love 1996); however, there is little information on regional variation in stock structure.

Starry flounder consume crabs, shrimps, worms, clams and clam siphons, other small mollusks, small fish, nemertean worms, and brittle stars (Hart 1988).

Stock Status and Management History

The U.S. west coast starry flounder stock was assessed in 2005 (Ralston 2006). The assessment was based on the assumption of separate biological populations north and south of the California-Oregon border. The assessment used catch data, relative abundance indices derived from trawl logbook data, and an index of age-1 abundance from trawl surveys in the San Francisco Bay and Sacramento-San Joaquin River estuary. Unlike most other groundfish stock assessments, no age- or length-composition data were directly used in the assessment. Both the northern and southern populations were estimated to be above the target level of 40 percent of virgin spawning biomass (44 percent in Washington-Oregon and 62 percent in California), although the status of this data-poor species remained fairly uncertain compared to that of many other groundfish species. One of the most significant areas of uncertainty in the assessment was the estimate of natural mortality rate, which was quite high (0.30 for females and 0.45 for males).

Starry flounder were managed in the Other Flatfish complex until 2007, when the stock was removed from the complex and managed with stock-specific specifications determined from the assessment. Starry flounder have never been overfished or subject to overfishing.

Stock Productivity

Recruitment deviations were estimated in both the northern and southern starry flounder assessment models, although selectivity patterns were fixed external to the model after analysis of trawl length composition information from the PacFIN-BDS data base and sport length composition information from the RecFIN data base. Growth and other life history parameters were also fixed, largely based on a detailed study of starry flounder by Orcutt (1950). Finally, spawner-recruit steepness ($h = 0.80$) and recruitment variability ($\sigma r = 1.00$) were also held constant.

Starry flounder is a relatively productive stock with a PSA productivity score of 2.15. They are also not vulnerable to potential overfishing ($V = 1.04$).

Fishing Mortality

Starry flounder are mostly caught in nearshore recreational fisheries. Historically, they were also caught in nearshore trawl efforts; however, this catch is rare today given that Washington and California have closed their state nearshore waters to trawling. Both the northern and southern stocks were estimated to be well above the $B_{25\%}$ B_{MSY} threshold ($B_{44\%}$ in Washington-Oregon and $B_{62\%}$ in California). In addition, recent exploitation rates have been well below the F_{MSY} proxy for flatfish. Recent landings in both areas have been less than 20% of the calculated ABC/OFL.

1.1.4.21 Widow Rockfish

Distribution and Life History

Widow rockfish (*Sebastes entomelas*) range from Albatross Bank off Kodiak Island to Todos Santos Bay, Baja California, Mexico (Eschmeyer, *et al.* 1983; Miller and Lea 1972; NOAA 1990). They occur over hard bottoms along the continental shelf (NOAA 1990) and prefer rocky banks, seamounts, ridges near canyons, headlands, and muddy bottoms near rocks. Large widow rockfish concentrations occur off headlands such as Cape Blanco, Cape Mendocino, Point Reyes, and Point Sur. Adults form dense, irregular, midwater and semi-demersal schools deeper than 100 m at night and disperse during the day (Eschmeyer, *et al.* 1983; NOAA 1990; Wilkins 1986). All life stages are pelagic, but older juveniles and adults are often associated with the bottom (NOAA 1990). All life stages are fairly common from Washington to California (NOAA 1990). Pelagic larvae and juveniles co-occur with yellowtail rockfish, chilipepper, shortbelly rockfish, and bocaccio larvae and juveniles off Central California (Reilly, *et al.* 1992).

Widow rockfish are ovoviviparous, have internal fertilization, and brood their eggs until released as larvae (NOAA 1990; Reilly, *et al.* 1992). Mating occurs from late fall-early winter. Larval release occurs from December through February off California, and from February through March off Oregon. Juveniles are 21 mm to 31 mm at metamorphosis, and they grow to 25 cm to 26 cm over three years. Age and size at sexual maturity varies by region and sex, generally increasing northward and at older ages and larger sizes for females. Some mature in three years (25 cm to 26 cm), 50 percent are mature by four years to five years (25 cm to 35 cm), and most are mature in eight years (39 cm to 40 cm) (NOAA 1990). The maximum age of widow rockfish is 28 years, but rarely over 20 years for females and 15 years for males (NOAA 1990). The largest size is 53 cm and about 2.1 kg (Eschmeyer, *et al.* 1983; NOAA 1990).

Widow rockfish are carnivorous. Adults feed on small pelagic crustaceans, midwater fishes (such as age-one or younger Pacific whiting), salps, caridean shrimp, and small squids (Adams 1987; NOAA 1990). During spring, the most important prey item is salps, during the fall fish are more important, and during the winter widow rockfish primarily eat sergestid shrimp (Adams 1987). Feeding is most intense in the spring after spawning (NOAA 1990). Pelagic juveniles are opportunistic feeders, and their prey consists of various life stages of calanoid copepods, and euphausiids (Reilly, *et al.* 1992).

Stock Status and Management History

Widow rockfish are an important commercial species from British Columbia to central California, particularly since 1979, when Oregon trawl fisherman demonstrated the ability to make large catches at night using midwater trawl gear. Many more participants have entered the fishery since that time, and landings of widow rockfish have increased rapidly (Love, *et al.* 2002). Widow rockfish are a minor component of the recreational groundfish fisheries.

Williams et al. (2000) assessed the coastwide stock of widow rockfish in 2000. The spawning output level (8,223 mt eggs), based on that assessment and a revised rebuilding analysis (Punt and MacCall 2002) adopted by the Council in June 2001, was at 23.6 percent of the unfished level (33,490 mt eggs) in 1999. The widow rockfish stock was declared overfished in 2001 based on this assessment result.

It was concluded in the 2003 assessment (He, *et al.* 2003) that the widow rockfish stock size was at 24.7 percent of the unfished biomass and that stock productivity was considerably lower than previously thought. Data sparseness was a significant problem in this widow rockfish assessment. Results from the 2003 widow rockfish rebuilding analysis were used to develop the first widow rockfish rebuilding plan, which was adopted in April 2004 under Amendment 16-3 to the groundfish FMP. The rebuilding plan established a target rebuilding year of 2038 and a harvest control rule of F = 0.0093 (with a P_{MAX} of 60 percent).

A full assessment was completed in 2005 for widow rockfish (He, *et al.* 2006a). In addition to including the new data from 2003 to 2004, this assessment added an index of relative abundance based on the triennial survey data and estimated the power coefficient of the midwater juvenile survey index instead of using a fixed value. The base model estimated that spawning biomass declined steadily since the early 1980s and that spawning output in 2004 was 31 percent of the unexploited level, above the Council's overfished threshold. Further, spawning output in the base model was estimated to have never dropped below the 25 percent overfished threshold. Alternative model runs, which were considered to be only slightly less plausible than the base model, however, indicated that the stock had been below $B_{25\%}$. The 2005 rebuilding analysis indicated that the stock was much closer to reaching a rebuilt biomass than previously estimated: under the 2005 rebuilding analysis (He, *et al.* 2006b), T_{MIN} was estimated to be 2013, compared to a T_{MIN} of 2026 in the 2003 analysis (He, *et al.* 2003). This rebuilding analysis was used to modify the widow rockfish rebuilding plan, which was adopted under Amendment 16-4 in 2006. The target rebuilding year under the modified rebuilding plan was 2015 and the harvest control rule was an SPR harvest rate of 95 percent.

An updated assessment was done in 2007 (He, *et al.* 2008) using the same age-based model (written in ADMB) and data compiling procedures used in the previous assessment. New data from 2005 and 2006, including catches, age composition, and a CPUE time series, were included in the 2007 assessment. Sources of uncertainty include a questionable source of information (Oregon bottom trawl logbook data); the validity of the fixed natural mortality rate used; the estimation of stock-recruitment relationships, which also led to uncertainty in the rebuilding analysis; the appropriateness of using the Santa Cruz juvenile survey data; and stock structure issues including relationship to the Canadian stock. The estimated total biomass in 2006 was 120,132 mt and the estimated 2006 spawning biomass was 47,478 mt. Spawning biomass in the 2007 assessment is higher than in the 2005 assessment primarily because of the relatively strong recruitment in 2003 by the 2000 cohort. The estimated current depletion rate is 35.5 percent of the unfished spawning output. The ABC for 2007 is 5,334 mt and the harvest guideline is 368 mt. It is estimated that the population will recover to the target in 2009, which is six years earlier than the target year in the rebuilding plan. Based on these results, the SSC recommended no changes to the rebuilding plan.

Future research needs include reliable abundance indices, continue the long-term recruitment index and midwater juvenile trawl survey, ability to infer direct and indirect estimates of year class strengths, better understand the relationship between environmental conditions in the California Current Ecosystem, improve short-term forecasts of productivity, biomass levels and allowable catches from stock assessments, new discard data, evaluate the utility of hydro-acoustic surveys, increase age-collection programs to increase sample size, and determination of age-composition for the triennial survey.

A full assessment of widow rockfish was conducted in 2011 (He, *et al.* 2011), which indicated the spawning stock biomass was successfully rebuilt with a depletion of 51 percent at the start of 2011. However, there is considerable uncertainty regarding the new stock assessment's finding that the stock has rebuilt. Productivity and status of this stock are highly uncertain because the available biomass indices are not informative. Nonetheless, the SSC considered the base model of the new widow rockfish assessment to be the best available science.

Stock Productivity

The major axis of uncertainty in the new widow rockfish assessment is steepness, which defines the relative productivity of the stock. The SSC recommended fixing the steepness parameter at 0.76 in the assessment, due to the lack of information to reliably estimate steepness. The steepness parameter of 0.76 is the median value in the distribution of steepness parameters of assessed rockfish species in the Dorn (2002b) meta-analysis. The decision table in the assessment was developed to bracket model uncertainty in widow rockfish productivity with alternative values of steepness. The 12.5 percent and 87.5 percent quantiles from the prior distribution on h translate into steepness values of 0.54 and 0.95, respectively. This range was considered reasonable to account for the uncertainty associated with steepness. It was, however, agreed by the STAT and the SSC to shift this range to a lower steepness value to (a) take account of the data which, while not greatly informative, did provide some evidence for a lower steepness value, and (b) provide continuity by considering the value of steepness used in the 2009 assessment (0.41). As a result, steepness values of 0.41 and 0.90 were used for the low and high states of nature in the assessment decision table.

The high uncertainty in the steepness of the stock-recruitment relationship and the lack of recent strong recruitments compels a precautionary approach to managing widow rockfish. If the pessimistic state of nature is correct (h = 0.41), then annual constant catches of up to 1,500 mt are projected to maintain spawning stock biomass above the MSST during the 10-year projection period (i.e., 2013-2022).

The base model in the 2011 widow assessment estimated a time series of recruitment of age-0 fish from 1948 to 2009. The highest recruitment occurred in 1970 (Figure 23). Recruitments remained generally low in the early 1990s and have been very low since 2001, as compared to the long-term average. As in the past widow assessments, uncertainties in estimation of recruitment remain high.

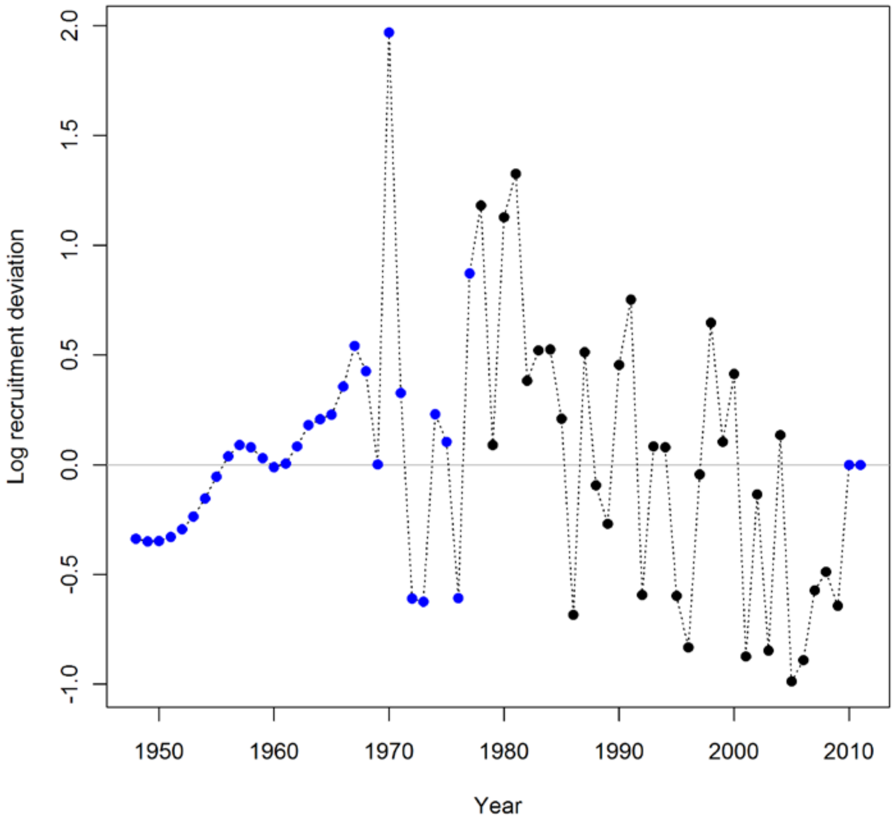

Figure 23. Time series of estimated recruitments from the base model in the 2011 widow rockfish assessment.

Fishing Mortality

Widow rockfish are caught mostly in midwater trawls used to target Pacific whiting and, before 2002, used to target widow and yellowtail rockfish. The exploitation rate was above the target SPR of 50 percent (i.e., $F<F_{MSY}$) until the late 1970s when trawl catches in the target midwater fishery increased to rates beyond the target. This continued until the stock was declared overfished and managed under a rebuilding plan. Harvest declined dramatically and the estimated SPR harvest rates increased rapidly above target F_{MSY}. The increase in biomass during the past decade was the result of reduced catches rather than strong year-classes.

Lower OYs specified in 2005-2010 were not exceeded as the fishery was managed to avoid widow bycatch and the percent of OY attainment decreased with time during that period. The percent attainment of the 2011 IFQ allocation was 40 percent. The at-sea whiting sectors have been better able to avoid widow rockfish in recent years with the lowest bycatch rates (widow catch/whiting catch) observed in the past couple of years.

Management uncertainty is low since widow rockfish is a trawl-dominant species and there is mandatory 100 percent observer coverage in trawl fisheries.

1.1.4.22 Yellowtail Rockfish North of 40º10’ N lat.

Distribution and Life History

Yellowtail rockfish (*Sebastes flavidus*) range from San Diego, California, to Kodiak Island, Alaska (Fraidenburg 1980; Gotshall 1981; Lorz, *et al.* 1983; Love, *et al.* 2002; Miller and Lea 1972; Norton and MacFarlane 1995). The center of yellowtail rockfish abundance is from Oregon to British Columbia (Fraidenburg 1980). Yellowtail rockfish are a common, demersal species abundant over the middle shelf (Carlson and Haight 1972; Fraidenburg 1980; Tagart 1991; Weinberg 1994). Yellowtail rockfish are most common near the bottom, but not on the bottom (Love, *et al.* 2002; Stanley, *et al.* 1994). Yellowtail rockfish adults are considered semi-pelagic (Stanley, *et al.* 1994; Stein, *et al.* 1992) or pelagic, which allows them to range over wider areas than benthic rockfish (Pearcy 1992). Adult yellowtail rockfish occur along steeply sloping shores or above rocky reefs (Love, *et al.* 2002). They can be found above mud with cobble, boulder and rock ridges, and sand habitats; they are not, however, found on mud, mud with boulder, or flat rock (Love, *et al.* 2002; Stein, *et al.* 1992). Yellowtail rockfish form large (sometimes greater than 1,000 fish) schools and can be found alone or in association with other rockfishes (Love, *et al.* 2002; Pearcy 1992; Rosenthal, *et al.* 1982; Stein, *et al.* 1992; Tagart 1991). These schools may persist at the same location for many years (Pearcy 1992).

Yellowtail rockfish are viviparous (Norton and MacFarlane 1995) and mate from October to December. Parturition peaks in February and March and from November to March off California (Westrheim 1975). Young-of-the-year pelagic juveniles often appear in kelp beds beginning in April and live in and around kelp in midwater during the day, descending to the bottom at night (Love, *et al.* 2002; Tagart 1991). Male yellowtail rockfish are 34 cm to 41 cm in length (five years to nine years) at 50 percent maturity, females are 37 cm to 45 cm (six years to ten years) (Tagart 1991). Yellowtail rockfish are long-lived and slow-growing; the oldest recorded individual was 64 years old (Fraidenburg 1980; Tagart 1991). Yellowtail rockfish have a high growth rate relative to other rockfish species (Tagart 1991). They reach a maximum size of about 55 cm in approximately 15 years (Tagart 1991). Yellowtail rockfish feed mainly on pelagic animals, but are opportunistic, occasionally eating benthic animals as well (Lorz, *et al.* 1983). Large juveniles and adults eat fish (small Pacific whiting, Pacific herring, smelt, anchovies, lanternfishes, and others), along with squid, krill, and other planktonic organisms (euphausiids, salps, and pyrosomes) (Love, *et al.* 2002; Phillips 1964; Rosenthal, *et al.* 1982; Tagart 1991).

Stock Status and Management History

Until the late 1990s, yellowtail rockfish were harvested as part of a directed midwater trawl fishery. Yellowtail rockfish are common in both commercial and recreational fisheries throughout its range and commonly occur with canary and widow rockfishes (Cope and Haltuch 2012). Despite historically large removals and its popularity in commercial and recreational fisheries, its association with those highly regulated species has greatly decreased removals over the last decade. From the end of 2002 through 2010, implementation of the RCAs and small landings limits designed to only accommodate incidental bycatch eliminated directed mid-water fishing opportunities for yellowtail rockfish in non-tribal trawl fisheries. A limited opportunity to target yellowtail rockfish in the trawl fishery has been available since 2011 under the trawl rationalization program, yet low quotas for widow rockfish, canary rockfish, and for other constraining stocks has continued to limit mid-water targeting of yellowtail rockfish.

Yellowtail rockfish are currently managed with stock-specific harvest specifications north of 40º10’ N lat. and within the southern Shelf Rockfish complex south of 40º10’ N lat. There has never been an assessment of the southern stock and the OFL contribution of yellowtail rockfish to the southern Shelf Rockfish complex is based on a DB-SRA estimate.

Yellowtail rockfish on the U.S. west coast north of 40º10’ N lat. were assessed in 1984 (Weinberg, *et al.* 1984), 1986 (Coleman 1986), 1988 (Tagart 1988), 1993 (Tagart 1993), 1996 (Tagart and Wallace 1996), and 1997 (Tagart, *et al.* 1997) to determine harvest specifications for the stock. A full assessment in 2000 (Tagart, *et al.* 2000) was the first that estimated stock status with an estimated depletion of 60.5% at the start of 2000. Lai et al. (2003) updated the 2000 assessment and estimated stock depletion was 46% at the start of 2003. Another assessment update was prepared in 2005 (Wallace and Lai 2006) with an estimated depletion of 55% at the start of 2005.

A new data-moderate assessment of yellowtail rockfish north of 40º10’ N lat. was conducted in 2013 (Cope and Dick 2014). The estimated depletion at the start of 2013 was 69% and the spawning biomass was estimated to be 38,168 mt. This was a large biomass increase relative to previous estimates and largely due to low removals in the last 10 years.

Stock Productivity

The posterior median estimate of steepness in the 2013 yellowtail rockfish assessment is 0.79, indicating a relatively productive stock. However, this estimate may not be as informative of relative stock productivity. Due to the low susceptibility of yellowtail rockfish to fisheries removals, the vulnerability to overfishing of yellowtail rockfish is relatively low (V = 1.88), though the productivity of this species is also relatively low (P = 1.33) based on other life history traits, including a longevity to almost 70 years.

Fishing Mortality

Fishing mortality of yellowtail rockfish north of 40º10’ N lat. was relatively high in the 1980s and 1990s with direct targeting by mid-water trawl gear of yellowtail and widow rockfish. The elimination of that fishery in 2003 to reduce impacts on widow rockfish (and canary rockfish to some degree), coupled with RCA implementation, significantly reduced fishing mortality of yellowtail rockfish. The decision table in the 2013 assessment predicts the stock will keep building under the average annual catch estimated in the assessment (1,376 mt) and would remain at a healthy level in the next 10 years (i.e., above B_{MSY}) at catch levels over 4 times that amount.

1.1.5 Groundfish Stock Complexes

There are eight stock complexes for which ACLs were specified through the 2013-2014 management cycle. These complexes are the Nearshore, Shelf, and Slope Rockfish complexes north and south of 40°10’ N lat., the Other Flatfish, and the Other Fish complexes.

Most of the component stocks comprising the stock complexes are unassessed category 3 stocks with OFLs that are determined using data-poor methods such as DBSRA, DCAC, or average historical catch (see Section 1.1.1). In cases where assessments were used to inform OFLs for component stocks managed in stock complexes, the OFLs were projected from those assessments using proxy F_{MSY} harvest rates. A more detailed description of the assessed stocks managed in stock complexes follows.

1.1.5.1 Nearshore Rockfish North and South of 40°10’ N Lat.

The nearshore rockfish complexes north and south of 40º10’ N lat. are comprised of both assessed and unassessed species. Of the stocks managed in the nearshore rockfish complexes, only blue rockfish in California north of Pt. Conception, brown rockfish, China rockfish, copper rockfish, and gopher rockfish in California north of Pt. Conception have been assessed. The following section defines these complexes in terms of their component stocks and provides further detail on those component stocks that have been assessed.

The Nearshore Rockfish complex north of 40°10' N lat. is composed of the following species: black and yellow rockfish (*Sebastes chrysomelas*); blue rockfish (*S. mystinus*); brown rockfish (*S. auriculatus*); calico rockfish (*S. dalli*); China rockfish (*S. nebulosus*); copper rockfish (*S. caurinus*); gopher rockfish (*S. carnatus*); grass rockfish (*S. rastrelliger*); kelp rockfish (*S. atrovirens*); olive rockfish (*S. serranoides*); quillback rockfish (*S. maliger*); and treefish (*S. serriceps*). These stocks are all unassessed with the exception of brown rockfish, blue rockfish in California, China rockfish, and copper rockfish.

The Nearshore Rockfish complex south of 40°10' N lat. is further subdivided into the following management categories: 1) shallow nearshore rockfish [comprised of black and yellow rockfish (*Sebastes chrysomelas*), China rockfish (*S. nebulosus*), gopher rockfish (*S. carnatus*), grass rockfish (*S. rastrelliger*), and kelp rockfish (*S. atrovirens*)], and 2) deeper nearshore rockfish [comprised of black rockfish (*S. melanops*), blue rockfish (*S. mystinus*), brown rockfish (*S. auriculatus*), calico rockfish (*S. dalli*), copper rockfish (*S. caurinus*), olive rockfish (*S. serranoides*), quillback rockfish (*S. maliger*), and treefish (*S. serriceps*)]. With the exception of the blue rockfish stock occurring in waters off California north of Point Conception (i.e., 34°27' N lat. to 40°10' N lat.) and gopher rockfish north of Point Conception (34°27' N lat.), all of the Nearshore Rockfish South stocks are unassessed. The blue rockfish stock was estimated to be at 29.7 percent of its unfished biomass in 2007; therefore, the stock is considered to be in the precautionary zone. Spawning biomass depletion of gopher rockfish north of Point Conception was estimated to be at 97 percent of its unfished biomass in 2005.

Blue Rockfish in California

Distribution and Life History

Blue rockfish (*Sebastes mystinus*) range from the Gulf of Alaska to northern Baja California, although they are most commonly found between Oregon and central California (Love, *et al.* 2002). They inhabit kelp forests and rocky reefs in relatively shallow depths usually to about 90 meters (50 fm) (Miller and Lea 1972; Reilly 2001), but have been landed as deep as 549 meters (300 fm) (Love, *et al.* 2002). Blue rockfish are residential, with their movements restricted to a small area, usually near the kelp canopy or pinnacles for shelter and spatial orientation (Jorgensen, *et al.* 2006; Lea, *et al.* 1999; Miller and Geibel 1973). Genetic evidence suggests distinct subpopulations of blue rockfish with a biogeographic barrier at Cape Mendocino, California (Cope 2004). More recently, evidence suggests the presence of two genetically distinct cryptic species in central California (Burford, *et al.* 2011).

Blue rockfish are primarily "selective opportunity" planktivores (Gotshall, *et al.* 1965; Love and Ebeling 1978). As juveniles, they feed on planktonic crustacea, hydroids, and algae (Miller and Geibel 1973). Adults also consume fish, squid, tunicates, scyphozoids, bull kelp nori, and pelagic gastropods (Hobson, *et al.* 1996; Lea, *et al.* 1999; Love, *et al.* 2002). Many of these prey items are made available from the relaxation of upwelling or southerly winds, explaining high blue rockfish numbers in the summer off central and northern California, where these conditions are well developed (Hobson and Chess 1988; Love, *et al.* 2002). Due to their great abundance in kelp forests, blue rockfish juveniles are recognized as a key species in the piscivore trophic web of these ecosystems (Hallacher and Roberts 1985).

Stock Status and Management History

The blue rockfish stock in California waters north of Pt. Conception was assessed in 2007 and the stock's depletion was estimated to be 29.7% of its unfished spawning output at the start of 2007 (Key, *et al.* 2008). Blue rockfish were not a highly sought species historically, but an increase in catches in the 1970s resulted in a continuous decline in spawning biomass through the early 1990s. The abundance of blue rockfish was at the management target (SB40%) in 1980 and at the overfished threshold in 1982., Spawning biomass reached a minimum (10% of unexploited) in 1994 and 1995; however, there has been a constant increase since then.

During the 2009 and 2010 biennial specifications process, the Council contemplated removing blue rockfish from the Nearshore Rockfish complexes. Blue rockfish was managed within the Nearshore Rockfish complexes because of scientific uncertainty and management needs, given the interaction of blue rockfish with other nearshore species. When blue rockfish occur offshore they can be targeted separately from other nearshore rockfish, but those that occur inshore mix with other nearshore rockfish stocks. Blue rockfish are managed under the California nearshore management plan which has mandatory sorting requirements for landed catch. Landings are routinely tracked and monitored, thereby reducing management uncertainty. For more efficient state management, blue rockfish remains a component stock within the Nearshore Rockfish complexes. The OFL contribution of blue rockfish is projected from the 2007 assessment using the proxy $F_{50\%}$ F_{MSY} harvest rate and apportioning 87.3 percent of the OFL based on average catches of the assessed stock south of 40°10' N lat. (Key, *et al.* 2008). The OFL contribution of blue rockfish south of 34º27' N lat. is based on DCAC. The assessed portion of the blue rockfish stock is categorized as a category 2 stock, and the unassessed portion south of 34º27' N lat. is categorized as a category 3 stock. The Council has implemented precautionary management of the California population of blue rockfish since 2009 by setting a harvest guideline for California fisheries based on the sum of the 40-10 adjusted ACL contribution north of Pt. Conception and the ABC contribution south of Pt. Conception. This HG has not been exceeded since then.

Stock Productivity

A Beverton-Holt steepness of 0.58 was assumed in the 2007 blue rockfish assessment based on the median steepness in the rockfish meta-analysis done at that point in time. The GMT's PSA analysis indicates a relatively high vulnerability to potential overfishing (V = 2.01) due partly to a relatively low relative productivity (P = 1.22) (Table 2).

Recruitment is variable and highly uncertain for blue rockfish. There was little information other than the pre-recruitment index in the recent years to inform the 2007 assessment model about recruitments. Recruitment appeared to be high in the 1960s, and more recently strong year classes appeared in 1993 and 1998. The late 1970s showed all time low recruitment, with 2006 among the 3 lowest recruitment years estimated.

Fishing Mortality

Blue rockfish have been an important part of the recreational fishery in California since the late 1950s (Mason 1998; Reilly, *et al.* 1993; Wilson-Vandenberg, *et al.* 1996). Commonly taken by Commercial Passenger Fishing Vessels (CPFVs, aka partyboats), skiffs, and divers, it is among the most frequently caught species north of Point Conception (Karpov, *et al.* 1995). However, since the mid-1980s the California recreational catch has declined significantly, especially in the south. This may be a result of overfishing from the more heavily populated southern coast (Love, *et al.* 1998), where there is more angling opportunity due to more favorable access and ocean conditions (Bennett, *et al.* 2004); poor recruitment resulting from a long-term shift away from preferred cold, productive waters (Jarvis, *et al.*

2004; Love, *et al.* 2002); or the effect of increasingly strict fishing regulations. Fishing mortality exceeded current target levels from the mid 1970s through the late 1990s, but has been close to target levels since 2000.

The California blue rockfish catch has played a relatively minor role in the commercial fishery compared to the recreational fishery. This has remained true, even with the advent of the live-fish fishery in the late 1980s, although the contribution of blue rockfish has been increasing in recent years. Since the preferred dinner plate-sized catch for this fishery results in immature fish being targeted in many cases, there is concern over the potential implications of the increasing effort in this fishery. Selection of younger, smaller individuals has led to lower lifetime egg production and consequently, threatened population viability (O'Farrell and Botsford 2005; O'Farrell and Botsford 2006).

Brown Rockfish

Distribution and Life History

Brown rockfish (*Sebastes auriculatus*) are distributed from Prince William Sound to southern Baja California in Mexico, but are most abundant on the U.S. west coast south of Bodega Bay, California (Love, *et al.* 2002). They occur from very shallow inshore waters out to 135 m (74 fm). Brown rockfish are a sedentary rockfish found in shallow water and bays (Eschmeyer, *et al.* 1983), among sheltering weed-covered rocks or around pilings (Lamb and Edgell 1986). Brown rockfish show distinct genetic differentiation by distance in coastal populations off California (Buonaccoursi, *et al.* 2005), though no distinct break is obvious to define substocks. Life history information is not spatially resolved. While coastwide populations may be subject to localized depletion because of reef-specific associations and small home ranges, no subpopulations have been distinguished.

Brown rockfish have been aged to 34 years (Love, *et al.* 2002).

Stock Status and Management History

Brown rockfish are managed in the northern and southern Nearshore Rockfish complexes. A single coastwide data-moderate assessment of brown rockfish was conducted in 2013 (Cope, *et al.* 2014). The assessment estimated the brown rockfish stock to be healthy with a depletion of 42% of its unfished biomass at the start of 2013. The brown rockfish assessment used a CPUE index of the California recreational fisheries derived from dockside intercept surveys during 1980-2003 and an observer-based recreational CPUE index from California Party Fishing Vessels (CPFV; i.e., charter boats) during 1999-2011 as indices of abundance. No indices were constructed for north of 40º10’ N lat. since this is a rare species north of Cape Mendocino. While coastwide landings were used in the assessment, only about 1% of the cumulative coastwide landings of brown rockfish were from fisheries north of 40º10’ N lat. It was assumed that the population in the north followed the same trends as the southern population.

Stock Productivity

Brown rockfish has a notably elevated vulnerability to overfishing (V = 1.99) but a relatively high productivity score for a rockfish (P = 1.72) in the GMT’s PSA analysis (Table 2).

Fishing Mortality

China Rockfish

Distribution and Life History

China rockfish (*Sebastes nebulosus*) range from Kachemak Bay in the Gulf of Alaska to Redondo Beach and Nicholas Island in the Southern California Bight but are most abundant from Prince William Sound to northern California (Love, *et al.* 2002). They occur primarily in nearshore and shelf waters in depths ranging from 3 to 128 m. Chinas are a solitary species associated with high relief habitats, especially boulder fields with many crevices. They are territorial and a study off Vancouver Island indicates that individuals are likely to move 10 m or less within their territories.

China rockfish are long-lived with the oldest age reported at 79 years (Love, *et al.* 2002). Males and females mature at about the same size and age with some fish mature at 26 cm and all fish mature at 30 cm. The maximum size is reported to be 45 cm. Larval release occurs off California from January to June peaking in January. Larvae are released later in the season in the Gulf of Alaska during April to August with peak release in May.

Chinas prey on benthic organisms including brittle stars, crabs, shrimps, chitons, and small fishes. Nudribranchs, octopi, snails, and red abalone were observed prey for China rockfish off central and northern California.

Stock Status and Management History

China rockfish are managed in the northern and southern Nearshore Rockfish complexes. Separate data-moderate assessments of China rockfish north and south of 40º10’ N lat.[6] were conducted in 2013 (Cope, *et al.* 2014). The China rockfish population south of 40º10’ N lat. was estimated to be healthy with a depletion of 66% of its unfished biomass at the start of 2013. However, the population north of 40º10’ N lat. was estimated to be more depleted and in the precautionary zone with a depletion ratio of 37% at the start of 2013. The southern China rockfish assessment used a CPUE index of the California recreational fisheries derived from dockside intercept surveys during 1980-2003, as well as an observer-based recreational CPUE index from CPFVs during 1999-2011 as indices of abundance. The northern China rockfish assessment used a CPUE index of the Oregon and northern California recreational fisheries derived from dockside intercept surveys during 1980-2003 and an Oregon onboard charter boat index during 2001-2012 as indices of abundance and assumed the population off Washington followed the same trends.

The Council decided to continue to manage China rockfish in the Nearshore Rockfish complexes in 2015-2016. The Council expressed interest in conducting a full assessment of China rockfish with greater focus on modeling state-specific indices of abundance. There was also the suggestion of exploring an Oregon nearshore commercial index which can be theoretically constructed given Oregon’s logbook program (an effort metric can be derived from logbook data). Available age and length composition data may also help inform some of the China rockfish dynamics.

[6] Separate China rockfish data-moderate assessments were also conducted north and south of the California-Oregon border at 42º N lat. at the Council’s request. The SSC recommended the Council’s choice of a management line for China rockfish should dictate which assessments should be used to set harvest specifications. The Council’s decision to continue to manage the stock within the Nearshore Rockfish complexes north and south of 40º10’ N lat. in 2015 and beyond rendered the second set of assessments stratified at 42º N lat. moot.

Stock Productivity

The productivity score for China rockfish is relatively low (P = 1.33) and there is a major vulnerability to potential overfishing (V = 2.23).

Fishing Mortality

China rockfish are an important species in the nearshore recreational and commercial fisheries on the west coast. They are particularly valuable in the commercial live-fish fishery where their unique coloration and high quality flesh commands the highest prices for rockfish delivered as a live product on the west coast. California and Oregon allow nearshore commercial fisheries while Washington does not.

Fishing mortality of China rockfish south of 40º10' N lat. has been well below the F_{MSY} harvest rate. The XDB-SRA base model estimates that median MSY for southern China rockfish is 32 mt per year (Table 6), and the fishing mortality rate in 2012 was 28% of F_{MSY}. However, that is not the case for the population north 40º10' N lat. The XDB-SRA base model estimates that median MSY for northern China rockfish is 9 mt per year, and the fishing mortality rate in 2012 was 191% of F_{MSY}. Figure 24 depicts total estimated catch of China rockfish north of 40º10' N lat. relative to the 2015 OFL and ACL contributions to the complex. The cumulative 2004-2012 total estimated catch of China rockfish north of 40º10' N lat. was 191% and 221% of the cumulative 2015 OFL and ACL contributions, respectively. Maintaining these catch levels is predicted to lead to continued stock decline.

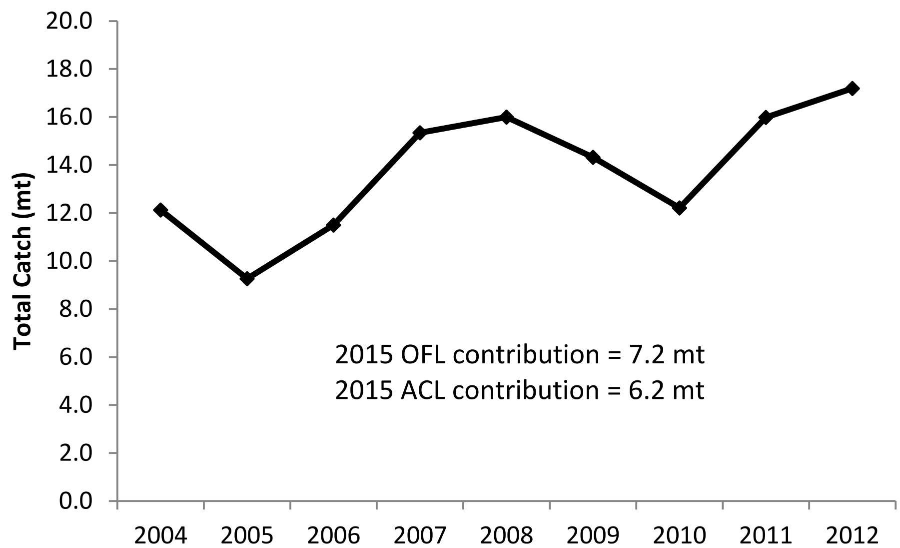

Figure 24. Estimated total catch of China rockfish north of 40º10' N lat. in 2004-2012 relative to the preferred 2015 OFL contribution and ACL contribution.

Copper Rockfish

Distribution and Life History

Copper rockfish (*Sebastes caurinus*) are a deep bodied and spiny rockfish that range from Kachemak Bay in the Gulf of Alaska to Isla San Benito in central Baja California and are common from Port Valdez, Alaska to northern Baja California (Love, *et al.* 2002). They range in depth from the subtidal zone to 183 m. Subadult and adult copper rockfish are found primarily in boulder fields and over high relief rocks, although they also inhabit low relief rock substrata. They perch on the substrata or hover a few meters above the bottom in aggregations and as solitary individuals (Love, *et al.* 2002). Depending on the habitat and the geographic location, coppers are often found with vermilion, brown, black, dusky, silvergray, yelloweye, quillback, or tiger rockfishes. Coppers have small home ranges in high relief habitats (<10 m^2) and large home ranges in low relief habitats (<4,000 m^2).

Stock Status and Management History

Copper rockfish are managed in the northern and southern Nearshore Rockfish complexes. Separate data-moderate assessments of copper rockfish north and south of 34º27' N lat. were conducted in 2013 (Cope, *et al.* 2014). Both copper rockfish populations were estimated to be healthy with depletions of 76% and 48% of unfished biomass at the start of 2013 in the southern and northern populations, respectively. The southern copper rockfish assessment used a CPUE index of the California recreational fisheries derived from dockside intercept surveys during 1980-2003, as well as an observer-based recreational CPUE index from CPFVs during 1999-2011 as indices of abundance. The northern copper rockfish assessment used the same CPUE indices as in the southern model with the addition of an Oregon onboard charter boat index during 2001-2012 as indices of abundance and assumed the population off Washington followed the same trends.

Stock Productivity

Fishing Mortality

Gopher Rockfish

Distribution and Life History

Gopher rockfish (*Sebastes carnatus*) range from Eureka, California, to San Roque, central Baja California (Miller and Lea 1972), but are most common from Mendocino County to Santa Monica Bay, California (Love 1996). Gopher rockfish is a residential and demersal species, associated with kelp beds or rocky reefs, from the intertidal to about 264 ft (80 m), most commonly between 30 and 120 ft (9-37 m) (Eschmeyer, *et al.* 1983; Love 1996; Love, *et al.* 2002). One tagging study off central California (Lea, *et al.* 1999) revealed that gopher rockfish exhibit minor patterns of movement (<1.5 nm, 2.8 km) with all fish being recaptured on the same reef system where they were tagged. Another study, conducted by Matthews (1986), reported movements up to 1.2 km (0.65 nm) by gopher rockfish that traveled from a low-relief natural reef to a high-relief artificial reef. The change in substrate type may have been a factor in the movement in the Matthews study.

Gopher rockfish settle out of the plankton as large larvae (2 cm. or less in length) primarily in the canopies of giant and bull kelp (*Macrocystis pyrifera* and *Nereocystis luetkeana*, respectively) where they remain close to the fronds (Love, *et al.* 2002). Settlement occurs primarily in June and July. With growth, older individuals move down the kelp stipes to the bottom where they take up residence in rocks and crevices. They are largely territorial with home ranges of 10-12 m^2 (Love, *et al.* 2002).

Gopher rockfish are closely related to black-and-yellow rockfish (*Sebastes chrysomelas*) and kelp rockfish (*Sebastes atrovirens*). Gopher and black-and-yellow rockfish are distinct morphologically by color and inhabit different depth ranges (gopher have a deeper depth range), but cannot be distinguished genetically (Love, *et al*. 2002). This presents an interesting phenomenon in how speciation in rockfish may occur. There are theories that interbreeding may be lessened by individuals only breeding with others of the same color. If it is determined the two species are actually one, then the name *S. carnatus* will prevail since it was described first (Love, *et al.* 2002).

Stock Status and Management History

Gopher rockfish was assessed for the first time in 2005 and estimated stock depletion under the base model was 97% of its unfished biomass at the start of 2005 (Key*, et al.* 2006). Although the distribution of gopher rockfish extends south into the Southern California Bight, the assessment was restricted to the stock north of Point Conception. The assessment is based on landings and length composition data from commercial and recreational fisheries (primarily hook and line gear) and an index of relative abundance (CPUE) from the CPFV Sportfish Survey database. These data sources were used to estimate population trends from 1965 to 2004. There are no fishery-independent indices of stock biomass for gopher rockfish. Assessment results indicate an upward trend in gopher rockfish biomass since the 1980s and estimates of 2005 abundance ranged between 60 percent and 110 percent of average unfished stock size; this range of depletion levels is the result of alternative emphases in the model given to the CPFV in the CPUE index, a data element identified as a major source of uncertainty.

During the 2007-2008 biennial specifications process, the Council decided to continue managing gopher rockfish within the Nearshore Rockfish South complex since there was adequate resource protection under the California nearshore management plan and managing gopher rockfish with stock-specific harvest specifications could disrupt that plan. The OFL contribution of gopher rockfish north of 34º27' N lat. is projected from the 2005 assessment (Key*, et al.* 2006) using the proxy $F_{50\%}$ F_{MSY} harvest rate. The OFL contribution of gopher rockfish south of 34º27' N lat. is based on DCAC. The assessed portion of the gopher rockfish stock is categorized as a category 1 stock and the unassessed portion south of 34º27' N lat. is categorized as a category 3 stock.

Stock Productivity

Recruitments were modeled in the 2005 assessment assuming a Beverton-Holt relationship, with steepness fixed at h=0.65 and recruitment variability fixed at sigma r = 0.5. Recruitment deviations were estimated for the period 1965-2000. This stock showed evidence of weak recruitment in the 1970s, with peaks in the mid-1980s and mid-1990s. Recruitment estimates in the 1970s are not reliable since length information was not available until the 1980s. Overall, recruitment has been variable throughout the entire time series.

The PSA productivity score of 1.56 for gopher rockfish indicates a moderate relative productivity among rockfish species. There is a relatively low vulnerability of potential overfishing (V = 1.76) for the stock.

Fishing Mortality

Gopher rockfish have been a minor component of the commercial and recreational rockfish fishery since at least the late 1960s. In 1980, an estimated 63 mt of gopher rockfish were landed commercially north of Point Conception, with a decrease in landings in the mid-1980s. Landings then began to increase, with a peak in the fishery occurring in 1992 when approximately 74 mt were landed. Since then, landings have slightly decreased over time. Lower recent landings in 2003 and 2004 (13 and 15 mt, respectively) are in part due to more restrictive federal limits placed on rockfishes. Hook-and-line gears have been the dominant gear type used during the 1969 to 2004 period accounting for 98% of commercial landings.

The recreational gopher rockfish fishery for California ports north of Point Conception peaked during a five-year period in the early 1990s, with 2001 and 2003 also being productive years. Since 1983, anglers caught the greatest proportion of gopher rockfish from private and rental boats (71%), followed next by party and charter boats (27%). However, in more recent years (1997 to 2004) these proportions have changed, with the private and rental boats taking 59% of gopher rockfish in the recreational fishery and 41% by the party and charter boats. Also since 1983, gopher rockfish have ranked 25th in northern California recreational fishery landings, accounting for approximately 1% of the total harvest for all recreationally caught fishes. However, gopher rockfish made up approximately 50% of the estimated take of the shallow nearshore rockfishes and 6% of all nearshore rockfish species combined. Additionally, recent catches have been influenced by size and bag limits.

Starting in the late 1980s the premium quality live- fish market developed (Larson and Wilson-Vandenberg 2001). Currently, nearly all gopher rockfish are landed in this condition due to a more lucrative high-demand market. As a result of the increasing demand for live- fish the average price per pound has risen steadily from a low of less than $2.00/lb at the inception of the live- fish market to approximately $6.15/lb in 2004 (unadjusted for inflation).

Recent exploitation rates are estimated to have been well below the F_{MSY} proxy for rockfish.

1.1.5.2 Shelf Rockfish North and South of 40°10’ N Lat.

The shelf rockfish complexes north and south of 40º10’ N lat. are comprised of both assessed and unassessed species. Of the stocks managed in the shelf rockfish complexes, chilipepper rockfish north of 40º10’ N lat. (the assessment for the northern stock only covers the area from 40º10’ N lat. to Cape Blanco, OR at 43º N lat. – see section 1.1.4.7 for more details), greenspotted rockfish, greenstriped rockfish, and stripetail rockfish have been assessed. The following section defines these complexes in terms of their component stocks and provides further detail on those component stocks that have been assessed.

The Shelf Rockfish complex north of 40°10' N lat. is comprised of the following species: bronzespotted rockfish (*Sebastes gilli*); bocaccio (*Sebastes paucispinis*); chameleon rockfish (*S. phillipsi*); cowcod (*S. levis*); dusky rockfish (*S. ciliatus*); dwarf-red rockfish (*S. rufianus*); flag rockfish (*S. rubrivinctus*); freckled rockfish (*S. lentiginosus*); greenblotched rockfish (*S. rosenblatti*); greenspotted rockfish (*S. chlorostictus*); greenstriped rockfish (*S. elongatus*); halfbanded rockfish (*S. semicinctus*); harlequin rockfish (*S. variegatus*); honeycomb rockfish (*S. umbrosus*); Mexican rockfish (*S. macdonaldi*); pink rockfish (*S. eos*); pinkrose rockfish (*S. simulator*); pygmy rockfish (*S. wilsoni*); redstripe rockfish (*S. proriger*); rosethorn rockfish (*S. helvomaculatus*); rosy rockfish (*S. rosaceus*); silvergray rockfish (*S. brevispinis*); speckled rockfish (*S. ovalis*); squarespot rockfish (*S. hopkinsi*); starry rockfish (*S. constellatus*); stripetail rockfish (*S. saxicola*); swordspine rockfish (*S. ensifer*); tiger rockfish (*S. nigrocinctus*); and vermilion rockfish (*S. miniatus*).

The Shelf Rockfish complex south of 40°10’ N lat. is composed of the following species: bronzespotted rockfish (*Sebastes gilli*); chameleon rockfish (*S. phillipsi*); dusky rockfish (*S. ciliatus*); dwarf-red rockfish (*S. rufianus*); flag rockfish (*S. rubrivinctus*); freckled rockfish (*S. lentiginosus*); greenblotched rockfish (*S. rosenblatti*); greenspotted rockfish (*S. chlorostictus*); greenstriped rockfish (*S. elongatus*); halfbanded rockfish (*S. semicinctus*); harlequin rockfish (*S. variegatus*); honeycomb rockfish (*S. umbrosus*); Mexican rockfish (*S. macdonaldi*); pink rockfish (*S. eos*); pinkrose rockfish (*S. simulator*); pygmy rockfish (*S. wilsoni*); redstripe rockfish (*S. proriger*); rosethorn rockfish (*S. helvomaculatus*); rosy rockfish (*S. rosaceus*); silvergray rockfish (*S. brevispinis*); speckled rockfish (*S. ovalis*); squarespot rockfish (*S. hopkinsi*); starry rockfish (*S. constellatus*); stripetail rockfish (*S. saxicola*); swordspine rockfish (*S. ensifer*); tiger rockfish (*S. nigrocinctus*); vermilion rockfish (*S. miniatus*); and yellowtail rockfish (*S. flavidus*).

Greenspotted Rockfish

Distribution and Life History

Greenspotted rockfish (*Sebastes chlorostictus*) are found in waters off the west coast of North America, ranging from Copalis Head, Washington to Isla Cedros, Baja California (approximately 25º to 47º N lat.). Abundance of this species is greatest from northern Baja California to Mendocino County in California. Greenspotted rockfish associate with several benthic habitat types between depths of 30-363 m, although adults are most common between 60 and 240 m (Love, *et al.* 2002).

Greenspotted rockfish are a long-lived and slow growing species, with sedentary adults associating with a wide variety of benthic habitats. Maximum reported age is 51 years (Benet, *et al.* 2009). Estimates of maximum length for greenspotted rockfish are in the vicinity of 50 cm. Benet et al. (2009) report maximum fork length as 48 cm for central California. Miller and Gotshall (1965) report 51 cm total length for the same area, but did not attempt to distinguish between greenspotted rockfish and pink rockfish (*Sebastes eos*), which grow to 56 cm (Love, *et al.* 2002). Commercial port samplers in California have reported individuals larger than 50 cm fork length (up to 57 cm), although fish of this size appear to be rare (CALCOM, 2011). In southern California, Love et al. (1990) report maximum length as 50 cm total length. Sexual dimorphism is not apparent in greenspotted rockfish (Benet, *et al.* 2009; Lenarz and Wyllie Echeverria 1991; Mason 1998), although latitudinal differences in weight-at-length, length-at-age, and size-at-maturity have been observed.

Seasonal maturation and size at maturity vary with latitude, a trend commonly seen in rockfishes (Benet, *et al.* 2009; Love, *et al.* 1990). In central and northern California, spawning months have been reported from March to September, with peak parturition from April to June (Benet, *et al.* 2009; Wyllie Echeverria 1987). In southern California spawning months begin in February and extend through July, with peak parturition in April (Love, *et al.* 1990). Benet et al. (2009) estimate length at 50% maturity for female greenspotted as 26 cm, consistent with a previous estimate of 27 cm (Wyllie Echeverria 1987) based on females from the same area. In southern California, Love et al. (1990) report length at 50% maturity as 22 cm (converted to fork length from total length). Love et al. (1990) detected evidence of multiple broods in females from southern California (ovaries containing eyed larvae and large numbers of fertilized or unfertilized eggs). No evidence of multiple broods was found in studies of greenspotted rockfish north of Point Conception (Benet, *et al.* 2009; Wyllie Echeverria 1987).

Several studies have reported on habitat associations for greenspotted rockfish. Yoklavich et al. (2000) quantified deep, rocky habitat in Monterey Bay. They observed smaller greenspotted rockfish in shallow depths (75-174 m), and reported strong associations with heterogeneous habitats (cobble-mud, mud-boulder, rock-mud, and rock-ridge). Laidig et al. (2009) studied habitat associations of demersal fishes from a manned submersible in central California, observing 809 greenspotted rockfish. They mainly encountered immature individuals (86% of greenspotted were <25 cm), identifying positive associations with all habitat types (boulder, brachiopod beds, cobble) other than mud. The predominance of juvenile rockfish in the study area suggests that the areas and depths surveyed may be nursery grounds for juvenile rockfish and/or transitional zones as individuals move toward adult habitats (Laidig, *et al.* 2009). Juvenile greenspotted rockfish are commonly seen in traps targeting spot prawn in Monterey Bay, usually in low-relief habitats (Dick, *et al.* 2011).

Adult greenspotted rockfish are generally sedentary, and associate with a wide range of habitat types. Yoklavich et al. (2000) observed 426 greenspotted rockfish (fourth highest abundance of observed species) in Monterey Bay, noting that adults were common near rocky outcrops, ridges, caves, and overhangs. Anderson et al. (2009) described greenspotted rockfish as characteristic of transition zones between hard and soft sediments, based on in situ observations across Cordell Bank in central California.

They classified habitat for greenspotted rockfish over a range of spatial scales. At the finest scale (1-10s of m), greenspotted were found to have weak associations with four of five possible categories: mud, boulders, cobbles, and rock (sand being the fifth category). At intermediate scales (10-100s of m) Anderson et al. (2009) characterized greenspotted habitat as depths between 100-300 m and soft and mixed sediment types.

Movements of greenspotted rockfish have been monitored using acoustic tagging experiments. Starr et al. (2002) implanted acoustic tags in six adults in Monterey Bay, finding that adults exhibit limited horizontal movement and almost no vertical movement. They also identified two movement patterns. In the first pattern, 94% of time was spent within a 0.58 km2 area. The second pattern involved larger movements, with excursions up to 3 km, but 60% of time was spent within the 1.6 km^2 study area. Lowe et al. (2009) monitored 4 adult greenspotted rockfish near oil platforms in southern California using acoustic tags. Probabilities of detection near the release sites dropped by 14% in one year of monitoring. Two individuals returned to their release sites after a 7-month absence.

Williams and Ralston (2002) studied the distribution and co-occurrence of rockfishes over continental shelf and slope habitats using fishery-independent trawl survey data. Greenspotted rockfish were consistently caught (>80% co-occurrence) with bocaccio, chilipepper, stripetail (*S. saxicola*), and shortbelly rockfish. Williams and Ralston (2002) proposed species assemblages for management purposes, including greenspotted in a "southern shelf" assemblage along with bocaccio, chilipepper, shortbelly, stripetail, greenstriped, and cowcod. Since greenspotted rockfish is not a primary target of commercial fisheries, its association with other desirable shelf rockfish species (e.g., bocaccio and chilipepper) is likely a driving force behind historical exploitation of this species.

Molecular systematic studies (Hyde and Vetter 2007) report that greenspotted rockfish are closely related to pink rockfish and greenblotched rockfish (*S. rosenblatti*). Greenspotted rockfish can be distinguished from pink and greenblotched rockfishes by a smooth lower jaw, lacking scales found on the lower mandibles of the other two species (Love, *et al.* 2002).

Stock Status and Management History

The 2011 greenspotted rockfish assessment conducted for the portion of the stock off California was modeled as two area assessments north and south of Point Conception at 34º27' N lat. The assessment indicates the stock is in the precautionary zone with spawning biomass depletions of 30.6 percent and 37.4 percent for the stocks north and south of Point Conception, respectively. The stocks have shown substantial biomass increases since implementation of the RCAs in 2003. Shelf rockfish are particularly well protected by the RCAs, and greenspotted rockfish catches have been negligible since 2003. The Council recommended continuing to manage greenspotted rockfish within the Shelf Rockfish complexes since catch histories were too uncertain to allocate QS in the IFQ fishery. The OFL contribution of greenspotted rockfish to the Shelf Rockfish North complex was based on apportioning 22.2 percent of the projected OFLs from the assessment for the stock north of Point Conception, which is the average estimated catch proportion in the assessment for the stock occurring in the area between 40°10' N lat. and the California-Oregon border at 42° N lat. The OFL contribution for the portion of the stock occurring north of 42° N lat. was derived using DBSRA. The SSC categorized the assessed portion of the stock as a category 2 stock since recruitments were not estimated. The unassessed portion of the stock was categorized as a category 3 stock.

Stock Productivity

Length and age composition data available for the 2011 greenspotted rockfish assessment contained insufficient information to reliably resolve year-class strength. Both base models assumed that recruitment followed a deterministic Beverton-Holt stock-recruitment relationship, so trends in recruitment reflected trends in estimated spawning output.

While the productivity score for greenspotted rockfish is relatively low (P = 1.39), the susceptibility score is sufficiently low to estimate a medium vulnerability to potential overfishing (V = 1.98).

Fishing Mortality

Greenspotted rockfish are not usually a primary target of commercial or recreational fisheries. Regulations affecting this species are typically intended to alter fishing mortality of primary targets and/or overfished species. For example, implementation of RCAs statewide and CCAs in southern California has greatly reduced fishing mortality for greenspotted rockfish in the past decade.

Historical harvest rates for greenspotted rockfish peaked in the mid-1980s in southern California, but continued to rise in northern California until about a decade later. SPR harvest rates exceeded the current proxy MSY value in northern California from 1973-2000, and from 1969-1998 in southern California. Biomass in both regions is currently below target (<40% unfished spawning output), but above the MSST, and equilibrium SPR harvest rates have been below the proxy MSY level since 2001 in the north and since 1999 in the south.

Greenstriped Rockfish

Distribution and Life History

Greenstriped rockfish (*Sebastes elongatus*) can be found in abundance from British Columbia to Northern Baja California, but range from Chirikof Island in the Aleutian Islands (Gulf of Alaska) to central Baja California (Love, *et al.* 2002). Adults may inhabit depths between 12 and 500 meters, but are more commonly found between 100 and 250 m, and adults typically move to deeper water as they mature (Love, *et al.* 2002; Shaw and Gunderson 2006). This species of rockfish is found with other congeners or alone in a wide range of habitats, which include rocky outcroppings. However, unlike most other species of rockfish they seem to prefer mud or sand bottoms (Love, *et al.* 2002; Shaw and Gunderson 2006).

A genetic study of greenstriped rockfish was recently undertaken by Jon Hess (pers. comm., NWFSC, NOAA as cited in by Hicks et al. (2009)) to study the stock structure of greenstriped rockfish. The genetic variability was remarkably low and showed less variability than most other rockfish species, even when including samples from Puget Sound. However, latitudinal differences in life-history traits have been observed.

Typical of other species of the genus *Sebastes*, greenstriped rockfish are long-lived with maximum observed ages greater than 50 years (Love, *et al.* 2002). Females grow larger than males, but typically mature at about the same length, between 18 and 24 cm, which corresponds to an age between 7 and 10 years. A latitudinal cline in maturity has been observed with fish maturing at a smaller size in the southern areas (Wyllie Echeverria 1987).

Greenstriped rockfish give birth to live young and the fecundity of a 0.5 kilogram female is on average around 200,000 eggs (Dick 2009), although a wide range of fecundity has been reported (Love, *et al.* 2002). The reproductive development of males and females is slightly offset with mating occurring in December through February, fertilization occurring in early spring, and parturition occurring about a month later in late spring (Shaw and Gunderson 2006). Females have the ability to store sperm during the time between copulation and fertilization to ensure the availability of spermatozoa when oocyte maturation has occurred (Shaw and Gunderson 2006). However, in southern latitudes, parturition may occur from January to July and females in Southern California may release two broods during this time (Love, *et al.* 2002). Juveniles settle to the bottom at about 3 cm in length in autumn and are commonly found along the interface of fine sand and clay. Maturing adults typically move to deeper water (Love, *et al.* 2002).

A wide range of prey items make up the diet of greenstriped rockfish. They will feed from the water column or the bottom on such things as fish, krill, shrimps, copepods, amphipods, and squid. Other fish species may prey on greenstriped rockfish. They have been found in the stomachs of king salmon (Love, *et al.* 2002). Reefs with small numbers of piscivorous rockfish had much higher numbers of small rockfish, such as greenstriped rockfish, than reefs with high numbers of piscivorous rockfish (PFMC 2006).

Stock Status and Management History

Greenstriped rockfish are a bycatch species with little market value mainly due to its small size, and it has been reported that fillets from this species have a short shelf life (Love, *et al.* 2002). As a result, there has not been a long-term directed fishery for this species. However, greenstriped rockfish are often observed in landings from various fisheries, although in small proportions. The most common occurrence of greenstriped rockfish is in trawl fisheries, but they are often caught in recreational fisheries, especially when fishing vessels drift off of the rocks.

After many attempts to start trawl fisheries off the west coast of the United States in the late 1800s, the availability of the otter trawl and the diesel engine in the mid-1920s helped the trawl fisheries expand (Douglas 1998). The trawl fisheries really became established during World War II when demand increased for shark livers and bottomfish. A mink food fishery also developed during World War II (Jones and Harry 1960). Foreign fleets began fishing for rockfish in the mid 1960s until the EEZ was implemented in 1977 (Rogers 2003b). Since 1977, landings of rockfish were high until management restrictions were implemented in 2000.

Greenstriped rockfish are often caught in bottom trawls, but a long-term directed fishery has not occurred for this species and historical discarding rates are not well known. There have been many reports of greenstriped rockfish occurring in various fisheries, even as early as 1884 (Goode 1884). Fishermen report that greenstriped rockfish are ubiquitous, but are rarely if ever caught in great numbers.

A coastwide assessment of greenstriped rockfish was done in 2009, which indicated stock depletion was at 81% of its unfished biomass at the start of 2009 (Hicks, *et al.* 2009). The coastwide greenstriped harvest specifications were apportioned beginning in 2011 using the mean of the 2003-2008 swept area biomass estimates north of 40°10’ N lat. (84.5 percent) from the NMFS trawl survey. This stock has continued to be managed within the Shelf Rockfish complexes due to the complications associated with managing this species with IFQs. Species pulled out of a complex managed with IFQs must be converted into an IFQ management unit under the Amendment 20 rules. Greenstriped rockfish is a trawl-dominant bycatch species that is rarely landed due to their diminutive size and low market desirability. An initial allocation of quota share for greenstriped would be less than straightforward given the unreliable catch history. The SSC rated the greenstriped stock as category 2 on the basis of the very uncertain catch history in the 2009 assessment that prevented the estimation of discrete year classes.

Stock Productivity

Recruitment deviations were estimated in the 2009 assessment starting in 1970. The estimates showed that recruitment was highly variable for greenstriped rockfish with high values in 1971, 1984, 1993, and 1998, and low estimates of recruitment in the 1990s, early 1970s, and 2006. The age data from the

NWFSC trawl survey were very consistent with these estimates and precisely showed a very strong 1993 cohort.

While the greenstriped productivity score is relatively low (P = 1.28), the susceptibility to high exploitation was also low leading to a medium vulnerability to potential overfishing (V = 1.88).

Fishing Mortality

The spawning output of greenstriped rockfish reached a low in the late 1990s before beginning to increase throughout the last decade. The estimated depletion has remained above the 40% of unfished spawning output target and it is unlikely that the stock has ever fallen below this threshold. Throughout the 1970s, 1980s, and 1990s the exploitation rate and SPR have generally increased and occasionally exceeded current estimates of the harvest rate limit (SPR = 50%). Recent exploitation rates on greenstriped rockfish have been very small, which is primarily due to management actions in the late 1990s and early 2000s to rebuild other species.

Stripetail Rockfish

Distribution and Life History

Stripetail rockfish (*Sebastes saxicola*) are found from Yakutat Bay in the eastern Gulf of Alaska to Bahia Sebastian Vizcaino in central Baja California, but are more common from coastal British Columbia to southern California (Love, *et al.* 2002). They occur in depths ranging from 25 to 547 m but are most abundant between 100 and 200 m. Adult stripetail are benthically oriented and are most often associated mud, sand, and other low relief habitats. Stripetails are found in the same habitats as splitnose rockfish, greenstriped rockfish, Dover sole, and thornyheads.

Stripetail rockfish live at least 38 years and females grow faster (after reaching maturity) and achieve a larger size than males. Stripetail rockfish are relatively small-sized rockfish with a maximum size of 41 cm and 1 kg (Love, *et al.* 2002). Female stripetails along the California coast are mature by 18 cm or about 9 years of age. Off California, larval release occurs from November to March with peak release occurring off central and northern California in February and in December in the Southern California Bight (Love, *et al.* 2002). Females produce between 15,000 and 230,000 eggs.

Stripetails are primarily water column planktivores feeding mainly on krill and copepods. They are preyed on by a number of predators including Chinook salmon.

Stock Status and Management History

Stripetail rockfish are managed in the northern and southern Shelf Rockfish complexes. They are a relatively minor component stock to these complexes since stripetail are not targeted nor landed in large amounts.

A new data-moderate assessment of stripetail rockfish was conducted in 2013, which indicated the stock was healthy with a depletion exceeding 77.5% (Cope, *et al.* 2014). The 2013 assessment did not produce a reliable estimate of the scale of the stock's biomass; therefore, the SSC did not recommend using the OFL estimates in the assessment. However, the SSC did recommend the available data in the assessment provided strong evidence that the stock was well above the target B_{MSY} and that the assessment results could be used for status determination. Given that the assessment-based OFLs were not endorsed by the SSC, the OFL continues to be based on a DBSRA methodology and the stock is therefore categorized as a category 3 stock.

Stock Productivity

Two recruitment events reported in trawl studies off California from 1973-1993 occurred during El Ninos (Love, *et al.* 2002). It is not clear from the literature whether this is a representative recruitment pattern for the stock.

The PSA productivity score of 1.39 for stripetail rockfish indicates a relatively low productivity among rockfish species. There is a moderate vulnerability of potential overfishing (V = 1.8) for the stock.

Fishing Mortality

Stripetail rockfish are not targeted in commercial or recreational fisheries due to their small size. However, they are caught incidentally in bottom trawl fisheries due to their occurrence in low relief, trawlable habitats. They are rarely landed in current trawl fisheries although they were frequently landed and sold for animal food in the 1950s and 1960s. The stock has never experienced overfishing with the exploitation rate remaining well below the proxy SPR = 50% F_{MSY} harvest rate for rockfish.

1.1.5.3 Slope Rockfish North and South of 40°10’ N Lat.

The slope rockfish complexes north and south of 40º10’ N lat. are comprised of both assessed and unassessed species. Of the stocks managed in the slope rockfish complexes, aurora rockfish, blackgill rockfish south of 40º10’ N lat., rougheye rockfish (and blackspotted rockfish), and sharpchin rockfish have been assessed. There is an older assessment of bank rockfish that was done in 2000 (Piner, *et al.* 2000) that was limited in area and is not used in current management. The following section defines these complexes in terms of their component stocks and provides further detail on those component stocks that have been assessed.

The Slope Rockfish complex north of 40°10' N lat. is comprised of the following species: aurora rockfish (*Sebastes aurora*); bank rockfish (*S. rufus*); blackgill rockfish (*S. melanostomus*); blackspotted rockfish (*S. melanostictus*); redbanded rockfish (*S. babcocki*); rougheye rockfish (*S. aleutianus*); sharpchin rockfish (*S. zacentrus*); shortraker rockfish (*S. borealis*); splitnose rockfish (*S. diploproa*); and yellowmouth rockfish (*S. reedi*).

The Slope Rockfish complex south of 40°10' N lat. is composed of the following species: aurora rockfish (*Sebastes aurora*), bank rockfish (*S. rufus*), blackgill rockfish (*S. melanostomus*), POP (*S. alutus*), redbanded rockfish (*S. babcocki*), rougheye rockfish (*S. aleutianus*), sharpchin rockfish (*S. zacentrus*), shortraker rockfish (*S. borealis*), and yellowmouth rockfish (*S. reedi*).

Aurora Rockfish

Distribution and Life History

Aurora rockfish (*Sebastes aurora*) are encountered between the Queen Charlotte Islands (British Columbia, Canada) south to mid-Baja California (Mexico). Off of the United States, they are common from northern Oregon to southern California, and are most abundant in the area around Point Conception, California. They occur at depths from 200 to 700 m (~100 to 400 fm) with the median depth increasing to the south, such that they are most abundant from 350 to 550 m in the north and 400 to 600 m in the south.

While there are areas of greater abundance off of northern Oregon and especially off of Point Conception, California, the population appears continuous over the entire coast, so that there is no clear point for stock delineation. Survey catches exhibit a continuous distribution along the entire coast, though with areas of higher and lower abundances along the coast.

Aurora rockfish is a long-lived rockfish species, with maximum observed age of 125 years on the U.S. west coast based upon otoliths aged in the 2013 assessment (Hamel, *et al.* 2013). This is slightly greater than the maximum of 118 years seen by Thompson and Hannah (2010) and consistent with a maximum age greater than 75 as reported by Love et al. (2002). As with many rockfish species, aurora rockfish exhibit both spatially varying and sexually dimorphic growth, with females reaching a slightly larger size than males. Off of Oregon, females reached an asymptotic length of 36.9 cm, while males reached only 33.6 cm (Thompson and Hannah 2010). Asymptotic size and size at age decreases with latitude, and since the bulk of the stock is south of Oregon, the average asymptotic lengths are quite a bit lower than those reported above.

Thompson and Hannah (2010) found the age at 50% maturity for female aurora rockfish to be 12.56 years and the length at 50% maturity to be 25.54 cm. Maturity data collected coastwide during the 2012 NWFSC trawl survey found similar values, though with more evidence of atresia in older and larger fish than observed in the Thomson and Hannah study.

Aurora rockfish larvae have been collected off of California in months ranging from November to August, with abundance peaking in May and June, corresponding to the observation of females with developed embryos from March to May off of California and in May in Oregon (Love, *et al.* 2002). Thompson and Hannah (2010) also found that parturition peaked in May off of Oregon. Auroras settle on the bottom when they reach a length of about 3.3 cm (Love, *et al.* 2002).

Aurora rockfish display ontogenetic movement, with smaller fish found in shallower waters (below 400-450 m). They are distributed over both hard and soft substrates (Love, *et al.* 2002).

Aurora rockfish co-occurs with many prominent groundfish targets such as Dover sole, sablefish, thornyheads and hake, though are most reported in the catch of splitnose rockfish. Aurora rockfish contributes to the overall California Current ecosystem as both predator on crustaceans and small fishes, and as prey to larger fishes, marine mammals, and large squid. Juvenile aurora rockfishes are preyed on by salmon, birds, and other fishes (Love 2011).

Several aspects of aurora rockfish population biology are affected by the ecosystem. The recruitment of many species of rockfish appears to be high in 1999, suggesting that environmental conditions influence the spawning success and survival of larvae and juvenile rockfish, including aurora rockfish. The mechanism behind this observation is not well understood, but zooplankton abundance, changes in water temperature and currents, distribution of prey and predators, and amount and timing of upwelling are all possible linkages. Changes in the environment may also directly influence age-at-maturity, fecundity, growth, and survival, which can affect stock status determination and its susceptibility to fishing. Thompson and Hannah (2010) found variations in growth corresponding to individual years based upon dendrochronological techniques and otoliths, and found a correlation between an observed growth anomaly in otoliths and sea level in individual years.

Stock Status and Management History

Aurora rockfish reside in deep waters below 200 m. The primary gear type that has been used to catch aurora rockfish and other deepwater rockfish has been trawl gear. The use of trawls off the west coast of the United States dates to the late 1800s, though there was little fishery expansion until the availability of the otter trawl and the diesel engine in the mid-1920s (Douglas 1998). Trawl fisheries were mainly conducted on the shelf and became more established during World War II when demand increased for groundfish. Mink farms were also a major destination of groundfish removals in the 1940s and 1950s (Jones and Harry 1960). Foreign fleets began fishing for rockfish, including deeper waters of the slope, in the mid-1960s, with declining participation until the 200-mile EEZ was implemented in 1977 (Rogers 2003b). Peaks in the foreign catch have typically been seen in the mid-1960s for rockfishes, but for aurora rockfish, the largest catches were taken in the early 1970s. Foreign fishing was limited in the northern regions by 1970, shifting effort southward and more into aurora rockfish habitat. After 1977, domestic landings of rockfish increased rapidly until about 1990. Subsequent declines in rockfish landings were driven by declining biomass levels and implementation of new, more restrictive management practices, particularly between 1997 and 2002.

Documented and estimated removals of aurora rockfish do not reach consistently large levels until the 1980s. Aurora rockfish are and have been historically most commonly taken from central California to Oregon, tightly coupled with catches of splitnose rockfish. The term “rosefish” was often used to describe either splitnose or aurora rockfish and has been used as a reporting category in California since 1982. Aurora rockfish remains largely a non-targeted member of the slope rockfish complexes.

Limits on select rockfishes, which included the co-occurring species splitnose, were established in 1982. The first imposed catch limits on a coastwide *Sebastes* complex (aurora being one of the 50 rockfishes in the complex) were instituted in 1983. This complex was divided into two management areas north and south of 43º N lat. (separating the Eureka and Columbia INPFC areas) in 1994. Ongoing concern that shelf and slope rockfishes may be undergoing overfishing led the attempt by Rogers et al. (1996) to describe the status of most rockfishes contained in the *Sebastes* complex. Aurora rockfish information content was low, so only estimates of exploitation rates were provided, indicating the stock was undergoing very high exploitation rates relative to biomass estimates in both management areas.

The *Sebastes* complex was subsequently divided into nearshore, shelf, and slope complexes effective in the year 2000, and the dividing line between the northern and southern management areas was shifted to 40º10’ N. lat. Aurora rockfish has been managed under trip limits for the minor slope rockfish complex in both the north and south management areas from 2000-2010. Beginning in 2011, bottom trawl catches of slope rockfish north and south of 40º10’ N lat. have been managed under an IFQ system.

The first assessment of the west coast stock of aurora rockfish was conducted in 2013 (Hamel, *et al.* 2013); the assessment estimated stock depletion was at 64 percent of its unfished equilibrium at the start of 2013 and had never dropped below its B_{MSY} target (Figure 25). The assessment was a length-based full assessment with natural mortality identified as the major axis of uncertainty. The SSC categorized aurora rockfish as a category 1 stock based on the assessment. However, the uncertainty in estimated biomass in the 2013 assessment was greater than for other category 1 assessments resulting in a higher sigma value for defining the ABC buffer (see section 1.2.2 for more details).

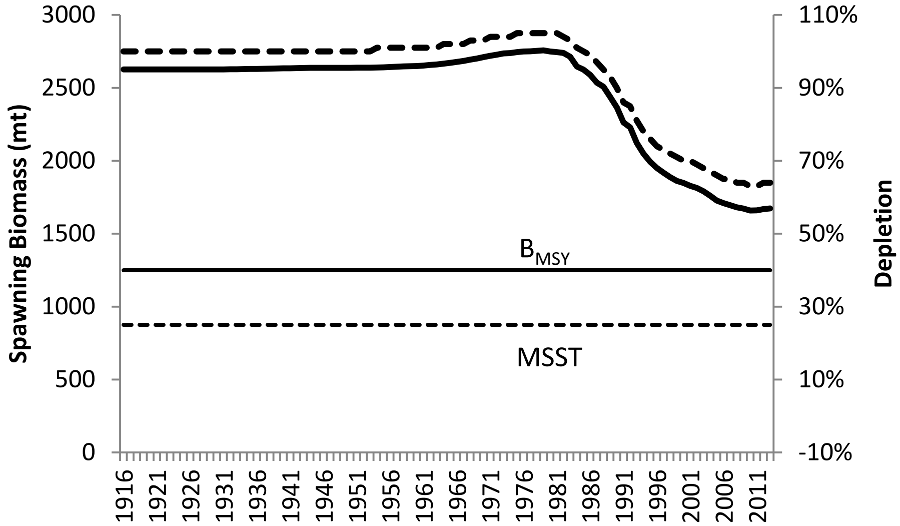

Figure 25. Time series of estimated spawning biomass and depletion of aurora rockfish, 1916-2013.

Stock Productivity

Steepness was fixed to the mean of the most recent rockfish steepness prior (h = 0.779; Thorson, 2013) in the 2013 assessment. Recruitment deviations were estimated from 1916 (the beginning of the modeling period), with a ramp towards bias correction beginning in 1962, full-bias adjustment beginning in 1970 and ending in 2008, and a ramping back down to no bias correction in 2012. Two of the largest contemporary recruitment events are found in 1999 and 2007 (Figure 26). Despite the inclusion of estimated ageing error, discerning individual year classes remains difficult and significant correlation exists between the estimated strength of adjacent year classes, which may be primarily due to ageing error rather than actual correlation in recruitment strength.

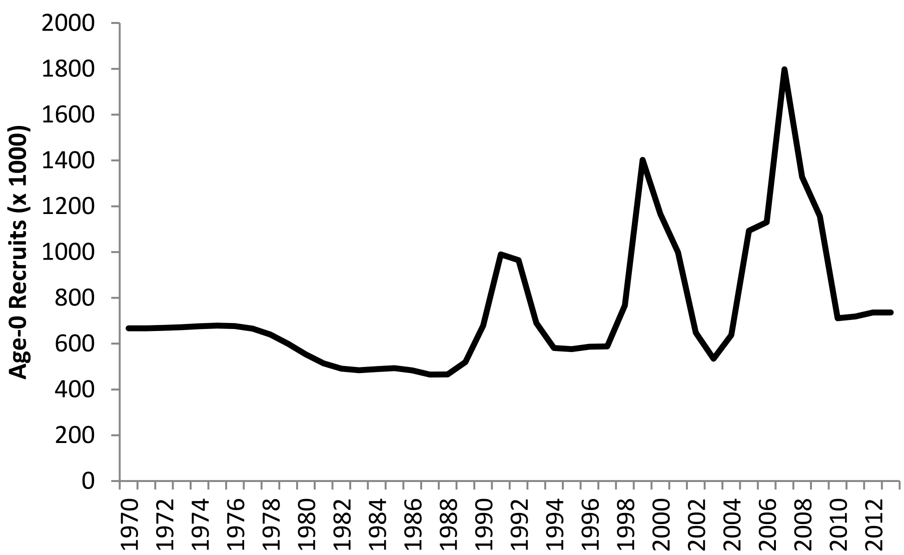

Figure 26. Time series of estimated age-0 recruits of aurora rockfish on the U.S. west coast, 1970-2013.

Fishing Mortality

The 2013 estimates that exploitation of aurora rockfish has been relatively low, with total catch estimated to have exceeded the current management harvest-rate limits in only 2 years, during the early peak in trawl catch (1990 and 1992) (Figure 27). Recent levels of removals have remained moderate. There seems to be very low risk that current removals are causing overfishing.

While stock-specific OFLs/ABCs were not historically set for aurora rockfish specifically, the reauthorized Magnuson-Stevens Act of 2006 and FMP Amendment 23 required OFLs for all species in a management plan, including those managed in stock complexes. The first OFL contributions were calculated using DB-SRA and provided in 2011. The 2015 and beyond OFLs are projected from the 2013 assessment. Recent catches since 2002 have been below the new 2015 OFL and ABC (Figure 28).

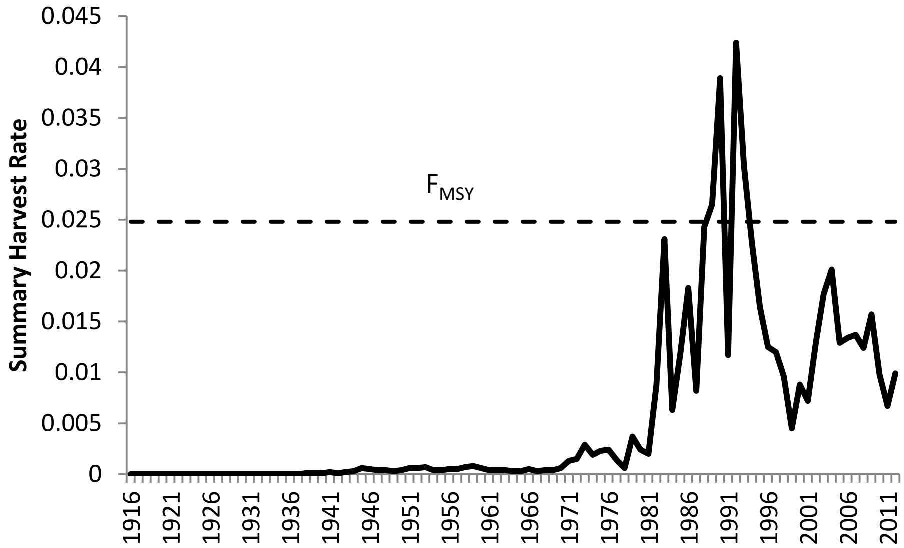

Figure 27. Time-series of estimated summary harvest rate for the west coast stock of aurora rockfish, 1916-2012. The dashed line is the harvest rate at the overfishing F_{MSY} proxy.

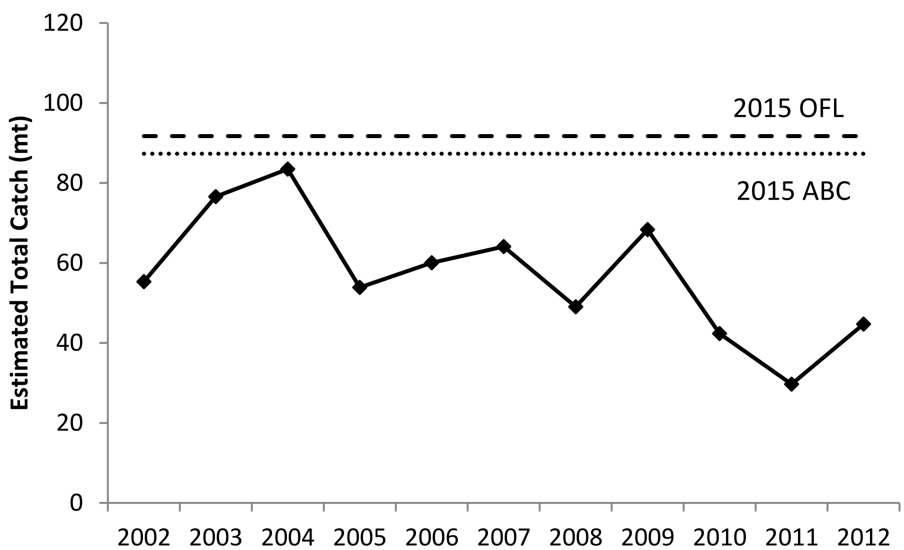

Figure 28. Estimated coastwide total annual catch of aurora rockfish in 2002-2012 relative to the proposed 2015 OFLs and 2015 ABCs (summed north and south of 40°10’ N lat. to compare to coastwide catches).

Blackgill Rockfish

Distribution and Life History

Blackgill rockfish (*Sebastes melanostomus*), also known at times as blackmouth rockfish or deepsea rockfish, range from at least central Vancouver Island to central Baja California (Love, *et al.* 2002). However, the species is relatively uncommon north of Cape Mendocino and occurs in the greatest densities in the Southern California Bight (SCB). The name very accurately describes the most identifying characteristic of adult blackgill rockfish, in that they have black pigmentation on the rear edge of their gill cover, as well as in the fold above the upper jaw and inside of the mouth. The rest of the fish appears pink with brown and white blotches underwater, or reddish with distinct brown saddles upon capture. It is a medium-sized (to about 62 cm maximum length) and deep bodied species. Additional descriptions and meristics can be found in Love et al. (2002) for adults and Moser (1996) for larvae and juveniles.

Hyde and Vetter (2007) did not find any evidence for close molecular or evolutionary relationships between blackgill and other rockfish species. Blackgill were found to be moderately related with several other slope or deep shelf species (*S. aurora*, *S. phillipsi, S. gilli*, *S. diploproa*, and *S. melanosema*) as well to a suite of mostly rare and poorly known species from the Gulf of California (*S. sinensis*, *S. peduncularis*, and *S. cortezi*) or southern California.

Blackgill are a slope rockfish species, and are generally rare in waters less than 100 meters and most abundant in waters between 300 and 500 meters depth. Love et al. (2002) report a depth distribution of 87 to 768 meters; however, from ten years of data from the NWFSC combined trawl survey, only one haul greater than 600 meters encountered blackgill (that tow was at 647 meters) and the shallowest fish was encountered at 133 meters. Survey data suggest that smaller fish tend to be encountered in shallower water and larger fish in deeper water; survey data also suggest few small fish in waters north of Cape Mendocino. Juveniles are often seen over soft bottom habitats with low relief. Adults are usually associated with high relief rocky outcrops, canyons or deep rock pinnacles, although fishermen often report taking them in midwater (Kronman 1999; Love, *et al.* 2002).

Little is known about the population structure of blackgill rockfish. Like most rockfish, larvae and juveniles circulate in the plankton for 3-4 months. Love et al. (2002) report that some juveniles may be pelagic for up to 7 months; however, this may be atypical. Thus, like most shelf and slope species, blackgill likely disperse over fairly long distances before settling to the bottom. Abundance south of the U.S./Mexico border is uncertain, but there appear to be substantial numbers and catches of blackgill in many areas, and pelagic juveniles have been found as far south as Punta Abreojos, in southern Baja California (Moser and Ahlstrom 1978). The CalCOFI Ichthyoplankton survey has been used to develop or explore indices of relative abundance for several rockfish species for which larvae can be morphologically identified to species (Moser, *et al.* 2000), and such indices have been used as relative abundance indices for assessments of bocaccio (Field, *et al.* 2009) and shortbelly rockfish (Field, *et al.* 2008) as well as northern anchovy (Jacobson and Lo 1994), Pacific sardine (Hill, *et al.* 2008), and California sheephead (Alonzo, *et al.* 2008). Unfortunately, blackgill rockfish are not among the species that have been historically sorted to the species level using morphological methods, although recent developments have led to the potential to use genetic methods to identify historical and contemporary Sebastes from the ichythyoplankton archives (e.g., (Taylor, *et al.* 2004), J. Hyde, FRD/SWFSC, unpublished data). Thus, it is possible that these collections could provide relative abundance information from past and contemporary monitoring programs.

Moser and Ahlstrom also found that blackgill represented approximately 16% of the total number of rockfish specimens encountered in a series of midwater trawls for late larvae and juvenile stage rockfish done in the early 1970s (prior to most historical exploitation). By contrast, from ongoing pelagic juvenile surveys run by the Fisheries Ecology Division used to develop juvenile (pre-recruit) indices for some species, blackgill rockfish comprised only about 3% of juveniles collected from the southern California region from 2004 through 2010 (K. Sakuma and J. Field, unpublished data as cited in Field and Pearson (2011)). However, these results are not likely to be comparable unless seasonal and depth of survey efforts are accounted for; the Moser and Ahlstrom (1978) study in particular fished depths ranging from 0 to 600 meters using an Isaacs-Kidd midwater trawl, while the FED survey uses a considerably larger (modified Cobb) midwater trawl and typically only fishes at 30 meters headrope depth. There is at least some potential to consider relative abundance indices of age-0 juveniles from the FED/SWFSC survey in the future, although given the very slow growth and difficulty in ageing of blackgill rockfish, it is unlikely that validation of survey indices or improved understandings of high frequency variation in year class strength will be of substantial near term benefit to the model.

Nearly 2/3rds of all U.S. landings are from waters south of Point Conception, for which blackgill accounted for as much as 20 to 30% of total *Sebastes* landings in the SCB during the 1980s, when deep water fixed gear fisheries rapidly expanded (more details in catch history section). Nearly all of the remaining landings took place between Conception and Cape Mendocino, such that less than 1.3% of historical California landings have come from waters north of Cape Mendocino. Landings in Oregon waters are even less, and only trace landings of blackgill are reported from Washington waters. Trawl survey abundance data (discussed later in the document) are consistent with these results, although they represent the period following the greatest extent of exploitation: surveys that took place from the 1970s through the late 1990s had virtually no coverage in southern waters where blackgill are the most abundant.

Blackgill rockfish have among the deepest distribution of all of the California Current *Sebastes* (although the three *Sebastolobus* species are common at considerably greater depths), and live at the edge of the low oxygen (hypoxic) conditions that characterize the slope waters of the California Current. Below these depths, species diversity declines to a smaller suite of species that have adapted to cope with low oxygen waters, notably the DTS complex species (Dover sole, thornyheads and sablefish), which have evolved a range of adaptive strategies including metabolic suppression, slow growth rates, late ages at maturity, and ambush (rather than active searching) predation methods (Childress and Seibel 1998; Jacobson and Vetter 1996; Koslow, *et al.* 2000; Vetter and Lynn 1997). These low oxygen waters, known as the oxygen minimum zone (OMZ), are a natural feature of the Eastern Pacific Rim and other regions characterized by high surface productivity and/or the upwelling of oxygen-poor source waters (Helly and Levin 2004). The California Current has a relatively deeper OMZ than the Equatorial Eastern Tropical Pacific (ETP) or the Humboldt Current (Helly and Levin 2004), with the zone starting at approximately 500 to 600 meters depth in the waters off of southern and central California. The observation that blackgill are likely the most deeply distributed medium-size Sebastes (at least in southern California Current waters) suggests that they have adapted to live on the edge of the OMZ, where oxygen availability is rapidly declining relative to shelf waters, although no Sebastes species appears able to tolerate the very low oxygen conditions within the OMZ itself.

Seibel (2011) describes two oxygen thresholds that are temperature dependent (as opposed to species or situation-specific), one in which virtually all species are capable are of physiologically adjusting or adapting to declining oxygen availability, and a second for which no further adjustment or adaptation in aerobic O2 utilization is possible. Seibel (2011) describes this latter threshold as one at which "organisms that are not specifically adapted to low O2 will suffer physiological stress and eventual death." Importantly, this threshold falls just below the currently observed oxygen levels throughout the slope waters of much of the California Current, inferring that any expansion of the OMZ in this region is likely to have tremendous impacts on the vertical distribution of populations and the species composition of ecosystems. Equally importantly, there is already some evidence of a shoaling (shallowing) of the depth of the OMZ throughout the California Current (Bograd, *et al.* 2008; Whitney, *et al.* 2007), with Bograd et al. (2008) reporting oxygen declines of 20-30% at depths of approximately 300 to 500 meters in the waters of the Southern California Bight, the region in which most of the blackgill biomass resides. A shoaling of the OMZ has been predicted to be a likely or plausible response to global climate change due to the fact that oxygen is less soluble in warmer waters, and warming is also expected to increase stratification in the upper ocean, which will both reduce oxygen supply and increase oxygen demand at depth (Keeling, *et al.* 2010; Sarmiento, *et al.* 1998; Seibel 2011).

For blackgill rockfish, it is the shoaling of the OMZ at depth that is likely to be the greatest long-term threat, as such a shoaling would likely represent a severe compression of the available habitat for this species. McClatchie et al. (2010) evaluated potential scenarios for hypoxia to impact the habitat of cowcod (Sebastes levis), a rebuilding shelf species that is a focus of management in the SCB. They found that as much as 37% of deep (240-350 m) cowcod habitat is currently affected by hypoxia, but that if the current trends of a shoaling OMZ continue for 20 years, this could increase to 55% of deep habitat, as well as an additional 18% of habitat in the 180 to 240 m depth range. These numbers would presumably differ substantially for blackgill rockfish, which have a very different (considerably deeper) distribution; due to their proximity to the OMZ, they may be at considerably greater risk to the longer-term impacts of shoaling. Moreover, changes in the characteristics and dynamics of the OMZ could lead to changes in the forage base for blackgill, which are described as foraging primarily on mesopelagic fishes which undergo dial migrations from the edge of the OMZ to surface waters in order to feed.

As previously mentioned, blackgill have been described as having a strong affinity for deep water habitat, particularly around offshore banks, canyons and areas of high depth gradients. They have been described as feeding on small mesopelagic fishes, such as myctophids and bathylagids (Love, *et al.* 2002). Isaacs and Schwartzlose (1965), Genin et al. (1988), Koslow (2000) and Genin (2004) describe the mechanisms by which vertical migrants, such as zooplankton and mesopelagic fishes, become trapped by topographic features. High densities of deepwater adapted resident species are consequently found in the relatively small, confined areas where these diurnally-migrating prey become aggregated. Such observations are consistent with the reports by fishermen of isolated deep banks, pinnacles or other habitat features often hosting very large numbers of fish over a relatively small spatial range, such that vertical hook and line gear (which can be more precisely targeted at small habitat features) is the gear of choice for targeting these species (as opposed to horizontal, or set, hook and line gear often used to target species in deeper slope waters, such as sablefish and thornyheads, which tend to be more widely dispersed).

With respect to predators and predation mortality, it is likely that sablefish and shortspine thornyheads are among the most important predators of blackgill rockfish. Both species are large (up to 100 and 75 cm, respectively, although individuals greater than 80 or 65 cm of either species are uncommon) and largely piscivorous ambush predators that are typically (along with longspine thornyhead and Dover sole) the most abundant and commercially important groundfish in the continental slope ecosystem (Lauth 2000). Food habits information for adult sablefish found that *Sebastolobus* and *Sebastes* species, particularly Sebastolobus altivelis, are key prey items, representing 15% to 30% of total prey by volume (Buckley, *et al.* 1999; Laidig, *et al.* 1997). Similarly, shortspine thornyhead preyed heavily on S. altivelis, unidentified *Sebastes*, and other fishes (Buckley, *et al.* 1999). Although no *S. melanostomus* were conclusively identified in either study, other slope rockfish species (*S. crameri*, *S. diploproa*, and *S. alutus*) were. The lack of specimens is likely due to both studies' focused sampling in northern California, Oregon and Washington slope waters, rather than the south-central and southern California waters in which *S. melanostomus* are most abundant.

Length data for both of these predators (sablefish and shortspine thornyheads) and their prey suggest that predation is low on fishes smaller than 5 cm, high on fishes ranging from 5 cm through 20 cm, and drops off notably for larger prey. However, the diet data summarized here were largely of smaller (40-60 cm) predators, and larger predators likely consume (or consumed) a broader range of prey. In the most recent stock assessment for longspine thornyhead (Sebastolobus altivelis), the base model suggested a declining or stable population (Fay 2006); however, it was noted that an ecosystem model of the northern California Current indicated that abundance of longspines should be increasing due to declines in predation mortality associated with declines in their primary predators (Field, *et al.* 2006). Survey biomass trends for longspine thornyheads, while limited to a relatively narrow time period and associated with considerable uncertainty, also suggested an increasing biomass trend. These observations led to exploration of both time and age-varying natural mortality rates for *S. altivelis* as informed by changes in predator biomass and estimates of predator consumption (Fay and Field, unpublished data as cited in Field and Pearson (2011)). Results suggest that, for this species, predation-related factors should be taken into account for future single-species stock assessments. Comparable evaluations could, and probably should, be done for blackgill rockfish and other slope species, for which their likely most important sources of predation mortality have themselves undergone significant changes in abundance.

Stock Status and Management History

Blackgill rockfish have historically represented a minor part of California rockfish landings north of Point Conception, but a substantial fraction of landings occur south of Conception. Based on consultations with fishery participants, Butler et al. (1999a) and Kronman (1999) defined the southern California targeted fishery for blackgill rockfish as being a relatively recent phenomenon. Although longline fishing had long been the primary means of catching rockfish in southern California waters, increased participation and declines in the catches of many highly desired shelf species (such as vermilion rockfish and cowcod) contributed to a gradual shift in effort towards deeper and more offshore waters. Moreover, improvements in technology and gear (such as loran, affordable acoustic systems, electric line haulers) helped ease the difficulties of fishing (and relocating good fishing sites) in deeper waters. Additionally, set nets (gillnets) also began to be deployed at a larger scale in southern California in the 1970s and 1980s, often targeting deep reefs for large bocaccio, cowcod, blackgill, bank and other rockfish species.

Such developments seem to have been associated with a geographic expansion of the regions fished, such that fishing locations were sequentially depleted and new fishing locations discovered and developed over time. The first stock assessment for blackgill rockfish (Butler, *et al.* 1999a) noted that there was significant evidence for sequential depletion of blackgill rockfish in localized areas. This included reports from fishery participants that many pinnacles or other fishing sites that routinely yielded 20,000 pounds of blackgill per trip in the early days of the fishery were now only yielding 500 or so pounds per trip and were often covered with lost gear. Similarly, in a review of historical southern California fisheries, Kronman (1999) also documented the rapid growth and development of the blackgill fishery specifically as one in which fishermen would often “completely decimate” rockfish spots with deep fishing vertical line gear, based on the accounts of the participants themselves. Consequently, there was an ongoing shift to newer fishing spots, generally further offshore and to greater depths, as well as greater experimentation with alternative gears and target species.

These observations suggest the potential for a situation in which the stock may have undergone the “sequential depletion” of biomass from available habitat patches. If so, this would suggest that a traditional (non-spatial) stock assessment assumption of evenly distributed fishing mortality across space is substantially flawed. In fact, if the fishery were sequentially depleting specific areas, the length frequency information would not be likely to suggest a shift to smaller fish over time as the length frequencies could essentially reflect “unfished” population structure for the duration over which the new habitats were discovered and exploited. The consequences of failing to recognize such patterns can lead to overexploitation and collapse, and such processes have been described for several marine invertebrate populations (Karpov et al. 2000, Orensanz et al. 2000) as well as temperate water reef fishes (Epperly and Dodrill 1995, Rudershausen et al. 2008). Ongoing efforts to analyze historical block summary data have the potential to identify such shifts and consider whether such factors are likely to be important for west coast groundfish species such as blackgill, as well as to determine whether there is sufficient data to estimate spatial effects or develop spatially-explicit models more capable of accounting for such factors.

Management of blackgill rockfish has generally not been to the species level, but rather as part of the "*Sebastes* complex" in the Pacific Fishery Management Council era (prior to which management was under the direction of the California Department of Fish and Game). The PFMC allowable biological catches (ABC) of blackgill have historically been grouped together with eleven other species of minor rockfishes called "remaining rockfish" and all "other" rockfish. The PFMC historically used trip limits, and later cumulative trip limits (over set time periods), to slow the pace of harvest based on allowable biological catch and to promote a year-round fishery. For all commercial gear types, the limits were initiated in 1983 when the PFMC imposed a monthly limit of 40,000 pounds per trip for the entire coastwide *Sebastes* complex, a limit that stayed in place through 1990. After recognizing the differential spatial distribution of the remaining rockfishes and the fisheries that target them, harvest limits on both open access and limited entry fisheries were divided between the northern and southern *Sebastes* complexes, and trip limits began to be implemented at variable levels over both time (month and year) and space (north and south of Mendocino), often with species-specific limits in addition to the overall limit on *Sebastes* catches. Although early limits applied to both trawl and fixed gears, beginning in 1995 fixed gear limits (hook and line and pot, primarily, as gill nets were phased out through the 1990s) were set to 10,000 lbs of *Sebastes* per trip, which persisted through the 1990s.

Consequently, prior to 1999 cumulative trip limits had been historically high relative to landings of blackgill rockfish from individual trips, and unlikely to have impacted fishing for blackgill and catches. Limits were dramatically reduced in 1999 for the southern *Sebastes* complex; 2-month cumulative limit of 3,500 pounds for limited entry and 3,600 pounds per month for open access. Since 2000, blackgill has been managed as part of the Minor Slope Rockfish sub-group, with limits ranging from 3,000-50,000 pounds per 2 months; Tables 1-3 show the trip limits implemented since 2000 for this complex for the limited entry trawl, limited entry fixed gear and open access fixed gear fisheries. Table 4 shows the total estimated catches of blackgill (including discards) south of 40° 10' for the period since 2001, during which time catches have typically ranged well below allowable levels.

In 2001 the Cowcod Conservation area was established outside of 20 fathoms and directly excludes directed groundfish fishing from an expansive area in the Conception and southern Monterey INPFC areas.[7] This regulation has had a tremendous impact on the southern fixed gear fleet that targets blackgill, as the deep offshore banks and features that characterize the CCAs in deep water are optimal habitat for this species. By contrast, the shelf closures (rockfish conservation areas) implemented to protect rebuilding shelf species (such as bocaccio, cowcod, canary and widow rockfish) have presumably had a negligible direct effect, as the depths closed in the RCAs do not encompass the depths at which most blackgill are encountered. Such measures may have had an indirect effect, by virtue of shifting trawl effort to deeper waters, although for much of California the overall effect has been a sharp decline in active participation in the trawl fishery more generally.

The first assessment for blackgill rockfish was conducted in 1998 and estimated stock depletion was between 40 and 54 percent of its unfished equilibrium at the start of 1998 (Butler, *et al.* 1999a). That assessment assumed a unit stock in southern and central California (Conception INPFC area) and was

7 As the current trawl survey also excludes this region from trawl gear impacts, the area of the CCAs is shown in later maps of survey CPUE for blackgill rockfish, in Figure 13

based on a stock reduction analysis assuming constant recruitment. The dynamics of the simple model were tuned to average mortality rates from catch curves and landings data. Fishery selectivity was assumed to mirror maturity at size/age; trends in fishable/mature biomass were then estimated.

A second blackgill rockfish stock assessment was completed in 2005 indicating a stock depletion of 52 percent (Helser 2006). This assessment expanded the geographic range of that in Butler et al. (1999a), including both the Monterey and Conception INPFC areas, where over 90 percent of the landings have occurred. The assessment was based on catch and length composition data from commercial fisheries and indices of relative abundance and size composition from the AFSC shelf trawl survey and the AFSC slope survey. The modeling approach included fishery and survey length compositions to explicitly estimate selectivity. The assumed natural mortality rate was identified as a key axis of uncertainty for this stock.

The most recent blackgill rockfish assessment, conducted in 2011 for the stock south of 40º10' N lat. (Field and Pearson 2011), estimated the stock was below target with a depletion of 30 percent of its unfished biomass at the start of 2011 (Figure 29). The spawning output of blackgill rockfish was at high levels in the mid-1970s, but began to decline steeply in the late 1970s through the 1980s, consistent with the rapid development and growth of the targeted fishery. The biomass reached a low of approximately 18 percent of the unfished level in the mid-1990s. Since that time, catches have declined and spawning output has increased. The estimated depletion level in 2011 is 30.2 percent.

Catch data used in the assessment are generally reliable throughout the time period, although there is a lot of uncertainty in catch data prior to the early 1980s. Ageing is very difficult for this species, which appears to have highly variable size at age, as well as apparent regional differences in growth rates and potentially other life history traits. The lack of a reliable, long-term, fishery-independent survey index that reflects abundance from the entire range of the stock is problematic. In general, natural mortality and growth parameters comprised the greatest contribution to model uncertainty.

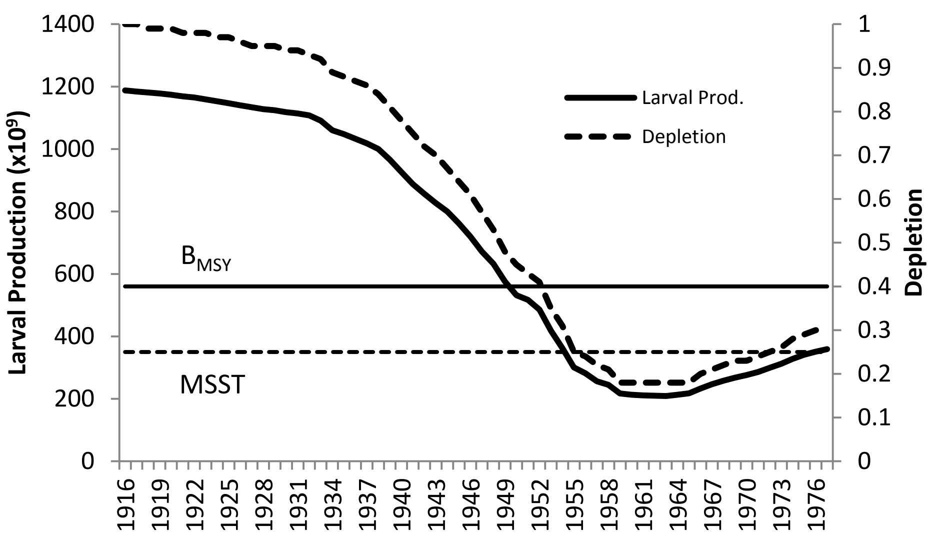

Figure 29. Time series of estimated spawning output and depletion of blackgill rockfish south of 40º10' N lat., 1950-2011.

Stock Productivity

In the 2013 assessment, the Beverton-Holt model was used to describe the stock-recruitment relationship. The log of the unexploited recruitment level was treated as an estimated parameter; recruits were taken deterministically from the stock-recruit curve. Recruitment deviations were not estimated, as the lack of obvious cohorts in either age or length data and the high degree of ageing uncertainty make plausible estimates unlikely. The estimated recruitment is projected to be at relatively high levels due to the fixed value of steepness (h = 0.76); this trend, however, is consistent with the trends from the survey data.

Blackgill rockfish have a relatively high potential vulnerability to overfishing (V = 2.08) driven by a combination of low productivity (P = 1.22) and relatively high susceptibility to being caught in the fishery (Table 2). The low productivity is due to the stock being long-lived (max. age = 87 yrs; (Love, *et al.* 2002)), with late maturation, and relatively low natural mortality (Table 5).

Fishing Mortality

Catches of blackgill rockfish primarily occur in the Southern California Bight south of Point Conception (34º27' N. lat.) where the species is caught in both directed fixed gear (hook-and-line) and historically, gillnet fisheries. Landings of this species are estimated to have risen slowly from very low levels (approximately 20-30 mt) in the 1950s, and then climbed rapidly in the 1970s and 1980s as improvements in technology and declines in other target species led fishermen to target blackgill rockfish in deeper and more offshore waters. Landings peaked in the mid-1980s at just over 1,000 mt, but have declined to approximately 100 mt to 150 mt in recent years.

The 2011 depletion estimate indicated the stock was in the precautionary zone compelling the Council to reduce impacts to prevent overfishing and allow the stock to rebuild back to its target biomass. The Council and NMFS implemented stringent harvest guidelines of 106 and 110 mt for 2013 and 2014, respectively corresponding to calculated 40-0 reductions. Specifying HGs created a sorting requirement for the stock allowing better inseason catch monitoring. The Council further established an apportionment of the non-trawl allocation of 60 percent to limited entry and 40 percent to open access fixed gears, which reflects the historical distribution of catch between the limited entry and open access fixed gear sectors from 2005-2010. Non-trawl landing limits for blackgill south of 40º10' N lat. were reduced beginning in 2013 to prevent targeting of the stock. Cumulative landing limits for blackgill south of 40º10' N lat. were reduced from 40,000 lbs/2 months for slope rockfish including blackgill to 40,000 lbs/ 2 months with a sublimit of 1,375 lbs/2 months for blackgill for the limited entry fixed gear sector. Open access cumulative landing limits south of 40º10' N lat. were reduced from 10,000 lbs/2 months for slope rockfish including blackgill to 10,000 lbs/ 2 months with a sublimit 475 lbs/2 months for blackgill. While final catch accounting of groundfish in 2013 groundfish fisheries will not be available until the end of 2014, landed catch of blackgill has been reduced significantly and fishermen report blackgill targeting is no longer occurring.

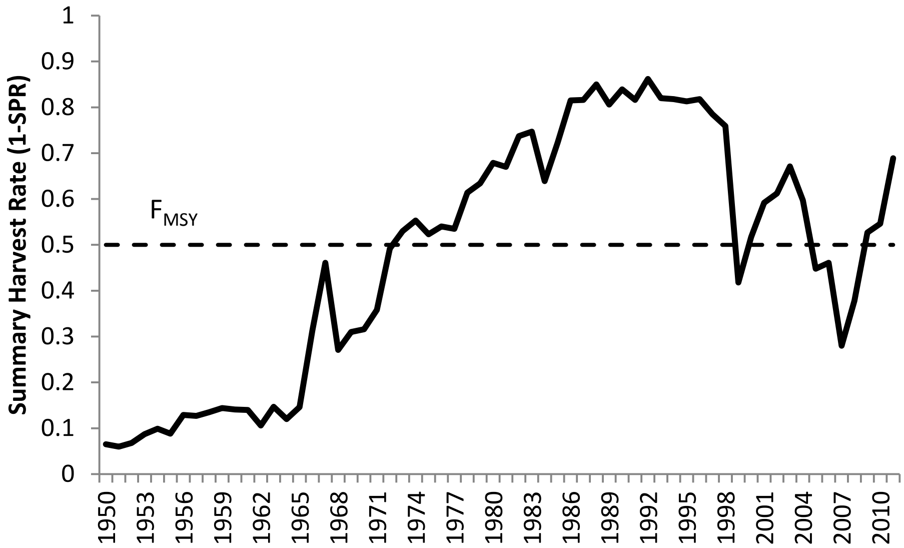

Figure 30. Time series of estimated summary harvest rate for the blackgill rockfish south of 40º10' N lat., 1950-2011. The dashed line is the harvest rate at the overfishing F_{MSY} proxy.

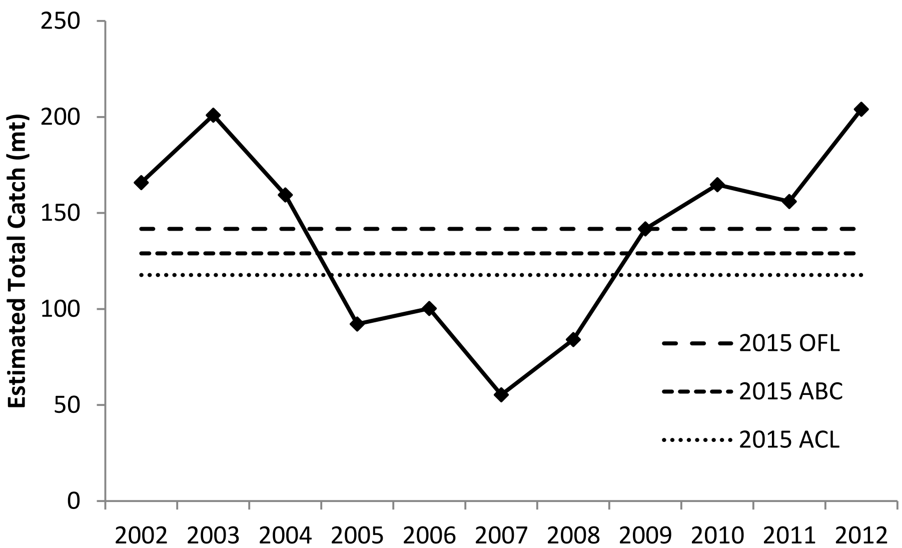

Figure 31. Estimated coastwide total annual catch of blackgill rockfish in 2002-2012 relative to the proposed 2015 OFLs, 2015 ABCs, and 2015 ACLs (summed north and south of 40º10' N lat. to compare to coastwide catches).

Rougheye/Blackspotted Rockfish

Distribution and Life History

Rougheye rockfish (*Sebastes aleutianus*) and blackspotted rockfish (*S. melanostictus*) are slope rockfish that share broad overlap in their depth and geographic distributions from the Eastern Aleutian Islands along the North American continental margin to southern Oregon, with blackspotted rockfish's range extending east beyond the Aleutian chain to the Pacific Coast of Japan (Gharrett, *et al.* 2005; Hawkins, *et al.* 2005; Orr and Hawkins 2008). It is very difficult to visually distinguish between the two species and they have been persistently confused in surveys and catches. It has only been from recent genetic studies in the early 2000s that the two separate species have been identified and described (Orr and Hawkins 2008).

Both species are encountered at depths shallower than 100 m to at least 439 m, however, blackspotted rockfish tend to be more prevalent in deeper waters (Hawkins et al. 2005, Orr and Hawkins 2008). Genetic information is not available to provide positive species identification in historical survey and landings information, but these data indicate that density of the nominal rougheye rockfish complex decreases sharply south of the Oregon-California border at 42° N lat. Studies suggest that rougheye rockfish account for a greater proportion of the species complex along the coast of Washington and Oregon than in Alaskan waters (Gharrett, *et al.* 2005; Hawkins, *et al.* 2005; Orr and Hawkins 2008). Recent discussions with port samplers in southern Oregon suggest that both rougheye and blackspotted rockfish are encountered with some regularity in the commercial trawl and fixed-gear landings in Charleston, Port Orford, and Brookings, with blackspotted rockfish composing approximately one third to one half of identified specimens (C. Good and N. Wilsman, ODFW, pers. comm. as cited in Hicks et al. 2013).

The west coast of the U.S. is the southern portion of the range of rougheye rockfish, and it is likely that the population north of the U.S.-Canada border is not a separate stock. The connectivity of rougheye populations throughout its range is unknown.

Compared with other rockfish species on the west coast of the U.S., rougheye rockfish life-history is poorly described and the recent resurrection of two species (rougheye and blackspotted rockfishes) has further complicated the understanding of life-history characteristics. Rougheye rockfish are often associated with boulders and steep habitats, and are typically found alone or in small aggregations (Love, *et al.* 2002). Younger fish may school and are often found in shallower waters on the shelf, and larger fish may form larger aggregations in the Pacific Northwest during the autumn and winter.

Rougheye rockfish give birth to live young with larvae released between February and June and at lengths between 4.5-5.3 mm (Love, *et al.* 2002). There are no studies on the fecundity of rougheye rockfish on the west coast of the U.S.

A wide range of prey items make up the diet of rougheye rockfish. Crangid and pandalid shrimps make up the majority of their diets, and larger individuals, greater than 30 cm, feeding upon other fishes (Love 2011). They are also known to feed upon gammarid amphipods; mysids, crabs, polychaetes, and octopuses (Love 2011; Love, *et al.* 2002).

Stock Status and Management History

Rougheye and blackspotted rockfish (henceforth denoted as rougheye) are landed as part of the minor slope rockfish complexes north and south of 40º10’ N lat.; however, they are rarely caught in the south. The historical reconstruction of landings for rougheye rockfish suggests that fixed gear fisheries have caught rougheye rockfish since the turn of the 20th century and landings in the trawl fishery are estimated to have increased into the 1940s. Landings remained relatively constant throughout the 1950s and into the 1960s before the foreign trawl fleet increased catches into the 1970s. The declaration of the EEZ resulted in the buildup of a domestic fleet and landings increased rapidly into the late 1980s and early 1990s. Subsequently, landings declined in the late 1990s and have been between 100 and 200 mt in recent years. Trawl, longline, and Pacific whiting at-sea trawl fisheries make up the majority of the catch.

Rougheye rockfish are a desirable market species and discarding has been low, historically. However, management restrictions (e.g., trip limits) have resulted in increased discarding since 2000. Trawl rationalization was introduced in 2011, and since then very little discarding of rougheye rockfish has occurred.

Hicks et al. (2013) conducted the first assessment of the U.S. west coast stock of rougheye and blackspotted rockfish as a complex of two species. The coastwide population was modeled assuming parameters for combined sexes (a single-sex model) and assuming removals beginning in 1916. The predicted spawning biomass from the base model generally showed a slight decline over the entire time series with a period of steeper decline during the 1980s and 1990s. Since 2000, the spawning biomass has stabilized and possibly increased because of reduced catches and above average recruitment in 1999. The 2013 spawning biomass relative to unfished equilibrium spawning biomass was estimated to be 47 percent of its unfished equilibrium at the start of 2013. The stock has been estimated to be healthy throughout the time series in the new assessment (Figure 32).

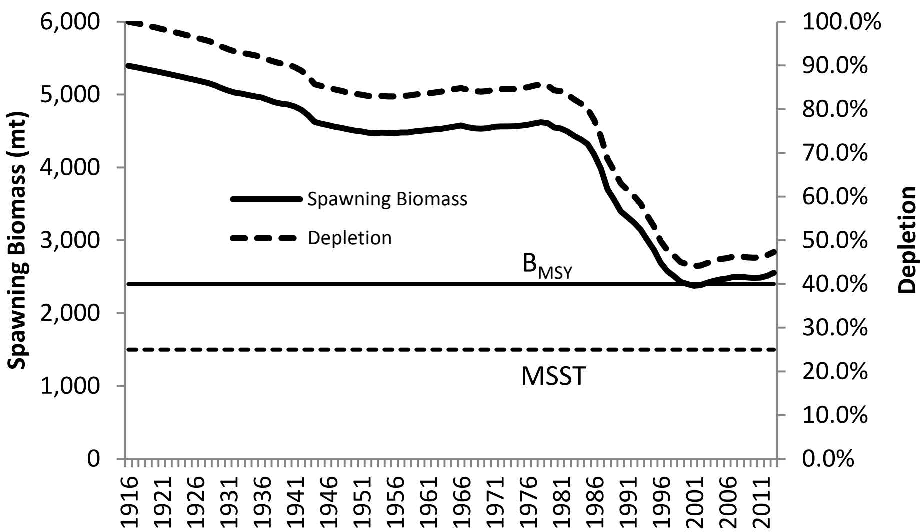

Figure 32. Time series of estimated spawning biomass and depletion of rougheye/blackspotted rockfish, 1916-2013 (from Hicks et al. 2013).

Stock Productivity

A steepness parameter was fixed at 0.779 in the 2013 assessment based on a steepness meta-analysis for west coast rockfishes (Jim Thorson, NWFSC). There is little information regarding recruitment prior to 1980, and the uncertainty in these estimates is expressed in the assessment. Estimates of recruitment appear to oscillate between periods of low and high recruitment. The four largest recruitments were estimated in 1999, 1998, 2001, and 1988, and the four smallest recruitments were estimated in 2002, 2006, 2005, and 1995 (Figure 33).

Rougheye rockfish have the highest potential vulnerability to overfishing (V = 2.27) driven by a combination of low productivity (P = 1.17) and relatively high susceptibility to being caught in the fishery (Table 2). The low productivity is due to the stock being long-lived (max. age = 205 yrs; (Love, *et al.* 2002)), with late maturation, and relatively low natural mortality (Table 5).

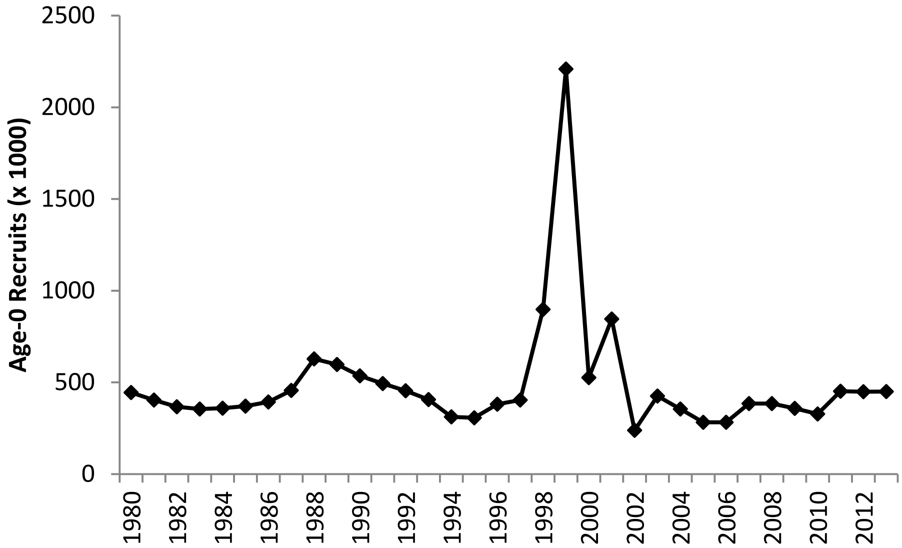

Figure 33. Time series of estimated age-0 recruits of rougheye/blackspotted rockfish on the U.S. west coast, 1980-2013(from Hicks et al. 2013).

Fishing Mortality

Rougheye rockfish are not often targeted by a specific fishery, but are desirable and marketable, thus are typically retained when captured. They are often captured in bottom trawl, mid-water trawl, and longline fisheries. Small numbers have been observed in pot, shrimp, and recreational fisheries.

After many attempts to start trawl fisheries off the west coast of the United States in the late 1800s, the availability of the otter trawl and the diesel engine in the mid-1920s helped the trawl fisheries expand (Douglas 1998). Trawl fisheries really became established during World War II when demand increased for shark livers and bottomfish. A mink food fishery also developed during World War II (Jones and Harry 1960). Foreign fleets began fishing for rockfish in the mid-1960s until the EEZ was implemented in 1977 (Rogers 2003b). Since 1977, landings of rockfish were high until management restrictions were implemented in 2000. Longline catches of rougheye rockfish are present from the turn of the century and continue in recent years, targeting sablefish and halibut.

A long-term directed fishery has not occurred for rougheye rockfish and historical discarding practices are not well known. Rougheye rockfish inhabit deeper water as adults, which were fished less often historically.

Throughout the 1980s and 1990s exploitation rates (1-SPR) were mostly above target levels (Figure 34). Recent exploitation rates on rougheye rockfish were predicted to be near target levels.

While stock-specific OFLs/ABCs were not historically set for rougheye rockfish specifically, the reauthorized Magnuson-Stevens Act of 2006 and FMP Amendment 23 required OFLs for all species in a management plan, including those managed in stock complexes. The first OFL contributions were calculated using DB-SRA and provided in 2011. The 2015 and beyond OFLs are projected from the 2013 assessment. Recent catches since 2002 have been above the new 2015 OFL since 2008 (Figure 35).

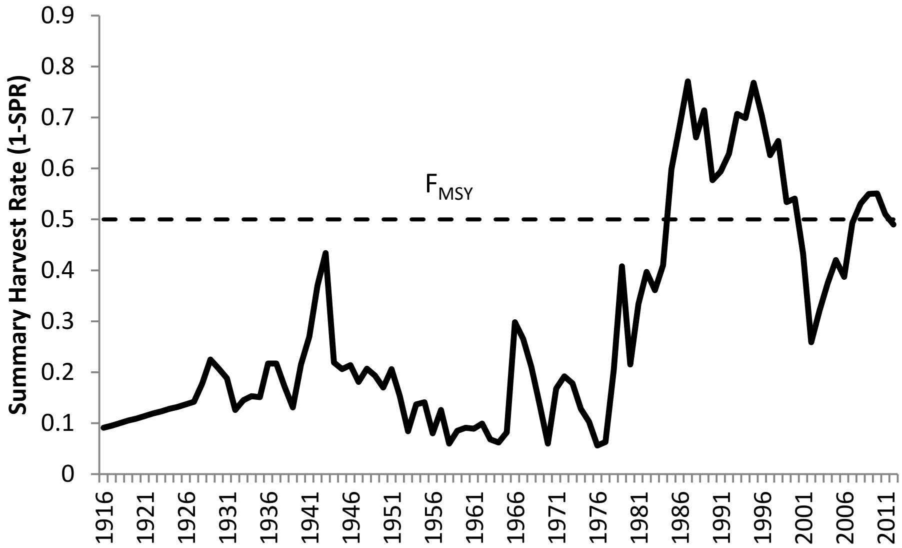

Figure 34. Time-series of estimated summary harvest rate for the west coast stocks of rougheye and blackspotted rockfish, 1916-2012. The dotted line is the harvest rate at the overfishing F_{MSY} proxy.

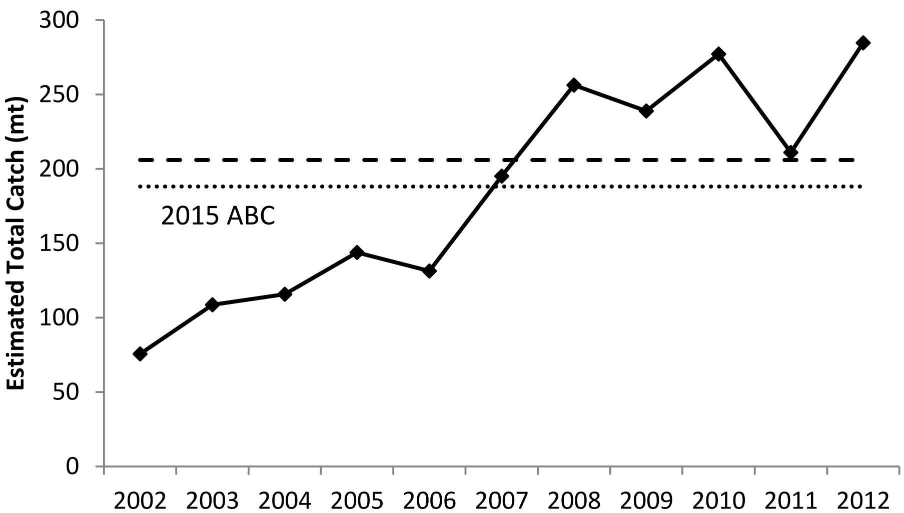

Figure 35. Estimated coastwide total annual catch of rougheye and blackspotted rockfish in 2002-2012 relative to the proposed 2015 OFLs and 2015 ABCs (summed north and south of 40º10' N lat. to compare to coastwide catches).

Sharpchin Rockfish

Distribution and Life History

Sharpchin rockfish (*Sebastes zacentrus*) range from the western Aleutian Islands (Attu Is.) to Southern California, though the core range is northern California to the Gulf of Alaska in waters between 100 m and 300 m (Love, *et al.* 2002). There is no indication of population structure in sharpchin rockfish. Sharpchin rockfish is a smaller-sized rockfish that inhabits waters up to 500 m, typically over muddy-rock habitats.

Mitochondrial DNA analyses indicate sharpchins are related mostly to harlequin, Puget Sound, and pygmy rockfishes (Love, *et al.* 2002).

Sharpchin rockfishes live to at least 58 years (Love, *et al.* 2002). Females attain a larger size than males with a reported maximum size of 45 cm (Love, *et al.* 2002). Off Oregon and Washington, the size at 50% maturity for females is 22cm with all females being mature at 30 cm. The size at 50% maturity is larger for samples farther north with 25 cm and 28 cm reported off British Columbia and the Gulf of Alaska, respectively. Larval releases occur from March to June off California and Oregon and during July off British Columbia.

Sharpchin eat a variety of prey including krill, shrimps, gammarid amphipods, copepods, and small fishes.

Stock Status and Management History

Sharpchin rockfish are managed in the northern and southern Slope Rockfish complexes.

A new data-moderate assessment of sharpchin rockfish was conducted in 2013, which indicated the stock was healthy with a depletion of 89% at the start of 2013 (Cope, *et al.* 2014). The SSC recommended the 2013 assessment be used for setting harvest specifications and upgraded the stock from a category 3 to a category 2 stock. The 2015 and 2016 OFLs are 382 and 372 mt, respectively. The coastwide OFLs were apportioned 80% to the north of 40º10' N lat. and 20% to the south to determine the OFL contributions to the Slope Rockfish complexes based on swept area biomass estimates from the triennial survey.

Stock Productivity

A high steepness of 0.95 was estimated in the 2013 sharpchin rockfish assessment, which is particularly high for a rockfish.

Sharpchin have a relatively low productivity (P = 1.36) and a relatively high vulnerability (V = 2.05) to overfishing based on the PSA scores derived prior to the 2013 assessment (Table 2).

Fishing Mortality

Sharpchin are not a major commercial target, though they are taken in large numbers and commonly seen in trawls that target Pacific ocean perch. They are taken most commonly of Oregon and Washington with POP, darkblotched, splitnose, and yellowmouth rockfish. While they are common in west coast bottom trawl catches, their smaller size makes them less valuable than the larger rockfish species. They are rarely taken in recreational fisheries.

1.1.5.4 Other Flatfish

The Other Flatfish complex contains most of the flatfish species managed in the Groundfish FMP (with the exception of arrowtooth flounder, Dover sole, English sole, petrale sole, and starry founder). These species include butter sole (*Isopsetta isolepis*), curlfin sole (*Pleuronichthys decurrens*), flathead sole (*Hippoglossoides elassodon*), Pacific sanddab (*Citharichthys sordidus*), rex sole (*Glyptocephalus zachirus*), rock sole (*Lepidopsetta bilineata*), and sand sole (*Psettichthys melanostictus*).

Pacific Sanddabs

Distribution and Life History

Pacific sanddab (*Citharichthys sordidus*) is a left-eyed flounder of the family Paralichthyidae and is widely distributed along the Pacific west coast from the Bering Sea to Cabo San Lucas, Baja California (Arora 1951; Hart 1988; Kramer and O'Connell 1995; Love, *et al.* 2005; Miller and Lea 1972; Rackowski and Pikitch 1989). Early studies reported that the species is the most abundant in the north-central portion of California from Eureka to San Francisco, but were also fairly common in southern California (Rackowski and Pikitch 1989). Early studies also reported that the species is usually found at depths between 18m and 275m and most commonly found at depths between 35m and 95m (Arora 1951; Demory 1971; Hart 1988; Miller and Lea 1972; Roedel 1953). On Oregon's continental shelf, Pacific sanddab is the most abundant small flatfish on sandy-bottom in the depths between 74 and 102 m (Pearcy 1978). Young Pacific sanddab (ages 0 and 1) are also found to be concentrated in the same depth range (Donohoe 2000). Pacific sanddab was also found to be relatively more abundant in shallow waters at higher latitudes (Chamberlain 1979).

Pacific sanddab are generally not considered a primary target for commercial fisheries along the U.S. west coast, but they are nevertheless highly prized by the commercial and recreational fisheries for their excellent edibility (CDFG 2001), and have long been an important component of the nearshore flatfish fishery, commanding a high price in fresh fish markets (Arora 1951). Commercial catches of Pacific sanddab were mostly from bottom trawl fisheries, and there is a long history of catches. Recreational catches of Pacific sanddab are from the hook and line fishery and most of this catch is from southern California waters. Some recreational anglers target Pacific sanddab in southern California, mostly from small boats and CPFVs (CDFG 2001).

Pacific sanddabs can growth to 35cm in length. They are sexually dimorphic, with females attaining larger sizes than males. Analysis of growth rates for both sexes between the southern and northern areas (divided at the California-Oregon border at 42º N lat.) showed no significant difference in growth rates for both sexes between the two areas.

There are no genetic or tagging studies informing stock structure of Pacific sanddab along the U.S. Pacific coast. Bottom trawl surveys in recent years (both NWFSC and triennial surveys) showed that Pacific sanddab are commonly caught along the coastal areas of all U.S. waters.

Pacific sanddabs play an important role in the coastal ecosystems in the U.S. waters, particularly because they are a relatively abundant species and are important prey items to a wide range of marine predators, including piscivorous fishes, sea mammals, and sea birds (Field, *et al.* 2006; Levin, *et al.* 2006).

Stock Status and Management History

Pacific sanddabs have been under federal management since the implementation of the groundfish FMP in 1982 and managed within the Other Flatfish complex of unassessed flatfish species. The management performance in recent years for Pacific sanddab has been good; the average 2005-2012 total annual catch has been about 23% of the stock's ACL/OY contribution to the Other Flatfish complex.

A coastwide assessment of Pacific sanddab was done in 2013 indicating the stock was at 95.5% of its unfished biomass (He, *et al.* 2013). The SSC recommended in 2013 that this assessment not be used for deciding harvest specifications since the scale of the stock's biomass could not be adequately estimated. However, the status estimate was precise enough to conclude the stock was well above the B_{MSY} proxy of $B_{25\%}$. The SSC recommended the stock continue to be categorized as a category 3 stock given the OFL estimate from the assessment depends on the biomass estimate, which was not estimated with adequate precision. The OFL estimate is therefore based on the DBSRA method used since 2011. The 2015 and 2016 OFL contribution of Pacific sanddab to the Other Flatfish complex is 4,801 mt.

Stock Productivity

A steepness prior of 0.8 was used in the 2013 assessment. Annual recruitment deviations were estimated between 1966 and 2011. Annual recruitment deviations were treated in a log-normal distribution with σ_R fixed at 0.45. Low recruitments occurred from the early 2000s to the mid-2000s. Recruitments in recent years have been at or above the long term average, with a strong recruitment in 2010.

The PSA productivity score of 2.4 indicates a very high relative productivity of Pacific sanddabs. This leads to a very low vulnerability (V = 1.25) of potential overfishing for the stock.

Fishing Mortality

There is a long history of commercial catches on Pacific sanddab (Barss 1976). Sette and Fiedler (1928) reported that landings of flatfish in California waters were first reported in 1892. The first available landings of Pacific sanddab in Oregon waters were in 1942 (Karnowski, *et al.* 2012). There were also commercial catches for mink foods in both California and Oregon waters in the 1950s and 1960s (Best 1959; Best 1961; Nitsos and Reed 1965). Reported total catches of Pacific sanddab were high in the late 1920s. And there was an increasing trend from the 1960s and reached the highest catch level in the late 1990s. Discards of Pacific sanddab in commercial trawl fisheries were high, primarily due to its small size (Sampson 2002). Catches of the species in recent years were in the range of 200 mt and 400 mt, well below the OFL contribution of the stock to the Other Flatfish complex of 4,801 mt.

Rex Sole

Distribution and Life History

Stock Status and Management History

Stock Productivity

Fishing Mortality

1.1.5.5 Other Fish

The Other Fish stock complex contains all the unassessed groundfish FMP species that are neither rockfish (family *Scorpaenidae*) nor flatfish, except for spiny dogfish which was newly assessed in 2011. These species include big skate (*Raja binoculata*), California skate (*Raja inornata*), leopard shark (*Triakis semifasciata*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias*), finescale codling (*Antimora microlepis*), Pacific grenadier (*Coryphaenoides acrolepis*), ratfish

(*Hydrolagus colliei*), cabezon (*Scorpaenichthys marmoratus*) (off Washington), and kelp greenling (*Hexagrammos decagrammus*).

A new assessment of spiny dogfish was done in 2011 indicating a healthy status with a spawning biomass depletion of 63% of its unfished biomass in 2011 (Gertseva and Taylor 2011). The spiny dogfish contribution to the complex 2013 and 2014 OFLs were projected from the new assessment using the proxy $F_{45\%}$ F_{MSY} harvest rate. The SSC categorized the stock as a category 2 stock since recruitments were not estimated.

The Other Fish complex is currently an aggregation of species with different life history characteristics and depth distributions. The historical catch of many of the component stocks is poorly understood with some stocks missing any record of landings on the west coast. The SSC recommended in 2012 this complex be re-evaluated for the next management cycle and to give consideration to adding new species related to the component species of the complex into the FMP and re-grouping species with similar vulnerabilities, ecological interactions, and distributions.

The Council proposes reconfiguring the Other Fish complex for 2015 and beyond to be comprised only of kelp greenling stocks coastwide, the Washington stock of cabezon, and leopard shark. The other species currently managed in the Other Fish complex are proposed to be designated as Ecosystem Component species.

1.1.6 Ecosystem Component Species

1.2 The Groundfish Harvest Specification Framework and Harvest Specifications for Fisheries in 2015 and Beyond

West coast groundfish stocks are managed under a harvest specification framework that considers scientific and management uncertainties. The first specification decided is the overfishing limit (OFL), which is the maximum sustainable yield (MSY) estimated for the stock and the legal harvest limit beyond which constitutes overfishing. The OFL is determined either by applying the harvest rate estimated to result in a biomass capable of sustaining MSY (i.e., F_{MSY}) recommended by the Council's Scientific and Statistical Committee (SSC) to an estimate of exploitable biomass in the case of assessed stocks or through an approved data-poor method (e.g., depletion-corrected average catch (DCAC) or depletion-based stock reduction analysis (DBSRA)) in the case of unassessed stocks. Regardless of the method or data informing the calculation of an OFL, there is scientific uncertainty in the estimation of an OFL. The Pacific Coast Groundfish Fishery Management Plan (FMP) mandates a precautionary buffer to address this uncertainty by prescribing an acceptable biological catch (ABC) harvest level that is less than the OFL. A further reduction from the ABC can be specified when setting an annual catch limit (ACL) that accounts for management uncertainty, socioeconomic considerations, ecological considerations, conservation objectives, and/or other considerations the Council and NMFS wish to address. Since the ACL can be set equal to the ABC, the ABC is the highest harvest level that can be considered for west coast groundfish stocks.

The following sections describe in detail the science informing 2015 and 2016 harvest specification decisions. Table 8 summarizes the 2014, 2015, and 2016 harvest specifications for west coast groundfish stocks.

Table 8. Status quo 2014 harvest specifications and final preferred overfishing limits (OFLs in mt), acceptable biological catches (ABCs in mt), annual catch limits (ACLs in mt), and ecosystem component species designations for west coast groundfish stocks and stock complexes in 2015 and 2016 (stocks with new assessments in bold).

Stock	2014			2015			2016		
	OFL	ABC	ACL	OFL	ABC	ACL	OFL	ABC	ACL
OVERFISHED STOCKS									
BOCACCIO S. of 40^{0}10’	**881**	**842**	**337**	**1,444**	**1,380**	**349**	**1,351**	**1,291**	**362**
CANARY	741	709	119	733	701	122	729	697	125
COWCOD S. of 40^{0}10’	**12**	**9**	**3**	**67**	**60**	**10**	**66**	**59**	**10**
DARKBLOTCHED	**553**	**529**	**330**	**574**	**549**	**338**	**580**	**554**	**346**
PACIFIC OCEAN PERCH	838	801	153	842	805	158	850	813	164
PETRALE SOLE	**2,774**	**2,652**	**2,652**	**2,946**	**2,816**	**2,816**	**3,044**	**2,910**	**2,910**
YELLOWEYE	51	43	18	52	47	18	52	47	19
NON-OVERFISHED STOCKS									
Arrowtooth Flounder	6,912	5,758	5,758	6,599	5,497	5,497	6,396	5,328	5,328
Black Rockfish (OR-CA)	1,166	1,115	1,000	1,176	1,124	1,000	1,183	1,131	1,000
Black Rockfish (WA)	428	409	409	421	402	402	423	404	404
Cabezon (CA)	165	158	158	161	154	154	158	151	151
Cabezon (OR)	49	47	47	49	47	47	49	47	47
California scorpionfish	122	117	117	119	114	114	117	111	111
Chilipepper S. of 40º10'	1,722	1,647	1,647	1,703	1,628	1,628	1,694	1,619	1,619
Dover Sole	77,774	74,352	25,000	66,871	63,929	50,000	59,221	56,615	50,000
English Sole	**5,906**	**5,646**	**5,646**	**12,092**	**11,040**	**11,040**	**8,493**	**7,754**	**7,754**
Lingcod N of 40º10'	3,162	2,878	2,878	3,010	2,830	2,830	2,891	2,719	2,719
Lingcod S. of 40º10'	1,276	1,063	1,063	1,205	1,004	1,004	1,136	946	946
Longnose skate	2,816	2,692	2,000	2,449	2,341	2,000	2,405	2,299	2,000
Longspine Thornyhead (coastwide)	**3,304**	**2,752**	**NA**	**5,007**	**4,171**	**NA**	**4,763**	**3,968**	**NA**
Longspine Thornyhead N of 34°27'	**NA**	**NA**	**1,958**	**NA**	**NA**	**3,170**	**NA**	**NA**	**3,015**
Longspine Thornyhead S. of 34°27'	**NA**	**NA**	**347**	**NA**	**NA**	**1,001**	**NA**	**NA**	**952**
Pacific Cod	3,200	2,221	1,600	3,200	2,221	1,600	3,200	2,221	1,600

Stock	2014			2015			2016		
	OFL	ABC	ACL	OFL	ABC	ACL	OFL	ABC	ACL
Sablefish (coastwide)	7,158	6,535	NA	7,857	7,173	NA	8,526	7,784	NA
Sablefish N of 36°	NA	NA	4,349	NA	NA	4,793	NA	NA	5,241
Sablefish S. of 36°	NA	NA	1,560	NA	NA	1,719	NA	NA	1,880
Shortbelly	6,950	5,789	50	6,950	5,789	50	6,950	5,789	50
Shortspine Thornyhead (coastwide)	**2,310**	**2,208**	**NA**	**3,203**	**2,668**	**NA**	**3,169**	**2,640**	**NA**
Shortspine Thornyhead N of 34°27'	**NA**	**NA**	**1,525**	**NA**	**NA**	**1,745**	**NA**	**NA**	**1,726**
Shortspine Thornyhead S. of 34°27'	**NA**	**NA**	**393**	**NA**	**NA**	**923**	**NA**	**NA**	**913**
Spiny dogfish	2,950	2,024	NA	2,523	1,912	1,912	2,503	1,897	1,897
Splitnose S. of $40^{0}10$’	1,747	1,670	1,670	1,794	1,715	1,715	1,826	1,746	1,746
Starry Flounder	1,834	1,528	1,528	1,841	1,534	1,534	1,847	1,539	1,539
Widow	4,435	4,212	1,500	4,137	3,929	2,000	3,990	3,790	2,000
Yellowtail N of $40^{0}10$’	**4,584**	**4,382**	**4,382**	**12,281**	**11,213**	**11,213**	**11,647**	**10,634**	**10,634**
STOCK COMPLEXES									
Nearshore Rockfish North	110	94	94	90	79	69	90	79	69
Shelf Rockfish North	2,195	1,932	968	2,208	1,944	1,944	2,217	1,953	1,952
Slope Rockfish North a/	1,553	1,414	1,160	1,804	1,669	1,669	1,818	1,683	1,683
Nearshore Rockfish South	1,160	1,001	990	1,309	1,165	1,114	1,317	1,163	1,006
Shelf Rockfish South	1,913	1,620	714	1,914	1,625	1,624	1,915	1,626	1,625
Slope Rockfish South a/	685	622	622	806	698	687	807	699	689
Other Flatfish	10,060	6,982	4,884	11,298	8,620	8,620	9,948	7,496	7,496
Other Fish	6,802	4,697	4,697						
Cabezon (WA)	*b/*	*b/*	*b/*	*4.5*	*3.7*	*3.7*	*4.8*	*4.0*	*4.0*
Kelp greenling (CA)	*118.9*	*82.5*	*NA*	*118.9*	*99.2*	*99.2*	*118.9*	*99.2*	*99.2*
Kelp greenling (OR)	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*
Kelp greenling (WA)	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*
Leopard shark	*167.1*	*139.4*	*139.4*	*167.1*	*139.4*	*139.4*	*167.1*	*139.4*	*139.4*

Stock	2014			2015			2016		
	OFL	ABC	ACL	OFL	ABC	ACL	OFL	ABC	ACL
ECOSYSTEM COMPONENT SPECIES									
Big skate	*458.0*	*317.9*	*NA*	No harvest specifications for an EC species					
California skate	*86.0*	*59.7*	*NA*	No harvest specifications for an EC species					
Aleutian skate	*c/*	*c/*	*c/*	No harvest specifications for an EC species					
Roughtail/black skate	*c/*	*c/*	*c/*	No harvest specifications for an EC species					
Bering/sandpaper skate	*c/*	*c/*	*c/*	No harvest specifications for an EC species					
All other skates	*c/*	*c/*	*c/*	No harvest specifications for an EC species					
Pacific grenadier	*1,519.0*	*1,054.2*	*NA*	No harvest specifications for an EC species					
Giant grenadier	*c/*	*c/*	*c/*	No harvest specifications for an EC species					
All other grenadiers	*c/*	*c/*	*c/*	No harvest specifications for an EC species					
Ratfish	*1,441.0*	*1,000.1*	*NA*	No harvest specifications for an EC species					
Soupfin shark	*61.6*	*42.8*	*NA*	No harvest specifications for an EC species					
Finescale codling	*b/*	*b/*	*b/*	No harvest specifications for an EC species					

a/ 2015 and 2016 harvest specifications assume the status quo stock complex structure. See "Slope RF" worksheet for stock complex alternatives.

b/ No OFL or ABC contribution for these stocks given the lack of an approved method.

c/ No harvest specifications adopted since these species are not currently managed in the FMP.

1.2.1 Overfishing Limits

The OFL is the MSY harvest level associated with the current stock abundance and is the estimated or proxy MSY harvest level, which is the harvest threshold above which overfishing occurs. The methods for determining OFL are based on the best available science and the recommendation of the SSC; therefore, alternatives are not developed for this reference point.

Amendment 23, which was adopted in December 2010 and implemented in 2011, revised the descriptions of species categories used in the development of harvest specifications. The first category (category 1) includes those species with relatively data-rich quantitative stock assessments that are developed on the basis of catch-at-age, catch-at-length, or other data. Recruitments are estimated for category 1 stocks. OFLs and overfished/rebuilding thresholds can generally be calculated for these species. The second category (category 2) includes species for which some biological indicators are available yet data informing an assessment are limited. Category 2 assessments include a new class of data-moderate assessments where catch data and one or more indices of abundance inform the status and estimated biomass of the stock, but age and length compositional data are excluded. This type of assessment allows for a more expeditious assessment review than the category 1 benchmark assessments, which require a rigorous review process[8], thus enabling more stocks to be assessed in an assessment cycle. Two data-moderate assessment models were approved for the 2013 assessment cycle (which informs management decision-making for 2015 and beyond): extended depletion-based stock reduction analysis (XDBSRA) and extended simple stock synthesis (exSSS). The third category (category 3) includes minor species which are caught and where the only available information is catch-based data. When setting the 2015 and 2016 OFLs for category 1 or 2 species, the F_{MSY} harvest rate or a proxy was applied to the estimated exploitable biomass. A policy of using a default harvest rate as a proxy for the fishing mortality rate that is expected to achieve MSY is also referred to as the F_{MSY} control rule or maximum fishing mortality threshold (MFMT) harvest rate. Catch-based methods are generally used to determine the OFL for category 3 species.

New stock assessments, stock assessment updates and rebuilding analyses recommended by the SSC as the "best available science" and suitable for use in setting biennial harvest specifications were approved by the Council for setting the 2015 and 2016 biennial harvest specifications. Eight full stock assessments, eight data-moderate stock assessments, and one stock assessment update were prepared to inform the 2015 and 2016 harvest specifications. Full stock assessments, those that consider the appropriateness of the assessment model and that revise the model as necessary, were prepared for the following stocks: aurora rockfish, cowcod south of 34º27' N lat., darkblotched rockfish, longspine thornyhead, petrale sole, Pacific sanddabs, rougheye/blackspotted rockfish (analyzed as a complex of two stocks), and shortspine thornyhead. These were the first west coast assessments for aurora rockfish, rougheye/blackspotted rockfish, and Pacific sanddabs. OFLs were estimated for seven of these eight stocks; the exception being Pacific sanddabs where the assessment was recommended to inform stock status but not estimates of current biomass or OFL. Eight stocks were assessed using the approved data-moderate models: brown rockfish, China rockfish, copper rockfish, English sole, rex sole, sharpchin rockfish, stripetail rockfish, and yellowtail rockfish north of 40º10' N lat. OFLs were estimated for seven of these eight stocks; the exception being stripetail rockfish where the assessment was recommended to inform stock status but not estimates of current biomass or OFL. A stock assessment update, which incorporates new data through existing models without changing the model, was prepared for bocaccio. For stocks that did not have new assessments or an update prepared, the Council considered OFLs projected in the most recent stock assessment or update or estimated using historical landings data.

[8] The review process for new benchmark assessments includes a Stock Assessment Review (STAR) panel review and a subsequent review by the Council's Scientific and Statistical Committee (SSC). Only those assessments that are endorsed by the SSC are considered for formal adoption in the Council process.

Two data-poor methods, depletion-corrected average catch (DCAC) and depletion-based stock reduction analysis (DBSRA), used to determine most of the category 3 OFLs since 2011 were recommended for use in determining 2015 and 2016 OFLs for unassessed stocks, where there was enough harvest data to use these methods. Average historical catch was used to determine OFLs for stocks where the historical catches were too sparse to use DCAC or DBSRA methods.

For 2015 and 2016, default harvest rates were used as a proxy for the fishing mortality rate that is expected to achieve the MSY (F_{MSY}). A proxy is used because there is insufficient information for most Pacific Coast groundfish stocks to establish a species-specific F_{MSY}. In 2015 and 2016, the following default harvest rate proxies, based on SSC recommendations, were used: $F_{30\%}$ for assessed flatfish, $F_{40\%}$ for Pacific whiting, $F_{50\%}$ for rockfish (including thornyheads), $F_{50\%}$ for spiny dogfish, and $F_{45\%}$ for other groundfish such as sablefish and lingcod. The FMP allows default harvest rate proxies to be modified as scientific knowledge improves for a particular species.

Table 9 compares the 2015 and 2016 OFLs with the 2014 OFL for stocks managed with stock-specific harvest specifications. The OFLs are specified for all the stocks and stock complexes actively managed in the fishery, as required by the FMP. The 2014 OFLs in Table 9 were projected from stock assessments done in 2011 or earlier. The 2015 and 2016 OFLs in Table 9 include the results of stock assessments done in 2013. The OFL contributions for the cowcod stock south of 40º10' N lat. are shown as area-specific OFL contributions because they were derived using different methodologies. The Conception area OFLs for cowcod were projected from the 2013 rebuilding analysis (Dick and MacCall 2013a) and the Monterey area OFLs were derived using DBSRA. Although the area-specific OFL contributions for cowcod are displayed in Table 9, the OFL is specified for the entire stock south of 40°10' N lat. and not for each area. The 2014 OFL and 2015 and 2016 OFL contributions of individual stocks within the six Rockfish complexes, the Other Flatfish complex, and the Other Fish complex are shown in italics in **Error! Reference source not found.**. The OFL contributions for the individual stocks were summed to derive the complex OFLs. **Error! Reference source not found.** assumes the status quo stock complex structure for the slope rockfish complexes. However, the Council is contemplating a restructuring of these complexes. The Council also recommended restructuring the status quo Other Fish complex by removing spiny dogfish and managing that stock with stock-specific harvest specifications (Table 9), designating the skates, grenadiers, soupfin shark, finescale codling, and ratfish stocks as Ecosystem Component species, and managing kelp greenling, the Washington stock of cabezon, and leopard shark in a reconfigured Other Fish complex.

The preferred 2015 and 2016 OFLs for west coast groundfish stocks and stock complexes used the same policies (e.g., F_{MSY} harvest rates and methodologies) used to determine the 2014 OFLs (i.e., No Action) with the following exceptions:

- The spiny dogfish F_{MSY} proxy harvest rate was changed from $F_{45\%}$ to $F_{50\%}$;
- Spiny dogfish is recommended to be removed from the Other Fish complex and managed with stock-specific harvest specifications;
- The skates, Pacific grenadier, finescale codling, soupfin shark, and ratfish stocks are removed from the Other Fish complex and designated as Ecosystem Component species;
- Those endemic skate and grenadier species not previously managed in the FMP are recommended to be added to the FMP and designated as Ecosystem Component species; and
- Kelp greenling, the Washington stock of cabezon, and leopard shark are recommended for management in a new Shallow Roundfish complex (there is also an alternative to manage these stocks individually with stock-specific harvest specifications).

Table 9. Specified 2014 OFLs (i.e., No Action alternative) (mt) and preferred 2015 and 2016 OFLs (mt) for west coast groundfish stocks stock complexes (overfished stocks in CAPS, stocks with new assessments in bold, substock contributions to a stock OFL in *italics*).

Stock	2014 OFL	Category	2015 OFL	2016 OFL
OVERFISHED STOCKS				
BOCACCIO S. of 40⁰10' N. lat.	**881**	**1**	**1,444**	**1,351**
CANARY	741	1	733	729
COWCOD S. of 40⁰10' N. lat.	12		**66.6**	**68.4**
COWCOD (Conception)	**7**	**2**	***55.0***	***56.4***
COWCOD (Monterey)	5	3	*11.6*	*12.0*
DARKBLOTCHED	**553**	**1**	**574**	**580**
PACIFIC OCEAN PERCH	838	1	842	850
PETRALE SOLE	**2,774**	**1**	**2,946**	**3,044**
YELLOWEYE	51	2	52	52
NON-DEPLETED STOCKS				
Arrowtooth Flounder	6,912	2	6,599	6,396
Black Rockfish (OR-CA)	1,166	1	1,176	1,183
Black Rockfish (WA)	428	1	421	423
Cabezon (CA)	165	1	161	158
Cabezon (OR)	49	1	49	49
California scorpionfish	122	1	119	117
Chilipepper S. of 40⁰10' N. lat.	1,722	1	1,703	1,694
Dover Sole	77,774	1	66,871	59,221
English Sole	**5,906**	**2**	**12,092**	**8,493**
Lingcod N. of 40º10' N. lat.	3,162	1	3,010	2,891
Lingcod S. of 40º10' N. lat.	1,276	2	1,205	1,136
Longnose skate	2,816	1	2,449	2,405
Longspine Thornyhead (coastwide)	**3,304**	**2**	**5,007**	**4,763**
Pacific Cod	3,200	3	3,200	3,200
Sablefish (coastwide)	7,158	1	7,857	8,526
Shortbelly	6,950	2	6,950	6,950
Shortspine Thornyhead (coastwide)	2,310	**2**	**3,203**	**3,169**
Spiny dogfish	2,950	2	2,523	2,503
Splitnose S. of 40⁰10' N. lat.	1,747	1	1,794	1,826
Starry Flounder	1,834	2	1,841	1,847
Widow	4,435	1	4,137	3,990
Yellowtail N. of 40⁰10' N. lat.	**4,584**	**2**	**12,281**	**11,647**
STOCK COMPLEXES				
Nearshore Rockfish North	110		88	88
Black and yellow	*0.01*	3	*0.01*	*0.01*
Blue (CA)	*27.4*	2	*27.4*	*27.7*
Blue (OR & WA)	*32.3*	3	*32.3*	*32.3*
Brown	***5.5***	**2**	***1.9***	***1.9***
Calico	-	3	-	-
China	***9.8***	**2**	***7.2***	***7.4***
Copper	***26.0***	**2**	***10.6***	***10.3***
Gopher	-	3	-	-
Grass	*0.7*	3	*0.7*	*0.7*
Kelp	*0.01*	3	*0.01*	*0.01*

Stock	2014 OFL	Category	2015 OFL	2016 OFL
Olive	*0.3*	3	*0.3*	*0.3*
Quillback	*7.4*	3	*7.4*	*7.4*
Treefish	*0.2*	3	*0.2*	*0.2*
Shelf Rockfish North	2,195		2,209	2,218
Bronzespotted	-	3	-	-
Bocaccio	*284.0*	3	*284.0*	*284.0*
Chameleon	-	3	-	-
Chilipepper	*129.6*	3	*128.2*	*127.5*
Cowcod	-	3	*0.4*	*0.4*
Flag	*0.1*	3	*0.1*	*0.1*
Freckled	-	3	-	-
Greenblotched	*1.3*	3	*1.3*	*1.3*
Greenspotted 40°10' to 42° N. lat.	*9.4*	2	*10.0*	*9.9*
Greenspotted N. of 42 N. lat. (OR & WA)	*6.1*	3	*6.1*	*6.1*
Greenstriped	*1,268.3*	2	*1,281.9*	*1,292.0*
Halfbanded	-	3	-	-
Harlequin	-	3	-	-
Honeycomb	-	3	-	-
Mexican	-	3	-	-
Pink	*0.004*	3	*0.004*	*0.004*
Pinkrose	-	3	-	-
Puget Sound	-	3	-	-
Pygmy	-	3	-	-
Redstripe	*269.9*	3	*269.9*	*269.9*
Rosethorn	*12.9*	3	*12.9*	*12.9*
Rosy	*3.0*	3	*3.0*	*3.0*
Silvergray	*159.4*	3	*159.4*	*159.4*
Speckled	*0.2*	3	*0.2*	*0.2*
Squarespot	*0.2*	3	*0.2*	*0.2*
Starry	*0.004*	3	*0.004*	*0.004*
Stripetail	*40.4*	3	*40.4*	*40.4*
Swordspine	*0.0001*	3	*0.0001*	*0.0001*
Tiger	*1.0*	3	*1.0*	*1.0*
Vermilion	*9.7*	3	*9.7*	*9.7*
Slope Rockfish North	1,553		1,804	1,818
Aurora	***15.4***	**1**	***17.4***	***17.5***
Bank	*17.2*	3	*17.2*	*17.2*
Blackgill	*4.7*	3	*4.7*	*4.7*
Redbanded	*45.3*	3	*45.3*	*45.3*
Rougheye/Blackspotted	***71.1***	**2**	***201.9***	***206.8***
Sharpchin	***214.5***	**2**	***305.6***	***297.6***
Shortraker	*18.7*	3	*18.7*	*18.7*
Splitnose	*974.1*	1	*1,000.6*	*1,018.2*
Yellowmouth	*192.4*	3	*192.4*	*192.4*
Nearshore Rockfish South	1,160		1,313	1,288
Shallow Nearshore Species	NA	NA	NA	NA
Black and yellow	*27.5*	3	*27.5*	*27.5*
China	***16.6***	**2**	***55.2***	***52.7***

Stock	2014 OFL	Category	2015 OFL	2016 OFL
Gopher (N of Pt. Conception)	*153.0*	1	*148.0*	*144.0*
Gopher (S of Pt. Conception)	*25.6*	3	*25.6*	*25.6*
Grass	*59.6*	3	*59.6*	*59.6*
Kelp	*27.7*	3	*27.7*	*27.7*
Deeper Nearshore Species	NA	NA	NA	NA
Blue (assessed area)	*187.8*	2	*188.6*	*190.3*
Blue (S of 34°27' N. lat.)	*72.9*	3	*72.9*	*72.9*
Brown	***204.6***	**2**	***163.8***	***160.2***
Calico	-	3	-	-
Copper	***141.5***	**2**	***301.1***	***284.3***
Olive	*224.6*	3	*224.6*	*224.6*
Quillback	*5.4*	3	*5.4*	*5.4*
Treefish	*13.2*	3	*13.2*	*13.2*
Shelf Rockfish South	1,912.9		1,917.9	1,918.9
Bronzespotted	*3.6*	3	*3.6*	*3.6*
Chameleon	-	3	-	-
Flag	*23.4*	3	*23.4*	*23.4*
Freckled	-	3	-	-
Greenblotched	*23.1*	3	*23.1*	*23.1*
Greenspotted	*80.3*	2	*82.8*	*82.0*
Greenstriped	*232.7*	2	*235.1*	*237.0*
Halfbanded	-	3	-	-
Harlequin	-	3	-	-
Honeycomb	*9.9*	3	*9.9*	*9.9*
Mexican	*5.1*	3	*5.1*	*5.1*
Pink	*2.5*	3	*2.5*	*2.5*
Pinkrose	-	3	-	-
Pygmy	-	3	-	-
Redstripe	*0.5*	3	*0.5*	*0.5*
Rosethorn	*2.1*	3	*2.1*	*2.1*
Rosy	*44.5*	3	*44.5*	*44.5*
Silvergray	*0.5*	3	*0.5*	*0.5*
Speckled	*39.4*	3	*39.4*	*39.4*
Squarespot	*11.1*	3	*11.1*	*11.1*
Starry	*62.6*	3	*62.6*	*62.6*
Stripetail	*23.6*	3	*23.6*	*23.6*
Swordspine	*14.2*	3	*14.2*	*14.2*
Tiger	*0.04*	3	*0.04*	*0.04*
Vermilion	*269.3*	3	*269.3*	*269.3*
Yellowtail	*1,064.4*	3	*1,064.4*	*1,064.4*
Slope Rockfish South	685		806	807
Aurora	***26.1***	**1**	***74.3***	***74.3***
Bank	*503.2*	3	*503.2*	*503.2*
Blackgill	*134.0*	2	*137.0*	*140.0*
Pacific ocean perch	-	3	-	-
Redbanded	*10.4*	3	*10.4*	*10.4*
Rougheye/Blackspotted	***0.4***	**2**	***4.1***	***4.2***
Sharpchin	***9.8***	**2**	***76.4***	***74.4***

Stock	2014 OFL	Category	2015 OFL	2016 OFL
Shortraker	*0.1*	3	*0.1*	*0.1*
Yellowmouth	*0.8*	3	*0.8*	*0.8*
Other Flatfish	10,060		11,298	9,948
Butter sole	*4.6*	3	*4.6*	*4.6*
Curlfin sole	*8.2*	3	*8.2*	*8.2*
Flathead sole	*35.0*	3	*35.0*	*35.0*
Pacific sanddab	*4,801.0*	**3**	*4,801.0*	*4,801.0*
Rex sole	***4,371.5***	**2**	***5,609.0***	***4,259.0***
Rock sole	*66.7*	3	*66.7*	*66.7*
Sand sole	*773.2*	3	*773.2*	*773.2*
Other Fish a/	6,802	3	291	291
Cabezon (WA)	*b/*	3	*4.5*	*4.8*
Kelp greenling (CA)	*118.9*	3	*118.9*	*118.9*
Kelp greenling (OR)	*b/*	3	*b/*	*b/*
Kelp greenling (WA)	*b/*	3	*b/*	*b/*
Leopard shark	*167.1*	3	*167.1*	*167.1*

a/ Values for these specifications are the sum of known contributions of component stocks. The 2014 OFL is not comparable to the 2015 and 2016 OFLs since the Other Fish complex was restructured by designating most of the component species as Ecosystem Component species.

b/ No OFL contribution for these stocks given the lack of an approved method.

1.2.2 Acceptable Biological Catches

The 2014, 2015, and 2016 ABCs are annual catch specifications that are the stock or stock complex's OFL reduced by an amount associated with the scientific uncertainty in estimating the OFL. Under the FMP harvest specification framework, scientific advice that is relatively uncertain will result in ABCs that are relatively lower, all other things being equal (i.e., a precautionary reduction in catch will occur due purely to scientific uncertainty in estimating the OFL). The ABC is the catch level that ACLs may not exceed. As explained in more detail below, the SSC recommended a two-step approach referred to as the P* approach for determining ABCs. In the P* approach, the SSC determines the amount of scientific uncertainty associated with estimating the OFL in stock assessments, referred to as the sigma (σ) value. Since the OFL is estimated by applying the harvest rate estimated or assumed to produce MSY (i.e., F_{MSY}) to the exploitable biomass and since assumed proxy F_{MSY} harvest rates by taxa are currently used to estimate the OFL, the variance in estimating biomass is the metric used for determining sigma. The Council chooses its preferred level of risk of overfishing, which is designated as the overfishing probability[9] (P*) (see Section 1.2.1). The scientists then apply the P* value to the sigma value to determine the amount by which the OFL is reduced to establish the ABC. The SSC's recommendations for sigma and the reductions from OFL associated with different P* values are science-based recommendations; therefore, alternatives to these values are not analyzed.

The SSC assigned each species in the groundfish fishery to one of three categories based on the level of information available about the species. Table 10 shows the criteria used by the SSC to categorize stocks. The SSC's recommended sigma value for category 1 stocks is based on a statistical analysis of the variance within and among stock assessments. The meta-analysis used stock assessments from 17 data-rich stocks to determine the proxy sigma value for category 1 stocks. The general methodology used by the SSC subcommittees to assess among-assessment uncertainty was to compare previous stock assessments and stock assessment updates[10], and consider the logarithms of the ratios of the biomass estimates for each pair of assessments and their reciprocals using the last 20 years from an assessment. This provides a distribution of stock size differences in log-space and, if this variation is averaged over species, provides a general view of total biomass variation (represented as sigma - σ) that emerges among repeat assessments of stocks, while embracing a wide range of factors that affect variability in results. The SSC indicated that biomass is most likely the dominant source of uncertainty; however, it is anticipated that other factors will need to be considered in the future.

[9] The overfishing probability (P*) is the probability of overfishing a stock or stock complex (i.e., exceeding the specified OFL) based solely on the scientific uncertainty in estimating the OFL.

[10] Stock assessment updates were excluded from the meta-analysis unless they were the most recent assessment conducted (in which case the original full assessment upon which the update was based was excluded from the meta-analysis) because of constraints imposed by the Terms of Reference for groundfish stock assessments on how much update assessments could change from the last full assessment.

Table 10. Criteria used by the SSC to categorize stocks based on the quantity and quality of data informing the estimate of OFL. Stock categories are used in deciding 2015 and 2016 ABCs that accommodate the uncertainty in estimating OFLs.

Category	Sub-category	Criteria
Category 1 - Data rich stocks. OFL based on F_{MSY} or F_{MSY} proxy from model output. ABC based on P* buffer.		
1	a	Reliable compositional (age and/or size) data sufficient to resolve year-class strength and growth characteristics. Only fishery-dependent trend information available. Age/size structured assessment model.
1	b	As in 3a, but trend information also available from surveys. Age/size structured assessment model.
1	c	Age/size structured assessment model with reliable estimation of the stock-recruit relationship.
Category 2 - Data moderate. OFL derived from model output (or natural mortality).		
2	a	M*survey biomass assessment (as in Rogers 1996).
2	b	Historical catches, fishery-dependent trend information only. An aggregate population model is fit to the available information.
2	c	Historical catches, survey trend information, or at least one absolute abundance estimate. An aggregate population model is fit to the available information.
2	d	Full age-structured assessment, but results are substantially more uncertain than assessments used in the calculation of the P* buffer. The SSC will provide a rationale for each stock placed in this category. Reasons could include that assessment results are very sensitive to model and data assumptions, or that the assessment has not been updated for many years.
Category 3 - Data poor. OFL derived from data-poor methods using historical catch.		
3	a	No reliable catch history. No basis for establishing OFL.
3	b	Reliable catch estimates only for recent years. OFL is average catch during a period when stock is considered to be stable and close to B_{MSY} equilibrium on the basis of expert judgment.
3	c	Reliable aggregate catches during period of fishery development and approximate values for natural mortality. Default analytical approach DCAC.
3	d	Reliable annual historical catches and approximate values for natural mortality and age at 50% maturity. Default analytical approach DBSRA.

Based on this analysis, the SSC recommended using the biomass variance statistic of $\sigma = 0.36$ for category 1 stocks. In cases where the stock biomass estimated in the most recent assessment has a variance greater than the variance estimated for that stock's category, the assessment's estimated biomass variance is used instead. The stock biomass estimated in the 2011 widow rockfish assessment was judged to have a greater variance than the sigma of 0.36 used for other category 1 stocks. In this case, the SSC recommended using a sigma value of 0.41 for deciding the widow rockfish ABC. Likewise, the 2013 assessment for aurora rockfish also indicated a greater variance than the sigma of 0.36 used for other category 1 stocks. In that case, a sigma value of 0.39 was chosen for deciding the aurora rockfish ABC. Each P* is mapped to its corresponding buffer fraction. The Council then recommends an appropriate P* value. When the P* approach is used, the upper limit of P* allowed by the FMP is 0.45.

Since there is greater scientific uncertainty for category 2 and 3 stocks relative to category 1 stocks, the scientific uncertainty buffer is generally greater than that recommended for category 1 stocks. The SSC recommended sigma values for category 2 and 3 stocks of 0.72 and 1.44, respectively (i.e., two and four times the sigma for category 1 stocks). The specific values of 0.72 and 1.44 were recommended by the SSC and considered to be the best available scientific information; however, the values are not based on a formal analysis of assessment outcomes and could change substantially when the SSC reviews additional analyses in future management cycles.

Table 11 shows the relationship between the values for sigma and the buffer for a range of values for P*.

1.2.2.1 Considerations for Deciding the Overfishing Probability (P*) When Specifying an Acceptable Biological Catch

The overfishing probability metric (P*) is technically defined as the probability of overfishing a stock based on the scientific uncertainty in estimating the OFL. This definition has generated much debate in the Council's harvest specification decision-making process. One side of the debate maintains the literal definition of the overfishing probability. The counter argument is that P* is the Council's level of risk tolerance that the OFL will be exceeded. Both arguments have merit but the latter argument is more tractable in the Council process and is a more accurate representation of how the P* value is decided.

The one problem with the literal definition of P* is that not all assessments are alike. The SSC recognizes this and has recommended a proxy value of sigma (0.36) for category 1 stocks, which are stocks that have assessments with estimated recruitment deviations (i.e., the strength of individual year classes is estimated). However, the SSC acknowledges that the proxy sigma for category 1 stocks may not represent the relative uncertainty of all category 1 stocks. For this reason, sigma is estimated in new category 1 assessments. If the estimated sigma is greater than the proxy value of 0.36, then the estimated sigma is used rather than the proxy value. However, the true scientific uncertainty is not estimated well in this process. Assessments vary greatly in the amount of uncertainty that is characterized in the assessment model. It is common that one or more parameters are either estimated outside the model or assumed based on the assessment scientist's best judgment. In such cases, the uncertainty associated with that parameter is also not estimated nor characterized in any way within the assessment. For instance, the 2011 sablefish assessment (Stewart, *et al.* 2011) appears to estimate current biomass with significant uncertainty. However, within that assessment many of the key parameters that affect the estimated biomass such as growth and natural mortality are explicitly estimated within the model[11]. The confidence interval associated with the ending year biomass estimate appears quite large relative to other assessments since the uncertainties associated with estimated growth and natural mortality are included within the overall assessment uncertainty. This compares to many other assessments, such as splitnose rockfish in 2009 (Gertseva, *et al.* 2009) or longspine thornyhead in 2013 (Stephens and Taylor 2013) where many parameters are assumed and fixed (e.g., natural mortality and steepness) and the estimated biomass variance appears smaller. However, this is not necessarily the case; more of the true uncertainty in estimated biomass is characterized in the sablefish assessment.

The spectrum of assessment approaches vary between fully Bayesian models with most key parameters estimated (e.g., sablefish in 2011) to deterministic models with most parameters fixed (e.g., longspine thornyhead in 2013). Within the spectrum are parameter estimations using informed or diffuse priors. Given this variety of approaches and the degree to which uncertainty is characterized, it is hard to pursue a formulaic approach where the P* decision hinges on the scientific uncertainty associated with estimating the OFL. For the most part, the relative uncertainty in estimating the OFL is addressed with the SSC's sigma specification. The Council's P* decision is therefore most appropriately considered as a risk assessment given many sources of uncertainty regarding the true state of nature for a stock.

1.2.2.2 Preferred 2015 and 2016 Acceptable Biological Catches

The ABCs for actively-managed stock complexes were determined by summing ABC values of the component stocks. Table 12 and Table 13 depict the potential alternative 2015 and 2016 ABCs, respectively for stocks and stock complexes across a range of P* values from 0.25 to 0.45. The Council

[11] Stock-recruitment steepness (h), another parameter that affects the estimate of biomass, is fixed at an assumed 0.6 in the 2011 sablefish assessment.

selected a P* value of 0.45 for most category 1 stocks. With a P* value of 0.45, a sigma value of 0.36 corresponds with a reduction of 4.4 percent from the OFL when deriving the ABC. For sablefish, the thornyheads, and assessed flatfish stocks, the Council selected a P* value of 0.4. The preferred 2015 and 2016 ABCs used the same policies (i.e., stock categories, sigma and P* values) used to determine the 2014 No Action ABCs with the following exceptions:

- Aurora rockfish was changed from a category 3 to a category 1 stock based on the new benchmark stock assessment adopted in 2013 (Hamel, *et al.* 2013). Therefore, the sigma of 1.44 for category 3 stocks was used to determine the 2014 ABC and a stock-specific sigma of 0.39 estimated for aurora rockfish was used to determine the 2015 and 2016 ABCs. The same P* of 0.45 was used to determine 2014, 2015, and 2016 ABCs;
- Rougheye/blackspotted rockfish was changed from a category 3 (for rougheye alone) to a category 2 stock based on the new benchmark stock assessment adopted in 2013 (Hicks, *et al.* 2013). The SSC decided to designate the rougheye/blackspotted assemblage of stocks as category 2 since the assessment was for the complex of these two hard to distinguish stocks;
- English sole and yellowtail rockfish north of 40º10' N lat. were changed from category 1 to category 2 stocks based on their new data-moderate assessments;
- Brown rockfish, China rockfish, copper rockfish, rex sole, and sharpchin rockfish were changed from category 3 stocks to category 2 stocks based on new data-moderate assessments for these stocks in 2013; and
- Shortspine thornyhead was changed from a category 1 stock to a category 2 stock based on the lack of age data in the new benchmark assessment for this stock in 2013 (Taylor and Stephens 2013). The same P* value of 0.4 was used to determine the 2014, 2015, and 2016 ABCs.

Table 11. Relationship between P* and the percent reduction of the OFL for deciding the 2015 and 2016 ABCs for category 1, aurora rockfish, widow rockfish, category 2, and category 3 stocks based on σ values of 0.36, 0.39, 0.41, 0.72, and 1.44, respectively.

P*	Assessment Uncertainty (σ)				
	Cat. 1	Aurora	Widow	Cat. 2	Cat. 3
	0.36	0.39	0.41	0.72	1.44
0.5	0	0	0	0	0
0.45	4.4%	4.8%	5.0%	8.7%	16.6%
0.44	5.3%		6.0%	10.3%	19.5%
0.43	6.2%		7.0%	11.9%	22.4%
0.42	7.0%		7.9%	13.5%	25.2%
0.41	7.9%		8.9%	15.1%	27.9%
0.4	8.7%	9.4%	9.9%	16.7%	30.6%
0.39	9.6%		10.8%	18.2%	33.1%
0.38	10.4%		11.8%	19.7%	35.6%
0.37	11.3%		12.7%	21.3%	38.0%
0.36	12.1%		13.7%	22.7%	40.3%
0.35	13.0%	14.0%	14.6%	24.2%	42.6%
0.34	13.8%		15.6%	25.7%	44.8%
0.33	14.6%		16.5%	27.1%	46.9%
0.32	15.5%		17.4%	28.6%	49.0%
0.31	16.3%		18.4%	30.0%	51.0%
0.3	17.2%	18.5%	19.3%	31.4%	53.0%
0.29	18.1%		20.3%	32.9%	54.9%
0.28	18.9%		21.3%	34.3%	56.8%
0.27	19.8%		22.2%	35.7%	58.6%
0.26	20.7%		23.2%	37.1%	60.4%
0.25	21.6%	23.1%	24.2%	38.5%	62.1%
0.24	22.5%		25.1%	39.9%	63.8%
0.23	23.4%		26.1%	41.3%	65.5%
0.22	24.3%		27.1%	42.6%	67.1%
0.21	25.2%		28.2%	44.0%	68.7%
0.2	26.1%	28.0%	29.2%	45.4%	70.2%
0.19	27.1%		30.2%	46.9%	71.8%
0.18	28.1%		31.3%	48.3%	73.2%
0.17	29.1%		32.4%	49.7%	74.7%
0.16	30.1%		33.5%	51.1%	76.1%
0.15	31.1%	33.2%	34.6%	52.6%	77.5%
0.14	32.2%		35.8%	54.1%	78.9%
0.13	33.3%		37.0%	55.6%	80.2%
0.12	34.5%		38.2%	57.1%	81.6%
0.11	35.7%		39.5%	58.7%	82.9%
0.1	37.0%	39.3%	40.9%	60.3%	84.2%
0.09	38.3%		42.3%	61.9%	85.5%
0.08	39.7%		43.8%	63.6%	86.8%
0.07	41.2%		45.4%	65.4%	88.1%
0.06	42.9%		47.1%	67.4%	89.3%
0.05	44.7%	47.3%	49.1%	69.4%	90.6%

Table 12. 2014 ABCs (mt) and a range of alternative 2015 ABCs (mt) varied by the probability of overfishing (P*) for west coast groundfish stocks (overfished stocks in CAPS; stocks with new assessments in bold; component stocks in stock complexes in italics).

Stock	Status Quo 2014 ABC	2015 OFL	Cat.	Range of Alternative 2015 ABCs				
				Overfishing Probability (P*)				
				0.45	0.40	0.35	0.30	0.25
OVERFISHED STOCKS								
BOCACCIO S. of 40⁰10' N. lat.	842	**1,444**	**1**	**1,380**	**1,318**	**1,256**	**1,195**	**1,132**
CANARY	709	733	1	701	669	638	607	575
COWCOD S. of 40⁰10' N. lat.	9	67		60	54	48	43	38
COWCOD (Conception)	***6***	***55***	***2***	**50**	**46**	**42**	**38**	**34**
COWCOD (Monterey)	*3*	*12*	*3*	10	8	7	5	4
DARKBLOTCHED	529	**574**	**1**	**549**	**524**	**499**	**475**	**450**
PACIFIC OCEAN PERCH	801	842	1	805	769	733	697	660
PETRALE SOLE	2,652	**2,946**	**1**	**2,816**	**2,690**	**2,563**	**2,439**	**2,310**
YELLOWEYE	43	52	2	47	43	39	35	32
NON-DEPLETED STOCKS								
Arrowtooth Flounder	5,758	6,599	2	6,025	5,497	5,002	4,527	4,058
Black Rockfish (OR-CA)	1,115	1,176	1	1,124	1,074	1,023	974	922
Black Rockfish (WA)	409	421	1	402	384	366	349	330
Cabezon (CA)	158	161	1	154	147	140	133	126
Cabezon (OR)	47	49	1	47	45	43	41	38
California scorpionfish	117	119	1	114	109	104	99	93
Chilipepper S. of 40⁰10' N. lat.	1,647	1,703	1	1,628	1,555	1,482	1,410	1,335
Dover Sole	74,352	66,871	1	63,929	61,053	58,178	55,369	52,427
English Sole	5,646	**12,092**	**2**	**11,040**	**10,073**	**9,166**	**8,295**	**7,437**
Lingcod N. of 40º10' N. lat.	2,878	3,010	1	2,830	2,659	2,494	2,334	2,172
Lingcod S. of 40º10' N. lat.	1,063	1,205	2	1,100	1,004	913	827	741
Longnose skate	2,692	2,449	1	2,341	2,236	2,130	2,027	1,920
Longspine Thornyhead (coastwide)	2,752	**5,007**	**2**	**4,571**	**4,171**	**3,795**	**3,435**	**3,079**
Pacific Cod	2,221	3,200	3	2,669	2,221	1,837	1,504	1,213
Sablefish (coastwide)	6,535	7,857	1	7,511	7,173	6,836	6,506	6,160
Shortbelly	5,789	6,950	2	6,345	5,789	5,268	4,768	4,274
Shortspine Thornyhead (coastwide)	2,208	**3,203**	**2**	**2,924**	**2,668**	**2,428**	**2,197**	**1,970**
Spiny dogfish	2,024	2,522.7	2	2,303.2	2,101.4	1,912.2	1,730.6	1,551.5
Splitnose S. of 40⁰10' N. lat.	1,670	1,794	1	1,715	1,638	1,561	1,485	1,406
Starry Flounder	1,528	1,841	2	1,681	1,534	1,395	1,263	1,132
Widow	4,212	4,137	1	3,929	3,729	3,532	3,337	3,138
Yellowtail N. of 40⁰10' N. lat.	4,382	**12,281**	**2**	**11,213**	**10,230**	**9,309**	**8,425**	**7,553**
STOCK COMPLEXES								
Nearshore Rockfish North	94	88		77	68	59	52	45
Black and yellow	*0.0*	*0.014*	3	*0.011*	*0.009*	*0.008*	*0.006*	*0.005*
Blue (CA)	*25.0*	*27.4*	2	*25.0*	*22.9*	*20.8*	*18.8*	*16.9*
Blue (OR & WA)	*26.9*	*32.3*	3	*26.9*	*22.4*	*18.5*	*15.2*	*12.2*
Brown	***4.6***	***1.9***	**2**	***1.7***	***1.6***	***1.4***	***1.3***	***1.2***
Calico	*0.0*	-	3	-	-	-	-	-
China	***8.2***	***7.2***	**2**	***6.6***	***6.0***	***5.5***	***4.9***	***4.4***

Stock	Status Quo 2014 ABC	2015 OFL	Cat.	Range of Alternative 2015 ABCs				
				Overfishing Probability (P*)				
				0.45	0.40	0.35	0.30	0.25
Copper	***21.6***	***10.6***	**2**	***9.7***	***8.9***	***8.1***	***7.3***	***6.5***
Gopher	*0.0*	-	3	-	-	-	-	-
Grass	*0.5*	*0.7*	3	*0.5*	*0.5*	*0.4*	*0.3*	*0.2*
Kelp	*0.0*	*0.009*	3	*0.008*	*0.006*	*0.005*	*0.004*	*0.003*
Olive	*0.3*	*0.3*	3	*0.3*	*0.2*	*0.2*	*0.1*	*0.1*
Quillback	*6.2*	*7.4*	3	*6.2*	*5.1*	*4.2*	*3.5*	*2.8*
Treefish	*0.2*	*0.2*	3	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
Shelf Rockfish North	1,932	2,209		1,944	1,712	1,505	1,317	1,142
Bronzespotted	*0.0*	-	3	-	-	-	-	-
Bocaccio	*236.9*	*284.0*	3	*236.9*	*197.1*	*163.0*	*133.5*	*107.6*
Chameleon	*0.0*	-	3	-	-	-	-	-
Chilipepper	*108.1*	*128.2*	3	*106.9*	*88.9*	*73.6*	*60.2*	*48.6*
Cowcod	*0.0*	*0.4*	3	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
Flag	*0.1*	*0.07*	3	*0.06*	*0.05*	*0.04*	*0.03*	*0.03*
Freckled	*0.0*	-	3	-	-	-	-	-
Greenblotched	*1.1*	*1.3*	3	*1.1*	*0.9*	*0.7*	*0.6*	*0.5*
Greenspotted 40°10' to 42° N. lat.	9	*10.0*	2	*9.1*	*8.3*	*7.5*	*6.8*	*6.1*
Greenspotted N. of 42 N. lat. (OR & WA)	*5.1*	*6.1*	3	*5.1*	*4.2*	*3.5*	*2.9*	*2.3*
Greenstriped	*1,158*	*1,281.9*	2	*1,170.3*	*1,067.8*	*971.7*	*879.4*	*788.3*
Halfbanded	*0.0*	-	3	-	-	-	-	-
Harlequin	*0.0*	-	3	-	-	-	-	-
Honeycomb	*0.0*	-	3	-	-	-	-	-
Mexican	*0.0*	-	3	-	-	-	-	-
Pink	*0.0*	*0.004*	3	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*
Pinkrose	*0.0*	-	3	-	-	-	-	-
Puget Sound	*0.0*	-	3	-	-	-	-	-
Pygmy	*0.0*	-	3	-	-	-	-	-
Redstripe	*225.1*	*269.9*	3	*225.1*	*187.3*	*154.9*	*126.9*	*102.3*
Rosethorn	*10.8*	*12.9*	3	*10.8*	*9.0*	*7.4*	*6.1*	*4.9*
Rosy	*2.5*	*3.0*	3	*2.5*	*2.1*	*1.7*	*1.4*	*1.1*
Silvergray	*133.0*	*159.4*	3	*133.0*	*110.6*	*91.5*	*74.9*	*60.4*
Speckled	*0.1*	*0.17*	3	*0.14*	*0.12*	*0.10*	*0.08*	*0.06*
Squarespot	*0.1*	*0.17*	3	*0.14*	*0.12*	*0.10*	*0.08*	*0.07*
Starry	*0.0*	*0.00*	3	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*
Stripetail	*33.7*	*40.4*	3	*33.7*	*28.0*	*23.2*	*19.0*	*15.3*
Swordspine	*0.0*	*0.0001*	3	*0.00008*	*0.00007*	*0.00006*	*0.00005*	*0.00004*
Tiger	*0.8*	*1.0*	3	*0.8*	*0.7*	*0.6*	*0.5*	*0.4*
Vermilion	*8.1*	*9.7*	3	*8.1*	*6.7*	*5.6*	*4.6*	*3.7*
Slope Rockfish North	1,414	1,804		1,669	1,545	1,430	1,322	1,215
Aurora	*12.8*	***17.4***	***1***	***16.6***	***15.8***	***15.0***	***14.2***	***13.4***
Bank	*14.4*	*17.2*	3	*14.4*	*12.0*	*9.9*	*8.1*	*6.5*
Blackgill	*3.9*	*4.7*	3	*3.9*	*3.3*	*2.7*	*2.2*	*1.8*
Redbanded	*37.7*	*45.3*	3	*37.7*	*31.4*	*26.0*	*21.3*	*17.2*

Stock	Status Quo 2014 ABC	2015 OFL	Cat.	Range of Alternative 2015 ABCs Overfishing Probability (P*)				
				0.45	0.40	0.35	0.30	0.25
Rougheye/Blackspotted	*59.3*	***201.9***	***2***	***184***	***168***	***153***	***138***	***124***
Sharpchin	*178.9*	***305.6***	***2***	***279.0***	***254.6***	***231.6***	***209.6***	***187.9***
Shortraker	*15.6*	*18.7*	3	*15.6*	*13.0*	*10.7*	*8.8*	*7.1*
Splitnose	*931.3*	*1,000.6*	1	*956.6*	*913.6*	*870.5*	*828.5*	*784.5*
Yellowmouth	*160.5*	*192.4*	3	*160.5*	*133.6*	*110.5*	*90.4*	*72.9*
Nearshore Rockfish South	1,001	1,313		1,169	1,042	928	823	725
Shallow Nearshore Species	*NA*	*NA*	NA	*NA*	*NA*	*NA*	*NA*	*NA*
Black and yellow	*23.0*	*28*	3	*23.0*	*19.1*	*15.8*	*12.9*	*10.4*
China	*13.8*	***55***	***2***	***50.4***	***46.0***	***41.9***	***37.9***	***34.0***
Gopher (N of Pt. Conception)	*146.3*	*148*	1	*141.5*	*135.1*	*128.8*	*122.5*	*116.0*
Gopher (S of Pt. Conception)	*21.4*	*26*	3	*21.4*	*17.8*	*14.7*	*12.0*	*9.7*
Grass	*49.7*	*60*	3	*49.7*	*41.4*	*34.2*	*28.0*	*22.6*
Kelp	*23.1*	*28*	3	*23.1*	*19.2*	*15.9*	*13.0*	*10.5*
Deeper Nearshore Species	*NA*	*NA*	NA	*NA*	*NA*	*NA*	*NA*	*NA*
Blue (assessed area)	*171.4*	*189*	2	*172.2*	*157.1*	*142.9*	*129.4*	*116.0*
Blue (S of 34°27' N. lat.)	*60.8*	*73*	3	*60.8*	*50.6*	*41.8*	*34.3*	*27.6*
Brown	***170.6***	***164***	**2**	***149.5***	***136.4***	***124.1***	***112.3***	***100.7***
Calico	*0.0*	-	3	-	-	-	-	-
Copper	***118.0***	***301***	**2**	***274.9***	***250.8***	***228.2***	***206.6***	***185.2***
Olive	*187.4*	*225*	3	*187.4*	*155.9*	*128.9*	*105.6*	*85.1*
Quillback	*4.5*	*5*	3	*4.5*	*3.7*	*3.1*	*2.5*	*2.0*
Treefish	*11.0*	*13*	3	*11.0*	*9.2*	*7.6*	*6.2*	*5.0*
Shelf Rockfish South	1,620	1,918		1,625	1,375	1,159	970	802
Bronzespotted	*3.0*	*3.6*	3	*3.0*	*2.5*	*2.1*	*1.7*	*1.4*
Chameleon	*0.0*	-	3	-	-	-	-	-
Flag	*19.5*	*23.4*	3	*19.5*	*16.3*	*13.4*	*11.0*	*8.9*
Freckled	*0.0*	-	3	-	-	-	-	-
Greenblotched	*19.3*	*23.1*	3	*19.3*	*16.1*	*13.3*	*10.9*	*8.8*
Greenspotted	*73.3*	*82.8*	2	*75.6*	*69.0*	*62.8*	*56.8*	*50.9*
Greenstriped	*212.4*	*235.1*	2	*214.7*	*195.9*	*178.2*	*161.3*	*144.6*
Halfbanded	*0.0*	-	3	-	-	-	-	-
Harlequin	*0.0*	-	3	-	-	-	-	-
Honeycomb	*8.2*	*9.9*	3	*8.2*	*6.8*	*5.7*	*4.6*	*3.7*
Mexican	*4.2*	*5.1*	3	*4.2*	*3.5*	*2.9*	*2.4*	*1.9*
Pink	*2.1*	*2.5*	3	*2.1*	*1.8*	*1.5*	*1.2*	*1.0*
Pinkrose	*0.0*	-	3	-	-	-	-	-
Pygmy	*0.0*	-	3	-	-	-	-	-
Redstripe	*0.4*	*0.5*	3	*0.4*	*0.3*	*0.3*	*0.2*	*0.2*
Rosethorn	*1.8*	*2.1*	3	*1.8*	*1.5*	*1.2*	*1.0*	*0.8*
Rosy	*37.1*	*44.5*	3	*37.1*	*30.9*	*25.5*	*20.9*	*16.9*
Silvergray	*0.4*	*0.5*	3	*0.4*	*0.4*	*0.3*	*0.3*	*0.2*
Speckled	*32.8*	*39.4*	3	*32.8*	*27.3*	*22.6*	*18.5*	*14.9*
Squarespot	*9.2*	*11.1*	3	*9.2*	*7.7*	*6.4*	*5.2*	*4.2*
Starry	*52.2*	*62.6*	3	*52.2*	*43.4*	*35.9*	*29.4*	*23.7*

Stock	Status Quo 2014 ABC	2015 OFL	Cat.	Range of Alternative 2015 ABCs Overfishing Probability (P*)				
				0.45	0.40	0.35	0.30	0.25
Stripetail	*19.7*	*23.6*	3	*19.7*	*16.4*	*13.6*	*11.1*	*9.0*
Swordspine	*11.9*	*14.2*	3	*11.9*	*9.9*	*8.2*	*6.7*	*5.4*
Tiger	*0.0*	*0.04*	3	*0.03*	*0.03*	*0.02*	*0.02*	*0.02*
Vermilion	*224.6*	*269.3*	3	*224.6*	*186.9*	*154.6*	*126.6*	*102.1*
Yellowtail	*887.7*	*1,064.4*	3	*887.7*	*738.7*	*611.0*	*500.3*	*403.4*
Slope Rockfish South	622	806		698	606	524	452	386
Aurora	*21.7*	***74.3***	**1**	***70.7***	***67.3***	***63.9***	***60.6***	***57.1***
Bank	*459.4*	*503.2*	3	*419.7*	*349.2*	*288.8*	*236.5*	*190.7*
Blackgill	*122.3*	*137.0*	2	*125.1*	*114.1*	*103.8*	*94.0*	*84.3*
Pacific ocean perch	*0.0*	-	3	-	-	-	-	-
Redbanded	*8.7*	*10.4*	3	*8.7*	*7.2*	*6.0*	*4.9*	*3.9*
Rougheye/Blackspotted	*0.3*	***4.1***	**2**	***3.8***	***3.4***	***3.1***	***2.8***	***2.5***
Sharpchin	*8.2*	***76.4***	**2**	***69.8***	***63.6***	***57.9***	***52.4***	***47.0***
Shortraker	*0.1*	*0.10*	3	*0.09*	*0.07*	*0.06*	*0.05*	*0.04*
Yellowmouth	*0.7*	*0.8*	3	*0.7*	*0.6*	*0.5*	*0.4*	*0.3*
Other Flatfish	6,982	11,298		9,865	8,620	7,517	6,521	5,606
Butter sole	*3.2*	*4.6*	3	*3.9*	*3.2*	*2.7*	*2.2*	*1.8*
Curlfin sole	*5.7*	*8.2*	3	*6.9*	*5.7*	*4.7*	*3.9*	*3.1*
Flathead sole	*24.3*	*35.0*	3	*29.2*	*24.3*	*20.1*	*16.5*	*13.3*
Pacific sanddab	*3,331.9*	*4,801.0*	3	*4,004.0*	*3,331.9*	*2,755.8*	*2,256.5*	*1,819.6*
Rex sole	*3,033.8*	***5,609.0***	**2**	***5,121.0***	***4,672.3***	***4,251.6***	***3,847.8***	***3,449.5***
Rock sole	*46.3*	*66.7*	3	*55.6*	*46.3*	*38.3*	*31.3*	*25.3*
Sand sole	*536.6*	*773.2*	3	*644.8*	*536.6*	*443.8*	*363.4*	*293.0*
Other Fish	NA	*290.5*	3	*242.3*	*201.6*	*166.7*	*136.5*	*110.1*
Cabezon (WA)	*b/*	*4.5*	3	*3.8*	*3.1*	*2.6*	*2.1*	*1.7*
Kelp greenling (CA)	*82.5*	*118.9*	3	*99.2*	*82.5*	*68.2*	*55.9*	*45.1*
Kelp greenling (OR)	*b/*	*b/*	3	*b/*	*b/*	*b/*	*b/*	*b/*
Kelp greenling (WA)	*b/*	*b/*	3	*b/*	*b/*	*b/*	*b/*	*b/*
Leopard shark	*1,054.2*	*167.1*	3	*139.4*	*116.0*	*95.9*	*78.5*	*63.3*

a/ No OFL or ABC contribution for these stocks given the lack of an approved method for estimating the OFL.

Table 13. 2014 ABCs (mt) and a range of alternative 2016 ABCs (mt) varied by the probability of overfishing (P*) for west coast groundfish stocks (overfished stocks in CAPS; stocks with new assessments in bold; component stocks in stock complexes in italics).

Stock	Status Quo 2014 ABC	2016 OFL	Range of Alternative 2016 ABCs Overfishing Probability (P*)				
			0.45	0.40	0.35	0.30	0.25
DEPLETED STOCKS							
BOCACCIO S. of 40^{0}10' N. lat.	842	**1,351**	**1,291**	**1,233**	**1,175**	**1,118**	**1,059**
CANARY	709	729	697	666	634	604	572
COWCOD S. of 40^{0}10' N. lat.	9	68	62	55	50	44	39
COWCOD (Conception)	***6***	***56***	**51**	**47**	**43**	**39**	**35**
COWCOD (Monterey)	*3*	*12*	10	8	7	6	5
DARKBLOTCHED	529	**580**	**554**	**530**	**505**	**480**	**455**
PACIFIC OCEAN PERCH	801	850	813	776	740	704	666
PETRALE SOLE	2,652	**3,044**	**2,910**	**2,779**	**2,648**	**2,520**	**2,386**
YELLOWEYE	43	52	47	43	39	35	32
NON-DEPLETED STOCKS							
Arrowtooth Flounder	5,758	6,396	5,840	5,328	4,848	4,388	3,934
Black Rockfish (OR-CA)	1,115	1,183	1,131	1,080	1,029	980	927
Black Rockfish (WA)	409	423	404	386	368	350	332
Cabezon (CA)	158	158	151	144	137	131	124
Cabezon (OR)	47	49	47	45	43	41	38
California scorpionfish	117	117	111	106	101	97	91
Chilipepper S. of 40^{0}10' N. lat.	1,647	1,694	1,619	1,547	1,474	1,403	1,328
Dover Sole	74,352	59,221	56,615	54,069	51,522	49,035	46,429
English Sole	5,646	**8,493**	**7,754**	**7,075**	**6,438**	**5,826**	**5,223**
Lingcod N. of 40º10' N. lat.	2,878	2,891	2,719	2,555	2,398	2,245	2,089
Lingcod S. of 40º10' N. lat.	1,063	1,136	1,037	946	861	779	699
Longnose skate	2,692	2,405	2,299	2,196	2,092	1,991	1,885
Longspine Thornyhead (coastwide)	2,752	**4,763**	**4,349**	**3,968**	**3,610**	**3,267**	**2,929**
Pacific Cod	2,221	3,200	2,669	2,221	1,837	1,504	1,213
Sablefish (coastwide)	6,535	8,526	8,151	7,784	7,418	7,060	6,684
Shortbelly	5,789	6,950	6,345	5,789	5,268	4,768	4,274
Shortspine Thornyhead (coastwide)	2,208	**3,169**	**2,893**	**2,640**	**2,402**	**2,174**	**1,949**
Spiny dogfish	2,024	2,503.3	2,285.5	2,085.2	1,897.5	1,717.2	1,539.5
Splitnose S. of 40^{0}10' N. lat.	1,670	1,826	1,746	1,667	1,589	1,512	1,432
Starry Flounder	1,528	1,847	1,686	1,539	1,400	1,267	1,136
Widow	4,212	3,990	3,790	3,596	3,407	3,218	3,026
Yellowtail N. of 40^{0}10' N. lat.	4,382	**11,647**	**10,634**	**9,702**	**8,828**	**7,990**	**7,163**
STOCK COMPLEXES							
Nearshore Rockfish North	94	88	77	68	59	52	45
Black and yellow	*0.0*	*0.014*	*0.011*	*0.009*	*0.008*	*0.006*	*0.005*
Blue (CA)	*25.0*	*27.7*	*25.3*	*23.1*	*21.0*	*19.0*	*17.0*
Blue (OR & WA)	*26.9*	*32.3*	*26.9*	*22.4*	*18.5*	*15.2*	*12.2*
Brown	***4.6***	***1.9***	***1.7***	***1.6***	***1.4***	***1.3***	***1.2***
Calico	*0.0*	-	-	-	-	-	-
China	***8.2***	***7.4***	***6.8***	***6.2***	***5.6***	***5.1***	***4.6***

Stock	Status Quo 2014 ABC	2016 OFL	Range of Alternative 2016 ABCs Overfishing Probability (P*)				
			0.45	0.40	0.35	0.30	0.25
Copper	***21.6***	***10.3***	***9.4***	***8.6***	***7.8***	***7.1***	***6.4***
Gopher	*0.0*	-	-	-	-	-	-
Grass	*0.5*	*0.7*	*0.5*	*0.5*	*0.4*	*0.3*	*0.2*
Kelp	*0.0*	*0.009*	*0.008*	*0.006*	*0.005*	*0.004*	*0.003*
Olive	*0.3*	*0.32*	*0.26*	*0.22*	*0.18*	*0.15*	*0.12*
Quillback	*6.2*	*7.4*	*6.2*	*5.1*	*4.2*	*3.5*	*2.8*
Treefish	*0.2*	*0.22*	*0.18*	*0.15*	*0.12*	*0.10*	*0.08*
Shelf Rockfish North	1,932	2,218	1,953	1,720	1,513	1,324	1,148
Bronzespotted	*0.0*	-	-	-	-	-	-
Bocaccio	*236.9*	*284.0*	*236.9*	*197.1*	*163.0*	*133.5*	*107.6*
Chameleon	*0.0*	-	-	-	-	-	-
Chilipepper	*108.1*	*127.5*	*106.4*	*88.5*	*73.2*	*59.9*	*48.3*
Cowcod	*0.0*	*0.4*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
Flag	*0.1*	*0.07*	*0.06*	*0.05*	*0.04*	*0.03*	*0.03*
Freckled	*0.0*	-	-	-	-	-	-
Greenblotched	*1.1*	*1.3*	*1.1*	*0.9*	*0.7*	*0.6*	*0.5*
Greenspotted 40°10' to 42° N. lat.	9	*9.9*	*9.0*	*8.2*	*7.5*	*6.8*	*6.1*
Greenspotted N. of 42 N. lat. (OR & WA)	*5.1*	*6.1*	*5.1*	*4.2*	*3.5*	*2.9*	*2.3*
Greenstriped	*1,158*	*1,292.0*	*1,179.6*	*1,076.2*	*979.3*	*886.3*	*794.6*
Halfbanded	*0.0*	-	-	-	-	-	-
Harlequin	*0.0*	-	-	-	-	-	-
Honeycomb	*0.0*	-	-	-	-	-	-
Mexican	*0.0*	-	-	-	-	-	-
Pink	*0.0*	*0.004*	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*
Pinkrose	*0.0*	-	-	-	-	-	-
Puget Sound	*0.0*	-	-	-	-	-	-
Pygmy	*0.0*	-	-	-	-	-	-
Redstripe	*225.1*	*269.9*	*225.1*	*187.3*	*154.9*	*126.9*	*102.3*
Rosethorn	*10.8*	*12.9*	*10.8*	*9.0*	*7.4*	*6.1*	*4.9*
Rosy	*2.5*	*3.0*	*2.5*	*2.1*	*1.7*	*1.4*	*1.1*
Silvergray	*133.0*	*159.4*	*133.0*	*110.6*	*91.5*	*74.9*	*60.4*
Speckled	*0.1*	*0.17*	*0.14*	*0.12*	*0.10*	*0.08*	*0.06*
Squarespot	*0.1*	*0.17*	*0.14*	*0.12*	*0.10*	*0.08*	*0.07*
Starry	*0.0*	*0.004*	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*
Stripetail	*33.7*	***40.4***	***33.7***	***28.0***	***23.2***	***19.0***	***15.3***
Swordspine	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Tiger	*0.8*	*1.0*	*0.8*	*0.7*	*0.6*	*0.5*	*0.4*
Vermilion	*8.1*	*9.7*	*8.1*	*6.7*	*5.6*	*4.6*	*3.7*
Slope Rockfish North	1,414	1,818	1,683	1,559	1,443	1,334	1,227
Aurora	*12.8*	***17.5***	***16.7***	***15.9***	***15.1***	***14.3***	***13.5***
Bank	*14.4*	*17.2*	*14.4*	*12.0*	*9.9*	*8.1*	*6.5*
Blackgill	*3.9*	*4.7*	*3.9*	*3.3*	*2.7*	*2.2*	*1.8*
Redbanded	*37.7*	*45.3*	*37.7*	*31.4*	*26.0*	*21.3*	*17.2*
Rougheye/Blackspotted	*59.3*	***206.8***	***189***	***172***	***157***	***142***	***127***

Stock	Status Quo 2014 ABC	2016 OFL	Range of Alternative 2016 ABCs Overfishing Probability (P*)				
			0.45	0.40	0.35	0.30	0.25
Sharpchin	*178.9*	***297.6***	***271.7***	***247.9***	***225.6***	***204.2***	***183.0***
Shortraker	*15.6*	*18.7*	*15.6*	*13.0*	*10.7*	*8.8*	*7.1*
Splitnose	*931.3*	*1,018.2*	*973.4*	*929.6*	*885.8*	*843.0*	*798.2*
Yellowmouth	*160.5*	*192.4*	*160.5*	*133.6*	*110.5*	*90.4*	*72.9*
Nearshore Rockfish South	1,001	1,291	1,148	1,023	910	807	710
Shallow Nearshore Species	*NA*	NA	*NA*	*NA*	*NA*	*NA*	*NA*
Black and yellow	*23.0*	*27.5*	*23.0*	*19.1*	*15.8*	*12.9*	*10.4*
China	*13.8*	***55.2***	*50.4*	*46.0*	*41.9*	*37.9*	*34.0*
Gopher (N of Pt. Conception)	*146.3*	*144.0*	*137.7*	*131.5*	*125.3*	*119.2*	*112.9*
Gopher (S of Pt. Conception)	*21.4*	*25.6*	*21.4*	*17.8*	*14.7*	*12.0*	*9.7*
Grass	*49.7*	*59.6*	*49.7*	*41.4*	*34.2*	*28.0*	*22.6*
Kelp	*23.1*	*27.7*	*23.1*	*19.2*	*15.9*	*13.0*	*10.5*
Deeper Nearshore Species	*NA*	NA	*NA*	*NA*	*NA*	*NA*	*NA*
Blue (assessed area)	*171.4*	*190.3*	*173.8*	*158.5*	*144.3*	*130.6*	*117.0*
Blue (S of 34°27' N. lat.)	*60.8*	*72.9*	*60.8*	*50.6*	*41.8*	*34.3*	*27.6*
Brown	***170.6***	***160.2***	***146.3***	***133.5***	***121.4***	***109.9***	***98.5***
Calico	*0.0*	-	-	-	-	-	-
Copper	***118.0***	***284.3***	***259.6***	***236.9***	***215.5***	***195.1***	***174.9***
Olive	*187.4*	*224.6*	*187.4*	*155.9*	*128.9*	*105.6*	*85.1*
Quillback	*4.5*	*5.4*	*4.5*	*3.7*	*3.1*	*2.5*	*2.0*
Treefish	*11.0*	*13.2*	*11.0*	*9.2*	*7.6*	*6.2*	*5.0*
Shelf Rockfish South	1,620	1,919	1,626	1,376	1,160	971	803
Bronzespotted	*3.0*	*3.6*	*3.0*	*2.5*	*2.1*	*1.7*	*1.4*
Chameleon	*0.0*	-	-	-	-	-	-
Flag	*19.5*	*23.4*	*19.5*	*16.3*	*13.4*	*11.0*	*8.9*
Freckled	*0.0*	-	-	-	-	-	-
Greenblotched	*19.3*	*23.1*	*19.3*	*16.1*	*13.3*	*10.9*	*8.8*
Greenspotted	*73.3*	*82.0*	*74.9*	*68.3*	*62.2*	*56.3*	*50.4*
Greenstriped	*212.4*	*237.0*	*216.4*	*197.4*	*179.6*	*162.6*	*145.8*
Halfbanded	*0.0*	-	-	-	-	-	-
Harlequin	*0.0*	-	-	-	-	-	-
Honeycomb	*8.2*	*9.9*	*8.2*	*6.8*	*5.7*	*4.6*	*3.7*
Mexican	*4.2*	*5.1*	*4.2*	*3.5*	*2.9*	*2.4*	*1.9*
Pink	*2.1*	*2.5*	*2.1*	*1.8*	*1.5*	*1.2*	*1.0*
Pinkrose	*0.0*	-	-	-	-	-	-
Pygmy	*0.0*	-	-	-	-	-	-
Redstripe	*0.4*	*0.5*	*0.4*	*0.3*	*0.3*	*0.2*	*0.2*
Rosethorn	*1.8*	*2.1*	*1.8*	*1.5*	*1.2*	*1.0*	*0.8*
Rosy	*37.1*	*44.5*	*37.1*	*30.9*	*25.5*	*20.9*	*16.9*
Silvergray	*0.4*	*0.5*	*0.4*	*0.4*	*0.3*	*0.3*	*0.2*
Speckled	*32.8*	*39.4*	*32.8*	*27.3*	*22.6*	*18.5*	*14.9*
Squarespot	*9.2*	*11.1*	*9.2*	*7.7*	*6.4*	*5.2*	*4.2*
Starry	*52.2*	*62.6*	*52.2*	*43.4*	*35.9*	*29.4*	*23.7*
Stripetail	*19.7*	*23.6*	*19.7*	*16.4*	*13.6*	*11.1*	*9.0*

Stock	Status Quo 2014 ABC	2016 OFL	Range of Alternative 2016 ABCs Overfishing Probability (P*) 0.45	0.40	0.35	0.30	0.25
Swordspine	*11.9*	*14.2*	*11.9*	*9.9*	*8.2*	*6.7*	*5.4*
Tiger	*0.0*	*0.04*	*0.03*	*0.03*	*0.02*	*0.02*	*0.02*
Vermilion	*224.6*	*269.3*	*224.6*	*186.9*	*154.6*	*126.6*	*102.1*
Yellowtail	*887.7*	*1,064.4*	*887.7*	*738.7*	*611.0*	*500.3*	*403.4*
Slope Rockfish South	622	807	699	607	525	452	387
Aurora	*21.7*	***74.3***	***70.7***	***67.3***	***63.9***	***60.6***	***57.1***
Bank	*459.4*	*503.2*	*419.7*	*349.2*	*288.8*	*236.5*	*190.7*
Blackgill	*122.3*	*140.0*	*127.8*	*116.6*	*106.1*	*96.0*	*86.1*
Pacific ocean perch	*0.0*	-	-	-	-	-	-
Redbanded	*8.7*	*10.4*	*8.7*	*7.2*	*6.0*	*4.9*	*3.9*
Rougheye/Blackspotted	*0.3*	***4.2***	***3.9***	***3.5***	***3.2***	***2.9***	***2.6***
Sharpchin	*8.2*	***74.4***	***67.9***	***62.0***	***56.4***	***51.0***	***45.8***
Shortraker	*0.1*	*0.10*	*0.09*	*0.07*	*0.06*	*0.05*	*0.04*
Yellowmouth	*0.7*	*0.8*	*0.7*	*0.6*	*0.5*	*0.4*	*0.3*
Other Flatfish	6,982	9,948	8,633	7,496	6,494	5,595	4,775
Butter sole	*3.2*	*4.6*	*3.9*	*3.2*	*2.7*	*2.2*	*1.8*
Curlfin sole	*5.7*	*8.2*	*6.9*	*5.7*	*4.7*	*3.9*	*3.1*
Flathead sole	*24.3*	*35.0*	*29.2*	*24.3*	*20.1*	*16.5*	*13.3*
Pacific sanddab	*3,331.9*	*4,801.0*	*4,004.0*	*3,331.9*	*2,755.8*	*2,256.5*	*1,819.6*
Rex sole	*3,033.8*	***4,259.0***	***3,888.5***	***3,547.7***	***3,228.3***	***2,921.7***	***2,619.3***
Rock sole	*46.3*	*66.7*	*55.6*	*46.3*	*38.3*	*31.3*	*25.3*
Sand sole	*536.6*	*773.2*	*644.8*	*536.6*	*443.8*	*363.4*	*293.0*
Other Fish	*NA*	*290.8*	*242.5*	*201.8*	*166.9*	*136.7*	*110.2*
Cabezon (WA)	*b/*	*4.8*	*3.8*	*3.1*	*2.6*	*2.1*	*1.7*
Kelp greenling (CA)	*82.5*	*118.9*	*99.2*	*82.5*	*68.2*	*55.9*	*45.1*
Kelp greenling (OR)	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*
Kelp greenling (WA)	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*	*b/*
Leopard shark	*116.0*	*167.1*	*139.4*	*116.0*	*95.9*	*78.5*	*63.3*

a/ No ABC contribution for these stocks given the lack of an approved method for estimating the OFL.

1.2.3 Annual Catch Limits

Annual catch limits (ACLs) are specified for each stock and stock complex that is "in the fishery" as specified under the FMP framework. An ACL is a harvest specification set equal to the ABC or below the ABC in consideration of conservation objectives, management uncertainty, socioeconomic considerations, ecological considerations, and other factors (e.g. rebuilding considerations) needed to meet management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and set-asides for exempted fishing permits (EFPs).

Under the FMP, the biomass level that produces MSY (B_{MSY}) is defined as the precautionary threshold. When the biomass for an assessed category 1 or 2 stock falls below the precautionary threshold, the harvest rate will be reduced to help the stock return to the B_{MSY} level, which is the management target for groundfish stocks. If a stock biomass is larger than B_{MSY}, the ACL may be set equal to or less than ABC. Because B_{MSY} is a long-term average, the true biomass could be below B_{MSY} in some years and above B_{MSY} in other years. Even in the absence of overfishing, biomass may decline to levels below B_{MSY} due to natural fluctuations in recruitment. The minimum stock size threshold (MSST) is the biomass threshold for declaring a stock overfished. When spawning stock biomass falls below the MSST, a rebuilding plan must be developed that determines the strategy for rebuilding the stock in the shortest time possible while considering impacts to fishing-dependent communities and other factors. When spawning stock biomass is below B_{MSY} yet above the MSST, the stock is considered to be in the precautionary zone. The current proxy B_{MSY} and MSST reference points for west coast groundfish stocks are as follows:

- Assessed flatfish stocks: B_{MSY} = 25 percent of initial biomass or $B_{25\%}$; MSST = 12.5 percent of initial biomass or $B_{12.5\%}$ (PFMC and NMFS 2011); and
- All other assessed groundfish stocks: B_{MSY} = 40 percent of initial biomass or $B_{40\%}$; MSST = 25 percent of initial biomass or $B_{25\%}$.

These reference points are only used to manage assessed stocks since they require estimates of spawning stock biomass.

West coast groundfish stocks are managed with harvest control rules that calculate ACLs below the ABCs when spawning biomass is estimated to be in the precautionary zone. These harvest control rules are designed to prevent a stock from becoming overfished. The FMP defines the 40-10 harvest control rule for stocks with a B_{MSY} proxy of $B_{40\%}$ that are in the precautionary zone. The analogous harvest control rule for assessed flatfish stocks is the 25-5 harvest control rule. Both ACL harvest control rules are applied after the ABC deduction is made. The further the stock biomass is below the precautionary threshold, the greater the reduction in ACL relative to the ABC, until at $B_{10\%}$ for a stock with a B_{MSY} proxy of $B_{40\%}$ or $B_{5\%}$ for a stock with a B_{MSY} proxy of $B_{25\%,}$ the ACL would be set at zero[12] (Figure 36). These harvest policies foster a quicker return to the B_{MSY} level and serve as an interim rebuilding policy for stocks that are below the MSST. The Council may recommend setting the ACL higher than what the default ACL harvest control rule specifies as long as the ACL does not exceed the ABC, complies with the requirements of the MSA, and is consistent with the FMP and National Standard Guidelines. Additional precautionary adjustments may be made to an ACL if necessary to address management

[12] The lower $B_{10\%}$ and $B_{5\%}$ thresholds in the precautionary ACL harvest control rules are used to establish the slope of the ACL curve in Figure 36. These precautionary ACL control rules only apply for stocks in the precautionary zone ($B_{MSY} > B_{CURRENT} >$ MSST). A rebuilding plan governs the ACL harvest control rule for any stock that falls below the MSST and is designated as overfished.

uncertainty, conservation concerns, socioeconomic concerns, ecological considerations, and the other factors that are considered when setting ACLs.

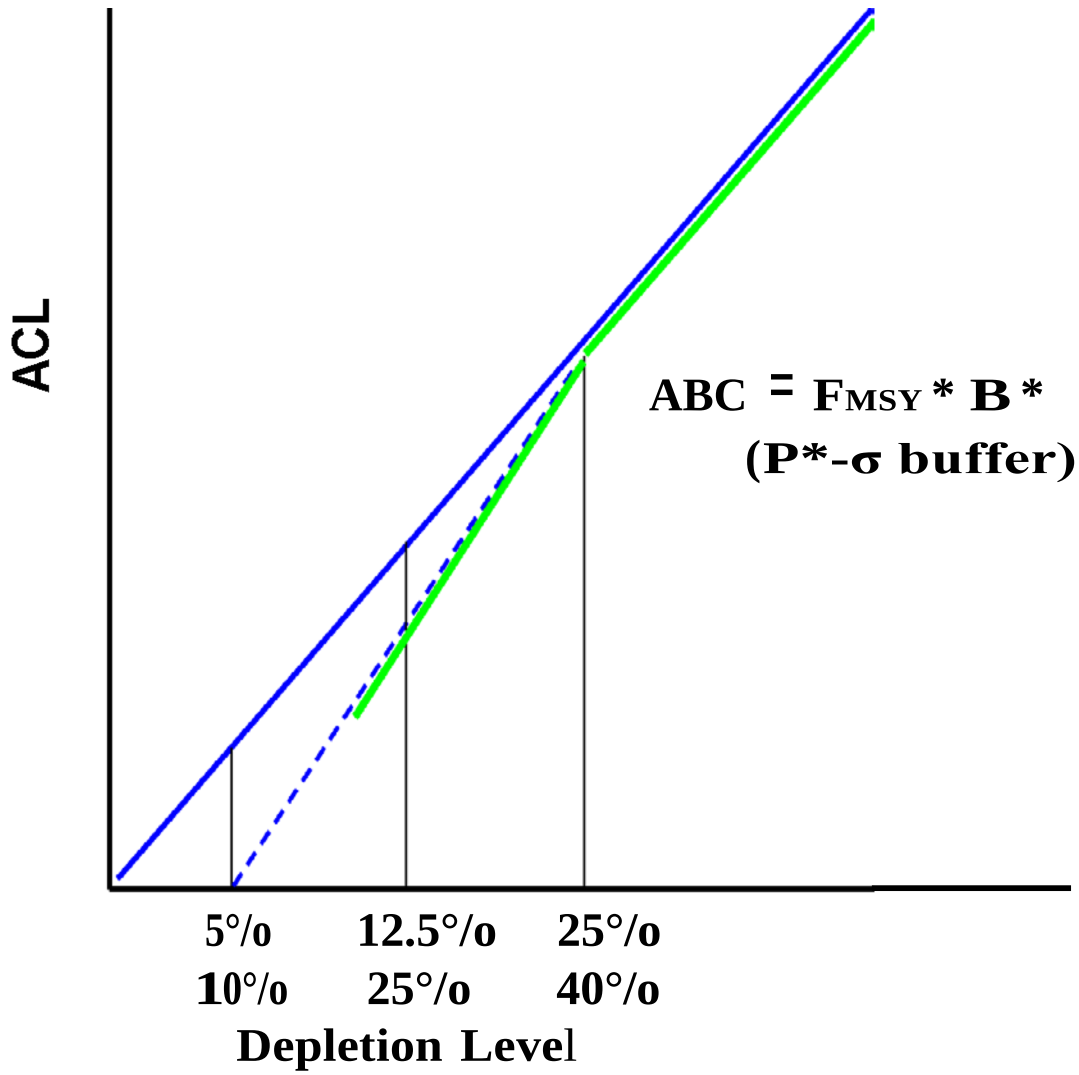

Figure 36. Conceptual diagram of the 25-5 and 40-10 ACL harvest control rules used to manage assessed west coast flatfish and other groundfish species, respectively, that are in the precautionary zone.

The ACL serves as the basis for invoking accountability measures (AMs), which are management measures or mechanisms used to address any management uncertainty that may result in exceeding an ACL. If ACLs are exceeded more often than 1 in 4 years, then AMs, such as catch monitoring and inseason adjustments to fisheries, need to improve or additional AMs may need to be implemented. Additional AMs may include setting an annual catch target (ACT), which is a specified level of harvest below the ACL. The use of ACTs may be especially important for a stock subject to highly uncertain inseason catch monitoring. A sector-specific ACT may serve as a harvest guideline (HG) for a sector or may be used strategically in a rebuilding plan to attempt to reduce mortality of an overfished stock more than the rebuilding plan limits prescribe.

The Council has the discretion to adjust the ACLs for uncertainty on a case-by-case basis. In cases where there is a high degree of uncertainty about the condition of the stock or stocks, the ACL may be reduced accordingly. Most category 3 species are managed in a stock complex (such as the minor rockfish complexes and the Other Flatfish complex) where harvest specifications are set for the complex in its entirety. For stock complexes, the ACL will be less than or equal to the sum of the individual component ABCs. The ACL may be adjusted below the sum of component ABCs as appropriate.

For most stocks and stock complexes, the Council elected to use the same general policies for deciding 2015 and 2016 ACLs as were used for deciding the 2014 ACLs (No Action) (Table 14). The No Action ACLs are the 2014 ACLs specified in Federal regulations.

Section 4.6.3 of the FMP states the Council's general policies on rebuilding overfished stocks. Section 4.6.3.1 of the FMP specifies the overall goals of rebuilding programs are to (1) achieve the population size and structure that will support the MSY within a specified time period that is as short as possible, taking into account the status and biology of the stock, the needs of fishing communities, and the interaction of the stock of fish within the marine ecosystem; (2) minimize, to the extent practicable, the adverse social and economic impacts associated with rebuilding, including adverse impacts on fishing communities; (3) fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational, and charter fishing sectors; (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future; and (5) promote widespread public awareness, understanding and support for the rebuilding program. These overall goals are derived from and consistent with the requirements of the MSA. The first goal embodies MSA National Standard 1 (NS1) and the requirements for rebuilding overfished stocks found at MSA section 304(e)(4)(A). The third goal is required by MSA section 304(e)(4)(B). The fourth and fifth goals represent additional policy preferences of the Council that recognize the importance of habitat protection to the rebuilding of some fish stocks and the desire for public outreach and education on the complexities—biological, economic, and social issues—involved with rebuilding overfished stocks. Overfished groundfish species are those with spawning biomasses that have dropped below the Council's MSST (i.e., 25 percent of initial spawning biomass or $B_{25\%}$ for all groundfish species other than flatfish where the MSST is $B_{12.5\%}$). The FMP requires these stocks to be rebuilt to a target biomass that supports MSY (i.e., B_{MSY} or $B_{40\%}$ for all groundfish species other than flatfish where the target is $B_{25\%}$).

Rebuilding plans are in place for six overfished rockfish species, as well as petrale sole, where assessments have indicated spawning biomass has declined to below the MSST. New full and updated assessments and rebuilding analyses were done in 2013 inform the 2015 and 2016 harvest specifications for many of the overfished species. New full assessments were conducted for cowcod, darkblotched rockfish, and petrale sole in 2013; however, a new rebuilding analysis was only prepared for cowcod. The results of the new assessments for darkblotched rockfish and petrale sole indicated those stocks would be rebuilt by 2015 and 2014, respectively. The SSC did not recommend new rebuilding analyses for these two stocks given their imminent rebuilding expectation. An update assessment for bocaccio was prepared in 2013. Like darkblotched, the stock is predicted to rebuild by 2015 and the SSC therefore recommended no new rebuilding analysis be prepared. Catch reports for canary rockfish, Pacific ocean perch, and yelloweye rockfish were prepared in 2013. These catch reports indicated total catches were within limits prescribed in these stocks' respective rebuilding plans.

Table 14. The status quo (No Action) 2014 and preferred 2015 and 2016 annual catch limits (ACLs in mt) for west coast groundfish stocks and stock complexes (stocks with new assessments in bold).

Stock	Status Quo ACL	Final Preferred ACLs		
	2014	2015	2016	ACL Harvest Control Rule
OVERFISHED STOCKS				
BOCACCIO S. of 40⁰10'	337	**349**	**362**	SPR = 77.7%
CANARY	119	122	125	SPR = 88.7%
COWCOD S. of 40⁰10'	3	**10**	**10**	SPR = 82.7% (F = 0.007); ACT = 4 mt
DARKBLOTCHED	330	**338**	**346**	SPR = 64.9%
PACIFIC OCEAN PERCH	153	158	164	SPR = 86.4%
PETRALE SOLE	2,652	**2,816**	**2,910**	25-5 rule
YELLOWEYE	18	18	19	SPR = 76.0%
NON-DEPLETED STOCKS				
Arrowtooth Flounder	5,758	5,497	5,328	ACL = ABC (P* = 0.4)
Black Rockfish (OR-CA)	1,000	1,000	1,000	Constant catch strategy
Black Rockfish (WA)	409	402	404	ACL = ABC (P* = 0.45)
Cabezon (CA)	158	154	151	ACL = ABC (P* = 0.45)
Cabezon (OR)	47	47	47	ACL = ABC (P* = 0.45)
California scorpionfish	117	114	111	ACL = ABC (P* = 0.45)
Chilipepper S. of 40º10'	1,647	1,628	1,619	ACL = ABC (P* = 0.45)
Dover Sole	25,000	50,000	50,000	Constant catch strategy; alt. ACL = 50,000 mt
English Sole	5,646	**11,040**	**7,754**	ACL = ABC (P* = 0.45)
Lingcod N. of 40º10'	2,878	2,830	2,719	ACL = ABC (P* = 0.45)
Lingcod S. of 40º10'	1,063	1,004	946	ACL = ABC (P* = 0.4)
Longnose skate	2,000	2,000	2,000	Constant catch strategy
Longspine Thornyhead N. of 34°27'	1,958	**3,170**	**3,015**	ACL = 76% of coastwide ABC (P* = 0.4)
Longspine Thornyhead S. of 34°27'	347	**1,001**	**952**	ACL = 24% of coastwide ABC (P* = 0.4)
Pacific Cod	1,600	1,600	1,600	ACL = 50% of OFL
Sablefish N. of 36°	4,349	4,793	5,241	40-10 rule applied to 73.6% of coastwide ABC (P* = 0.4)
Sablefish S. of 36°	1,560	1,719	1,880	40-10 rule applied to 26.4% of coastwide ABC (P* = 0.4)

Stock	Status Quo ACL	Final Preferred ACLs		
	2014	2015	2016	ACL Harvest Control Rule
Shortbelly	50	50	50	De minimis ACL to accommodate incidental bycatch and allow harvestable surplus to be available as forage
Shortspine Thornyhead N. of 34°27'	1,525	**1,745**	**1,726**	ACL = 65.4% of coastwide ABC (P* = 0.4)
Shortspine Thornyhead S. of 34°27'	393	**923**	**913**	ACL = 34.6% of coastwide ABC (P* = 0.4)
Spiny dogfish	NA	2,101	2,085	ACL = ABC (P* = 0.4)
Splitnose S. of 40°10'	1,670	1,715	1,746	ACL = ABC (P* = 0.45)
Starry Flounder	1,528	1,534	1,539	ACL = ABC (P* = 0.4)
Widow	1,500	2,000	2,000	Constant catch strategy; ACL = 2,000 mt
Yellowtail N. of 40°10'	4,382	**11,213**	**10,634**	ACL = ABC (P* = 0.45)
STOCK COMPLEXES				
Nearshore Rockfish North	94	69	69	ACL = ABC (P* = 0.45); 40-10 adj. ACL contrib. for blue RF in CA and China RF
Shelf Rockfish North	968	1,944	1,952	ACL = ABC (P* = 0.45); 40-10 adj. ACL contrib. for greenspotted RF in CA
Slope Rockfish North	1,160	1,669	1,683	ACL = ABC (P* = 0.45)
Nearshore Rockfish South	990	1,114	1,006	ACL = ABC (P* = 0.45); 40-10 adj. ACL contrib. for blue RF N of 34°27' N lat.
Shelf Rockfish South	714	1,624	1,625	ACL = ABC (P* = 0.45); 40-10 adj. ACL contrib. for greenspotted RF in CA
Slope Rockfish South	622	687	689	ACL = ABC (P* = 0.45); 40-10 adj. ACL contrib. for blackgill RF
Other Flatfish	4,884	8,620	7,496	ACL = ABC (P* = 0.4)
Other Fish	4,697	242	243	Sum of component species ACLs (ACLs = ABCs (P* = 0.45))
Cabezon (WA)	*NA*	*3.7*	*4.0*	ACL = ABC (P* = 0.45)
Kelp greenling (CA)	*NA*	*99.2*	*99.2*	ACL = ABC (P* = 0.45)
Kelp greenling (OR) a/	*NA*	*NA*	*NA*	No approved method for calculating the OFL contribution
Kelp greenling (WA) a/	*NA*	*NA*	*NA*	No approved method for calculating the OFL contribution
Leopard shark	*NA*	*139.4*	*139.4*	ACL = ABC (P* = 0.45)

Stock	Status Quo ACL	Final Preferred ACLs		
	2014	2015	2016	ACL Harvest Control Rule
ECOSYSTEM COMPONENT SPECIES				
Big skate	No harvest specifications for an EC species			
California skate				
Aleutian skate				
Roughtail/black skate				
Bering/sandpaper skate				
All other skates				
Pacific grenadier				
Giant grenadier				
All other grenadiers				
Ratfish				
Soupfin shark				
Finescale codling				

a/ No approved method for calculating the OFL contributions for these stocks in 2015-2016.

1.3 Historical Landings and Revenue in Groundfish Fisheries

The following tables were compiled using data downloaded in April 2013 from the PacFIN vdrfd table and the NorPAC 4900 table for at-sea Pacific whiting sectors. Groundfish fisheries are defined within the vdrfd table in the "dahl_sector" column. Nominal dollar values adjusted for inflation using Bureau of Economic Analysis Table 1.1.9 "Implicit Price Deflators for Gross Domestic Product, 1995=100" dated March 28, 2013.

List of Tables

Table Table 1a. Landings (shoreside commercial and tribal) by species group (mt), 1981-2012.

Year	CPS	CRAB	Groundfish	HMS	Other	Salmon	Shellfish	Shrimp	Total	Pct of Ann Average
1981	139,770	9,652	103,344	26,883	14,787	7,972	10,813	19,186	332,406	107%
1982	126,970	8,235	119,356	17,272	12,173	8,823	3,623	13,433	309,884	99%
1983	69,346	7,862	98,978	55,062	11,011	2,935	3,288	6,879	255,360	82%
1984	63,822	7,177	89,804	43,992	10,653	2,178	3,661	5,618	226,904	73%
1985	68,174	8,559	90,923	14,249	13,603	5,046	2,447	13,609	216,610	69%
1986	84,042	8,390	82,480	13,011	19,753	7,377	508	26,893	242,454	78%
1987	90,441	9,373	91,982	12,881	24,553	9,410	458	31,514	270,611	87%
1988	108,364	17,509	92,248	15,005	27,920	12,515	344	32,832	306,737	98%
1989	113,412	16,814	99,372	7,711	30,985	6,869	425	36,398	311,985	100%
1990	88,510	14,507	94,539	9,886	29,739	4,685	320	25,632	267,817	86%
1991	90,592	7,027	105,547	11,007	25,043	3,734	262	20,157	263,368	84%
1992	60,596	15,882	132,555	13,608	19,227	2,048	328	36,422	280,667	90%
1993	79,172	18,076	116,394	16,959	16,155	2,213	537	23,496	273,002	88%
1994	85,674	18,167	135,677	16,065	14,598	1,802	336	15,752	288,071	92%
1995	128,069	17,468	134,493	14,046	13,706	4,755	300	12,312	325,149	104%
1996	135,920	25,139	146,452	25,957	12,779	3,306	158	14,919	364,629	117%
1997	151,057	13,013	143,571	23,202	11,678	3,697	98	18,881	365,196	117%
1998	74,372	12,388	131,011	16,322	7,682	1,850	57	5,662	249,344	80%
1999	171,035	16,191	125,883	11,878	9,188	2,711	45	14,226	351,157	113%
2000	225,774	13,566	123,031	10,955	9,816	3,704	114	16,283	403,242	129%
2001	195,827	11,850	103,556	12,708	8,989	3,363	93	18,599	354,985	114%
2002	182,843	16,113	75,056	10,834	9,666	5,109	168	26,246	326,035	105%
2003	125,368	34,013	82,905	17,648	7,932	6,015	108	14,594	288,583	93%
2004	143,398	28,537	122,303	15,190	8,284	5,663	191	9,688	333,254	107%
2005	157,885	25,098	135,454	10,050	8,208	4,296	113	11,404	352,509	113%
2006	159,783	35,707	151,260	13,503	7,716	1,190	137	8,914	378,211	121%
2007	195,044	20,722	117,495	12,519	8,590	1,451	148	11,604	367,573	118%
2008	145,498	17,373	97,667	11,610	10,163	264	177	15,835	298,586	96%
2009	171,619	23,441	82,194	13,246	9,618	476	240	14,952	315,785	101%
2010	201,475	24,863	94,045	11,926	8,926	1,031	259	20,763	363,287	117%
2011	174,232	26,792	128,585	11,776	9,317	1,185	200	30,051	382,137	123%
2012	208,618	20,784	90,384	14,132	9,755	2,330	179	29,866	376,049	121%
Total	**4,216,702**	**550,284**	**3,538,542**	**531,092**	**442,212**	**130,002**	**30,131**	**602,619**	**10,041,584**	
Pct of Total	42%	5%	35%	5%	4%	1%	0%	6%	100%	
Ann Average	129,293	17,081	111,231	16,676	13,950	4,118	966	18,476	311,791	

Table 1b. Ex-vessel revenue (shoreside commercial and tribal) by species group in current (2012) dollars, $1,000s, 1981-2012.

Year	CPS	CRAB	Groundfish	HMS	Other	Salmon	Shellfish	Shrimp	Total	Pct of Ann Average
1981	$59,680	$43,250	$99,360	$96,687	$23,753	$70,120	$27,104	$51,459	$471,413	130%
1982	$58,446	$41,171	$124,177	$50,687	$20,059	$77,789	$14,583	$36,922	$423,833	116%
1983	$50,204	$49,450	$104,735	$118,259	$20,092	$18,183	$9,867	$25,767	$396,557	109%
1984	$25,646	$45,052	$93,393	$106,863	$20,511	$20,716	$11,676	$19,136	$342,992	94%
1985	$36,476	$48,946	$104,769	$49,319	$25,310	$39,028	$11,401	$24,801	$340,050	93%
1986	$35,178	$45,031	$103,392	$46,522	$35,713	$46,099	$3,973	$61,303	$377,212	104%
1987	$37,000	$48,619	$127,638	$53,329	$38,634	$81,970	$4,707	$86,593	$478,491	132%
1988	$42,311	$77,072	$117,690	$54,284	$50,513	$117,051	$3,747	$53,704	$516,373	142%
1989	$37,472	$68,464	$114,014	$29,611	$57,754	$44,329	$5,551	$50,467	$407,661	112%
1990	$35,479	$75,863	$102,573	$29,671	$64,952	$35,040	$4,338	$46,585	$394,502	108%
1991	$35,493	$35,797	$112,096	$26,281	$73,952	$21,900	$3,146	$40,474	$349,139	96%
1992	$28,189	$61,027	$107,278	$38,097	$62,280	$13,960	$5,146	$44,558	$360,535	99%
1993	$24,753	$65,077	$94,081	$43,503	$55,447	$13,160	$6,666	$29,036	$331,725	91%
1994	$31,226	$77,503	$97,997	$43,526	$52,800	$10,478	$4,210	$33,694	$351,434	97%
1995	$53,118	$91,621	$122,590	$31,052	$48,845	$21,833	$4,532	$31,633	$405,223	111%
1996	$59,598	$105,157	$113,988	$57,171	$42,620	$12,954	$3,184	$33,171	$427,843	118%
1997	$60,609	$72,798	$110,234	$48,246	$39,954	$13,776	$1,533	$31,298	$378,448	104%
1998	$13,257	$64,549	$71,877	$34,640	$26,015	$7,700	$94	$18,571	$236,704	65%
1999	$57,182	$90,813	$76,162	$31,446	$31,957	$12,876	$65	$26,692	$327,194	90%
2000	$54,390	$82,109	$79,651	$29,679	$34,940	$18,152	$208	$26,679	$325,808	90%
2001	$40,900	$67,313	$63,837	$30,808	$30,163	$13,454	$226	$21,293	$267,995	74%
2002	$40,665	$74,472	$52,936	$21,548	$29,262	$17,951	$457	$26,757	$264,047	73%
2003	$42,829	$144,262	$58,633	$34,541	$25,910	$25,773	$165	$14,026	$346,140	95%
2004	$38,551	$122,800	$55,574	$35,187	$26,173	$36,791	$558	$13,095	$328,729	90%
2005	$49,789	$96,980	$63,237	$26,521	$23,793	$27,808	$323	$16,234	$304,685	84%
2006	$45,409	$146,062	$67,733	$29,978	$24,588	$11,351	$400	$12,196	$337,716	93%
2007	$48,641	$113,854	$63,983	$27,507	$23,641	$13,835	$391	$16,597	$308,449	85%
2008	$47,496	$95,833	$74,119	$33,028	$29,010	$2,150	$521	$24,660	$306,817	84%
2009	$77,109	$109,774	$69,427	$31,752	$27,298	$2,632	$711	$15,854	$334,556	92%
2010	$87,805	$116,459	$70,256	$32,118	$30,545	$9,318	$716	$20,971	$368,188	101%
2011	$79,681	$159,591	$94,146	$47,467	$35,898	$11,138	$522	$39,210	$467,653	129%
2012	$86,956	$151,408	$73,448	$46,790	$35,593	$21,970	$489	$37,964	$454,618	125%
Total	**$1,521,538**	**$2,688,177**	**$2,885,025**	**$1,416,120**	**$1,167,978**	**$891,284**	**$131,211**	**$1,031,398**	**$11,732,730**	
Pct of Total	13%	23%	25%	12%	10%	8%	1%	9%	100%	
Ann Average	$46,277	$81,831	$90,696	$44,172	$36,529	$28,042	$4,217	$32,046	$363,810	

Table 2a. Groundfish landings (shoreside commercial and tribal) by species or species group (mt), 1981-2012.

Year	P. Whiting	Sablefish	Lingcod	P. Cod	Other Roundfish	Rockfish	Thornyheads	Arrowtooth Flounder	Dover Sole	English Sole	Petrale Sole	Other Flatfish	Other Groundfish	Total	Pct of Ann Average
1981	839	11,419	3,304	1,237	41	57,779	1,801	1,074	16,468	2,711	2,041	3,672	960	**103,344**	93%
1982	1,027	18,627	3,840	908	46	59,316	2,158	2,351	21,000	2,793	2,630	3,931	728	**119,356**	108%
1983	1,051	14,652	4,252	597	16	46,289	1,749	2,077	20,084	2,356	2,214	3,001	639	**98,978**	90%
1984	2,721	14,015	4,029	585	25	36,819	3,189	2,379	19,307	1,721	1,739	2,660	615	**89,804**	81%
1985	3,894	14,132	3,839	411	18	33,263	4,069	2,679	20,616	1,929	1,840	3,460	772	**90,923**	82%
1986	3,465	13,150	1,891	331	37	33,387	3,610	2,230	17,396	2,039	1,750	2,761	433	**82,480**	75%
1987	4,795	12,602	2,587	2,281	38	36,526	3,747	2,830	18,489	2,482	2,205	2,915	485	**91,982**	83%
1988	6,868	10,744	2,767	3,345	41	35,193	5,663	1,946	18,185	2,103	2,149	2,731	514	**92,248**	83%
1989	7,414	10,285	3,563	2,189	43	37,238	8,085	3,553	18,881	2,412	2,153	2,969	589	**99,372**	90%
1990	9,633	9,065	2,907	1,064	22	33,179	10,084	5,824	15,753	1,912	1,765	2,505	828	**94,539**	85%
1991	23,970	9,501	3,167	1,796	24	28,737	6,515	4,945	18,274	2,185	1,927	3,239	1,267	**105,547**	95%
1992	56,128	9,361	1,888	1,778	37	28,121	8,873	3,573	16,074	1,626	1,554	2,018	1,525	**132,555**	120%
1993	42,108	8,147	2,210	1,370	23	29,005	9,224	2,713	14,371	1,603	1,503	1,938	2,180	**116,394**	105%
1994	73,617	7,579	1,907	866	50	23,539	8,048	3,249	9,389	1,124	1,375	2,439	2,497	**135,677**	123%
1995	74,963	7,915	1,469	505	102	21,980	7,555	2,321	10,593	1,133	1,659	2,559	1,740	**134,493**	122%
1996	85,129	8,317	1,559	445	124	21,669	6,532	2,192	12,187	1,154	1,829	1,999	3,318	**146,452**	132%
1997	87,417	7,943	1,569	595	175	18,245	5,504	2,344	10,126	1,505	1,948	2,310	3,891	**143,571**	130%
1998	87,857	4,384	350	413	221	16,298	3,526	3,169	8,023	1,140	1,463	1,700	2,468	**131,011**	118%
1999	83,471	6,648	358	280	191	10,815	2,648	5,285	9,141	913	1,498	2,015	2,621	**125,883**	114%
2000	85,855	6,281	146	279	193	8,887	2,378	3,276	8,780	769	1,893	1,622	2,672	**123,031**	111%
2001	73,412	5,637	156	324	424	5,673	1,761	2,465	6,890	993	1,845	1,717	2,258	**103,556**	94%
2002	45,708	3,798	206	752	3,876	2,962	2,716	2,085	6,301	1,175	1,797	1,724	1,957	**75,056**	68%
2003	55,336	5,420	165	1,250	338	1,668	2,402	2,327	7,356	931	2,070	1,575	2,068	**82,905**	75%
2004	96,504	5,755	178	1,403	163	2,112	1,477	2,327	6,746	952	1,962	1,394	1,328	**122,303**	111%
2005	109,053	6,208	203	851	297	1,900	1,312	2,240	6,903	929	2,734	1,237	1,587	**135,455**	122%
2006	127,166	6,199	260	367	68	1,463	1,460	1,922	5,970	912	2,610	1,215	1,649	**151,260**	137%
2007	91,442	5,241	268	89	68	1,493	1,822	2,262	9,279	690	2,253	972	1,617	**117,495**	106%
2008	67,761	5,871	285	38	72	1,524	2,679	2,668	11,217	363	2,220	811	2,159	**97,667**	88%
2009	49,223	7,198	233	236	84	2,073	2,703	3,844	11,753	357	1,767	971	1,751	**82,194**	74%
2010	64,654	6,829	173	345	68	2,280	2,712	3,228	10,391	221	803	745	1,595	**94,045**	85%
2011	103,190	6,407	376	604	89	2,552	1,904	2,292	7,745	170	932	686	1,638	**128,585**	116%
2012	66,369	5,246	484	631	84	2,937	1,773	2,243	7,066	189	1,094	690	1,577	**90,384**	82%
Total	**1,692,039**	**274,576**	**50,588**	**28,160**	**7,097**	**644,922**	**129,679**	**89,912**	**400,752**	**43,492**	**59,223**	**66,177**	**51,926**	**3,538,543**	
Pct of Total	48%	8%	1%	1%	0%	18%	4%	3%	11%	1%	2%	2%	1%	100%	
Ann. Average	52,876	8,580	1,581	880	222	20,154	4,052	2,810	12,524	1,359	1,851	2,068	1,623	110,579	

Table 2b. Groundfish ex-vessel revenue (shoreside commercial and tribal) by species or species group in current (2012) dollars, $1,000s, 1981-2012.

Year	P. Whiting	Sablefish	Lingcod	P. Cod	Other Roundfish	Rockfish	Thornyheads	Arrowtooth Flounder	Dover Sole	English Sole	Petrale Sole	Other Flatfish	Other Groundfish	Total	Pct of Ann Average
1981	$311	$11,605	$3,669	$1,128	$31	$47,223	$1,960	$499	$17,528	$3,905	$5,084	$5,724	$691	**$99,358**	110%
1982	$377	$21,576	$4,380	$926	$40	$52,974	$2,228	$1,180	$22,179	$4,068	$7,305	$6,296	$649	**$124,175**	137%
1983	$376	$15,379	$4,683	$622	$34	$45,757	$1,789	$915	$19,748	$3,344	$6,669	$4,841	$572	**$104,731**	115%
1984	$781	$12,857	$4,207	$579	$25	$39,359	$3,254	$978	$18,850	$2,351	$5,235	$4,178	$731	**$93,387**	103%
1985	$1,067	$19,950	$4,188	$416	$17	$39,234	$4,194	$1,093	$20,294	$2,651	$5,578	$5,327	$760	**$104,769**	116%
1986	$830	$20,157	$2,434	$366	$24	$42,888	$4,067	$918	$18,065	$2,960	$5,483	$4,600	$597	**$103,389**	114%
1987	$1,184	$23,907	$3,852	$2,944	$32	$50,592	$4,765	$1,627	$22,072	$3,929	$7,044	$5,048	$644	**$127,641**	141%
1988	$1,933	$21,798	$3,867	$3,361	$46	$42,721	$7,554	$873	$20,907	$3,137	$6,645	$4,260	$585	**$117,686**	130%
1989	$1,753	$17,664	$4,605	$2,073	$41	$42,201	$10,936	$1,294	$18,934	$3,232	$6,440	$4,242	$600	**$114,015**	126%
1990	$2,335	$15,489	$3,657	$1,014	$29	$38,141	$13,665	$2,157	$14,810	$2,212	$5,126	$3,320	$615	**$102,568**	113%
1991	$5,986	$22,154	$3,795	$1,837	$42	$34,553	$10,095	$1,935	$18,707	$2,565	$5,410	$4,255	$765	**$112,098**	124%
1992	$8,931	$20,558	$2,440	$1,927	$104	$34,097	$13,524	$1,262	$15,044	$1,808	$4,161	$2,620	$800	**$107,277**	118%
1993	$4,295	$14,753	$2,749	$1,444	$196	$33,853	$14,080	$867	$12,761	$1,661	$3,844	$2,572	$1,010	**$94,083**	104%
1994	$7,278	$19,869	$2,519	$927	$432	$29,423	$18,594	$1,023	$8,838	$1,227	$3,684	$2,988	$1,195	**$97,995**	108%
1995	$11,119	$33,232	$2,108	$612	$971	$29,075	$23,769	$809	$10,760	$1,314	$4,929	$2,954	$936	**$122,588**	135%
1996	$7,156	$35,753	$2,234	$540	$1,209	$27,032	$17,461	$687	$11,514	$1,268	$5,127	$2,337	$1,673	**$113,990**	126%
1997	$11,131	$38,094	$2,262	$701	$1,380	$22,863	$13,014	$691	$8,933	$1,473	$5,275	$2,450	$1,970	**$110,237**	122%
1998	$6,423	$15,257	$770	$538	$1,937	$21,947	$7,547	$964	$8,119	$1,186	$4,107	$1,796	$1,286	**$71,877**	79%
1999	$9,088	$22,672	$833	$351	$1,891	$15,891	$6,756	$1,525	$8,805	$897	$4,171	$2,085	$1,197	**$76,162**	84%
2000	$9,907	$26,350	$449	$376	$2,203	$14,394	$6,797	$1,055	$8,704	$765	$5,490	$1,826	$1,336	**$79,651**	88%
2001	$6,632	$22,159	$491	$455	$1,810	$10,263	$5,064	$805	$6,809	$979	$5,155	$2,051	$1,162	**$63,837**	70%
2002	$5,465	$14,577	$650	$1,053	$2,050	$6,395	$7,320	$594	$6,246	$1,110	$4,508	$2,054	$915	**$52,938**	58%
2003	$6,487	$22,351	$499	$1,731	$1,234	$3,887	$5,441	$646	$7,135	$853	$5,487	$1,858	$1,024	**$58,632**	65%
2004	$8,800	$20,047	$516	$1,692	$1,149	$4,689	$3,370	$641	$6,412	$860	$5,196	$1,570	$633	**$55,574**	61%
2005	$13,814	$23,353	$531	$1,005	$944	$4,302	$3,081	$597	$6,405	$767	$6,344	$1,360	$733	**$63,236**	70%
2006	$17,776	$25,503	$643	$450	$761	$3,910	$3,613	$511	$5,433	$723	$6,465	$1,214	$733	**$67,735**	75%
2007	$15,216	$22,554	$718	$117	$753	$4,223	$3,850	$543	$8,309	$532	$5,391	$903	$876	**$63,984**	71%
2008	$16,114	$28,825	$781	$58	$804	$4,479	$5,108	$623	$9,787	$282	$5,270	$745	$1,243	**$74,120**	82%
2009	$6,652	$36,186	$634	$260	$717	$4,890	$4,445	$874	$9,109	$259	$3,741	$872	$786	**$69,427**	77%
2010	$10,328	$37,274	$494	$358	$681	$4,712	$4,716	$714	$7,237	$160	$2,083	$718	$780	**$70,255**	77%
2011	$24,137	$45,539	$878	$715	$861	$5,321	$4,218	$501	$7,089	$124	$2,940	$771	$1,052	**$94,146**	104%
2012	$20,499	$28,033	$1,114	$788	$846	$5,721	$3,662	$607	$6,496	$145	$3,550	$795	$1,192	**$73,448**	
Total	**$244,182**	**$755,473**	**$67,651**	**$31,363**	**$23,294**	**$767,010**	**$239,937**	**$30,008**	**$392,041**	**$52,747**	**$162,932**	**$88,629**	**$29,742**	**$2,885,009**	
Pct of Total	8%	26%	2%	1%	1%	27%	8%	1%	14%	2%	6%	3%	1%	100%	
Ann. Average	$7,631	$23,609	$2,114	$980	$728	$23,969	$7,498	$938	$12,251	$1,648	$5,092	$2,770	$929	$90,157	

Table 3a. Groundfish landings (shoreside commercial and tribal) by gear type (mt), 1991-2012.

Year	Dredge	Hook-and-line	Miscellaneous	Net	Pot	Shrimp Trawl	Trawl	Troll	Total
1981		4,308	2	1,770	3,961	1,846	90,949	508	103,344
1982		5,016	3	2,249	6,550	1,395	103,575	567	119,356
1983		3,990	6	3,203	5,989	1,221	84,141	430	98,978
1984		3,210	9	4,326	4,448	497	77,020	296	89,804
1985		5,361	1	5,499	3,938	522	75,261	340	90,923
1986		6,579	2	5,777	3,049	1,600	65,211	262	82,480
1987		7,576	11	4,650	2,139	1,622	75,789	196	91,982
1988		6,440	3	3,054	2,277	1,310	78,952	213	92,248
1989		6,680	11	3,248	2,125	1,232	85,800	276	99,372
1990		6,627	28	3,163	1,705	966	81,693	358	94,539
1991		8,293	1	1,898	1,086	873	93,282	115	105,547
1992		9,151	6	1,794	827	926	119,693	159	132,555
1993		7,559	2	1,287	871	1,597	104,844	235	116,394
1994		6,461	1	757	1,404	890	125,793	373	135,677
1995		6,396	2	792	1,118	754	125,214	217	134,493
1996		7,474	2	328	861	890	136,675	222	146,452
1997		7,100	<0.5	322	662	393	134,678	415	143,570
1998		4,661	2	387	546	386	124,751	279	131,011
1999		4,647	<0.5	140	821	427	119,755	93	125,883
2000		4,110	1	94	939	311	117,541	35	123,031
2001		3,697	1	87	734	241	98,760	37	103,556
2002	*	3,191	3	73	520	89	71,156	23	75,056
2003		3,489	1	80	842	32	78,438	24	82,905
2004	*	3,704	*	65	850	27	117,616	39	122,303
2005		3,932	2	56	1,023	16	130,383	42	135,454
2006		3,663	<0.5	63	1,079	19	146,397	39	151,260
2007		3,157	1	47	714	25	113,530	23	117,495
2008		3,588	<0.5	34	704	14	93,313	15	97,667
2009		4,391	*	13	890	16	76,872	13	82,195
2010		4,367	<0.5	8	934	14	88,704	18	94,045
2011		4,299	<0.5	9	1,484	70	122,708	16	128,585
2012	*	3,548	1	10	1,219	20	85,564	23	90,384
Total	*****	**166,665**	**102**	**45,280**	**56,303**	**20,236**	**3,244,054**	**5,901**	**3,538,542**
Pct of Total	<1%	4%	<1%	<1%	1%	<1%	95%	<1%	100%
Ann. Average	*	5,268	3	1,460	1,777	652	101,879	191	111,231

Table 3b. Groundfish ex-vessel revenue (shoreside commercial and tribal) by gear type in current (2012) dollars, $1,000s, 1981-2012.

Year	Dredge	Hook-and-line	Miscellaneous	Net	Pot	Shrimp Trawl	Trawl	Troll	Total
1981		$8,464	$7	$3,457	$4,353	$1,404	$81,027	$649	**$99,360**
1982		$9,895	$8	$3,835	$10,844	$1,215	$97,594	$786	**$124,177**
1983		$6,961	$10	$4,593	$7,790	$1,117	$83,720	$546	**$104,737**
1984		$6,007	$14	$6,283	$4,792	$484	$75,370	$446	**$93,394**
1985		$11,595	$28	$8,641	$6,439	$515	$77,051	$500	**$104,769**
1986		$14,217	$27	$8,939	$5,382	$1,716	$72,668	$443	**$103,392**
1987		$18,572	$34	$7,719	$4,424	$2,044	$94,499	$347	**$127,638**
1988		$16,924	$38	$4,970	$4,791	$1,153	$89,465	$348	**$117,690**
1989		$15,332	$17	$4,967	$3,644	$1,098	$88,509	$448	**$114,014**
1990		$15,213	$37	$4,942	$2,932	$867	$77,958	$624	**$102,573**
1991		$22,746	$3	$2,839	$2,615	$874	$82,825	$193	**$112,096**
1992		$21,603	$14	$2,647	$1,957	$941	$79,865	$252	**$107,278**
1993		$16,864	$3	$2,003	$1,792	$1,489	$71,614	$317	**$94,081**
1994		$16,686	$3	$1,185	$4,232	$1,114	$74,195	$582	**$97,997**
1995		$23,698	$4	$1,280	$5,215	$1,066	$90,950	$376	**$122,588**
1996		$27,070	$4	$566	$4,354	$1,171	$80,462	$362	**$113,990**
1997		$30,217	<$1	$517	$3,970	$564	$74,336	$630	**$110,234**
1998		$15,378	$3	$578	$2,400	$572	$52,538	$410	**$71,878**
1999		$18,574	$1	$235	$3,613	$614	$52,963	$162	**$76,162**
2000		$19,408	$9	$155	$5,175	$605	$54,215	$85	**$79,651**
2001		$17,065	$6	$160	$3,630	$374	$42,525	$78	**$63,838**
2002	*	$13,878	$33	$134	$2,678	$176	$35,983	$53	**$52,936**
2003		$15,977	$10	$137	$4,316	$82	$38,056	$54	**$58,632**
2004	*	$15,917	*	$148	$3,515	$72	$35,842	$77	**$55,574**
2005		$17,558	$7	$96	$4,356	$69	$41,062	$88	**$63,236**
2006		$17,729	$1	$130	$5,006	$60	$44,727	$79	**$67,733**
2007		$16,180	$10	$108	$3,383	$51	$44,180	$72	**$63,983**
2008		$19,093	$3	$60	$3,987	$26	$50,915	$36	**$74,119**
2009		$24,129	*	$16	$4,966	$24	$40,270	$19	**$69,427**
2010		$26,148	$2	$14	$5,676	$30	$38,345	$42	**$70,256**
2011		$31,589	$2	$15	$10,734	$101	$51,646	$58	**$94,145**
2012		$21,543	$4	$18	$6,452	$42	$45,319	$70	**$73,448**
Total	*	**$572,229**	**$347**	**$71,384**	**$149,411**	**$21,731**	**$2,060,695**	**$9,230**	**$2,885,028**
Pct of Total	<0.5%	34%	<0.5%	<0.5%	11%	<0.5%	55%	<0.5%	100%
Ann. Average	*	$17,452	$11	$2,262	$4,532	$687	$63,861	$290	$89,096

Table 4a. Shoreside IFQ - Trawl (whiting and nonwhiting) by groundish species or species group (mt), 2003-2012.

Fishery	P. Whiting	Sablefish	Lingcod	P. Cod	Other Roundfish	Rockfish	Thorny heads	Arrowtooth Flounder	Dover Sole	English Sole	Petrale Sole	Other Flatfish	Other Groundfish	Nonground fish	Total
Whiting Total	**717,634**	**361**	**35**	**10**	178	**2,706**	**24**	**59**	**2**	**2**	**1**	**15**	**804**	**2,241**	724,072
2003	51,183	40	<0.5	<0.5	*	68	<0.5	<0.5			<0.5	<0.5	4	88	51,385
2004	89,641	131	4	1	10	176	1	1			<0.5	<0.5	33	205	90,203
2005	97,559	22	6	1	165	289	<0.5	1			<0.5	<0.5	97	280	98,420
2006	97,267	11	6	1	<0.5	226	<0.5	2			<0.5	<0.5	38	71	97,622
2007	73,277	9	5	<0.5	*	319	<0.5	3	*	*	<0.5	1	52	197	73,864
2008	50,760	<0.5	3	<0.5		151	<0.5	2			<0.5	<0.5	60	880	51,857
2009	40,294	49	1	<0.5		211	<0.5	4			<0.5	<0.5	21	24	40,605
2010	62,655	21	2	<0.5	1	333	12	10			1	8	155	177	63,377
2011	89,826	30	5	7		530	2	13			<0.5	1	182	78	90,674
2012	65,171	47	4	<0.5		401	8	25			<0.5	4	162	242	66,065
Nonwhiting Total	**104**	**22,969**	**1,273**	**3,487**	**31**	**7,744**	**17,897**	**21,991**	**82,302**	**4,804**	**17,351**	**9,255**	**12,013**	**398**	201,618
2003	30	2,097	48	720	21	708	2,171	936	6,872	666	1,659	1,390	1,320	93	18,730
2004	12	2,183	53	825	4	979	1,279	1,246	6,555	817	1,749	1,280	784	38	17,803
2005	*	2,315	74	724	5	500	1,134	2,076	6,748	859	2,701	1,114	1,090	31	19,372
2006	*	2,467	115	330	<0.5	515	1,261	1,716	5,740	868	2,581	1,101	1,199	50	17,946
2007	2	2,428	119	43	*	576	1,605	2,025	8,951	622	2,207	884	1,090	40	20,592
2008	1	2,871	107	12	<0.5	603	2,438	2,635	10,970	327	2,175	743	1,391	43	24,313
2009	<0.5	3,009	109	87	*	757	2,459	3,823	11,611	265	1,696	887	1,441	49	26,192
2010	9	2,511	73	100	*	825	2,428	3,211	10,326	158	770	684	1,308	23	22,425
2011	26	1,663	239	252	*	928	1,585	2,167	7,586	108	792	585	1,177	12	17,120
2012	19	1,427	337	395	<0.5	1,354	1,538	2,158	6,944	115	1,021	587	1,212	19	17,126
Grand Total	**717,738**	**23,331**	**1,308**	**3,497**	**208**	**10,449**	**17,921**	**22,051**	**82,305**	**4,805**	**17,352**	**9,271**	**12,818**	**2,639**	**925,690**

Table 4b. Shoreside IFQ - Trawl (whiting and nonwhiting) ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Fishery	P. Whiting	Sablefish	Lingcod	P. Cod	Other Roundfish	Rockfish	Thorny heads	Arrowtooth Flounder	Dover Sole	English Sole	Petrale Sole	Other Flatfish	Other Groundfish	Nonground fish	Total
Whiting Total	123,210	**663**	**32**	**4**	18	**2,358**	**11**	**9**	**<$1**	**<$1**	**2**	**3**	**143**	**185**	126,639
2003	5,966	49	<$1	<$1	*	66	<$1	<$1			<$1	<$1	<$1	17	6,100
2004	8,271	67	4	1	2	174	<$1	<$1			<$1	<$1	10	27	8,558
2005	12,413	43	6	1	15	274	<$1	<$1			<$1	<$1	38	23	12,813
2006	14,018	21	5	<$1	<$1	207	<$1	<$1			<$1	<$1	12	11	14,276
2007	12305	14	4	<$1	*	246	<$1	<$1	*	*	<$1	<$1	16	40	12627
2008	12305	<$1	2	<$1		109	<$1	<$1			<$1	<$1	4	24	12444
2009	5590	8	<$1	<$1		151	<$1	<$1			<$1	<$1	<$1	<$1	5751
2010	10116	79	1	<$1	<$1	226	2	<$1			1	<$1	3	6	10436
2011	22027	189	5	<$1		531	2	2			<$1	<$1	46	12	22814
2012	20199	194	3	<$1		375	6	4			<$1	1	13	24	20820
Nonwhiting Total	**29**	**87160**	**2166**	**4394**	**25**	**9535**	**24859**	**5427**	**71485**	**3923**	**43473**	**9121**	**6440**	**1229**	269266
2003	**5**	**6,885**	**97**	**1,021**	**21**	**805**	**3,922**	**289**	**6,669**	**617**	**4,374**	**1,586**	**610**	**341**	27,243
2004	2	5,984	93	1,000	2	1,186	2,007	371	6,241	735	4,617	1,340	312	140	24,029
2005	*	6,516	119	860	2	567	1,767	553	6,267	704	6,260	1,146	430	113	25,302
2006	*	7,997	184	402	<$1	582	2,171	463	5,224	684	6,390	1,026	447	116	25,687
2007	<$1	8,556	216	57	*	747	2,311	487	8,016	474	5,273	783	584	136	27,639
2008	**1**	**12,073**	**177**	**15**	**<$1**	**853**	**3,319**	**615**	**9,565**	**251**	**5,154**	**655**	**865**	**109**	33,652
2009	<$1	13096	184	94	*	976	2726	870	8989	186	3557	770	647	97	32193
2010	3	11152	138	102	*	1025	2638	713	7182	111	2000	607	690	86	26445
2011	9	9340	402	322	*	1152	1927	476	6952	76	2538	604	827	40	24666
2012	8	5562	556	520	<$1	1642	2072	589	6380	86	3312	605	1028	51	22410
Grand Total	**123239**	**87823**	**2199**	**4398**	**43**	**11894**	**24869**	**5436**	**71485**	**3923**	**43475**	**9124**	**6583**	**1414**	**395904**

Table 5a. Shoreside IFQ - Nontrawl by groundish species or species group (mt), 2011-2012.

Species	2011	2012
Sablefish	1,116	923
Rougheye Rockfish	7	15
Blackgill Rockfish	2	6
Other Slope Rockfish	3	3
Shelf Rockfish	<0.5	<0.5
Thornyheads	23	13
Other Roundfish	3	2
Other Rockfish	1	<0.5
Flatfish	44	3
Other Groundfish	4	6
Nongroundfish	<0.5	<0.5
Total	**1203**	**971**

Table 5b. Shoreside IFQ - Nontrawl ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2011-2012.

Species	2011	2012
Sablefish	$7,611	$4,896
Rougheye Rockfish	$8	$17
Blackgill Rockfish	$8	$19
Other Slope Rockfish	$4	$4
Shelf Rockfish	<$1	<$1
Thornyheads	$146	$29
Other Roundfish	$6	$4
Other Rockfish	$1	<$1
Flatfish	$37	$9
Other Groundfish	$2	$5
Nongroundfish	<$1	<$1
Total	**$7,822**	**$4,983**

Spiny dogfish landings excluded due to data confidentiality rules.

Table 6a. Limited entry fixed gear landings by groundish species or species group (mt), 2003-2012.

Year	Sablefish	Rougheye Rockfish	Spiny Dogfish	Blackgill Rockfish	Other Slope Rockfish	Shelf Rockfish	Thorny heads	Other Roundfish	Other Rockfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	1,890	10	105	72	23	6	178	18	22	6	61	49	**2,441**
2004	2,136	19	90	42	25	12	166	22	19	5	37	54	**2,627**
2005	2,188	25	230	24	30	15	161	20	21	6	42	47	**2,808**
2006	2,209	40	131	38	23	14	172	21	23	4	36	50	**2,760**
2007	1,782	37	196	15	21	14	174	22	28	4	45	40	**2,377**
2008	1,844	39	181	20	21	13	199	32	38	7	66	31	**2,491**
2009	2,434	67	24	48	22	5	200	27	30	8	50	12	**2,928**
2010	2,474	48	8	40	29	3	225	24	32	8	57	4	**2,953**
2011	2,416	38	8	80	22	2	247	22	22	9	59	4	**2,929**
2012	1,845	34	1	47	36	6	177	20	18	10	84	8	**2,286**
Total	**21,218**	**356**	**974**	**425**	**250**	**91**	**1,901**	**226**	**252**	**67**	**539**	**299**	**26,599**

Table 6b. Limited entry fixed gear ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Year	Sablefish	Rougheye Rockfish	Spiny Dogfish	Blackgill Rockfish	Other Slope Rockfish	Shelf Rockfish	Thorny heads	Other Roundfish	Other Rockfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	$9,620	$12	$56	$244	$41	$15	$1,404	$98	$119	$6	$33	$300	**$11,948**
2004	$8,976	$20	$47	$152	$38	$53	$1,307	$88	$87	$7	$17	$320	**$11,112**
2005	$10,226	$28	$133	$71	$35	$60	$1,274	$72	$87	$5	$22	$262	**$12,274**
2006	$11,143	$43	$75	$109	$33	$55	$1,382	$74	$107	$3	$18	$373	**$13,414**
2007	$9,244	$42	$115	$60	$27	$51	$1,452	$99	$160	$2	$23	$325	**$11,600**
2008	$10,716	$46	$94	$79	$32	$57	$1,708	$150	$208	$9	$36	$239	**$13,377**
2009	$14,285	$80	$10	$135	$37	$18	$1,610	$125	$155	$8	$27	$67	**$16,556**
2010	$16,056	$68	$4	$109	$44	$11	$1,846	$111	$131	$17	$37	$33	**$18,466**
2011	$19,603	$61	$3	$232	$38	$8	$1,994	$102	$83	$19	$37	$32	**$22,213**
2012	$11,620	$60	<0.5	$165	$74	$26	$1,418	$99	$99	$34	$67	$56	**$13,718**
Total	**$121,488**	**$461**	**$538**	**$1,356**	**$399**	**$354**	**$15,396**	**$1,018**	**$1,237**	**$110**	**$316**	**$2,007**	**$144,678**

Table 7a. Open access landings (other than by fixed gear gear) by groundish species or species group (mt), 2003-2012.

Year	Sablefish	Black Rockfish	Brown Rockfish	Lingcod	Cabezon	Nearshore Rockfish	Thorny heads	Other Rockfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	4	<0.5		2		<0.5	1	27	<0.5	27	8	69
2004	4	<0.5		2		<0.5	1	24	7	20	6	64
2005	4	1		2		<0.5	*	13	<0.5	22	8	50
2006	3	<0.5		3		<0.5	*	19	<0.5	20	5	52
2007	7	<0.5	*	5	*	1	*	12	<0.5	12	5	43
2008	3	*		1		*		2	<0.5	8	7	22
2009	3	*		<0.5		*	*	1	*	4	1	16
2010		*		1		*	*	1	*	3	1	7
2011	3	<0.5		1		*	*	<0.5	<0.5	4	2	11
2012	6	<0.5		1		<0.5	<0.5	3	<0.5	5	2	16
Total	**36**	**2**	**<0.5**	**18**	**<0.5**	**2**	**6**	**101**	**13**	**125**	**45**	**347**

Spiny dogfish, kelp greenling, and other roundfish excluded for data confidentiality.

Table 7b. Open access ex-vessel revenue (other than by fixed gear) by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Year	Sablefish	Black Rockfish	Brown Rockfish	Lingcod	Cabezon	Nearshore Rockfish	Thorny heads	Other Rockfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	$9	$1		$7		$1	$4	$64	<$1	$37	$42	$165
2004	$11	$1		$11		$2	$2	$62	$8	$33	$29	$161
2005	$13	$1		$13		$1	*	$36	<$1	$31	$47	$144
2006	$9	$1		$16		$2	*	$47	<$1	$34	$30	$139
2007	$24	$1	*	$28	*	$4	*	$45	<$1	$20	$33	$155
2008	$17	*		$6		*		$13	$1	$11	$48	$100
2009	$19	*		$1		*	*	$2	*	$6	$8	$31
2010		*		$4		*	*	$3	*	$3	$4	$28
2011	$17	<$1		$6		*	*	$2	$3	$5	$12	$47
2012	$28	<$1		$3		<$1	*	$9	$1	$4	$14	$61
Total	**$146**	**$6**	**$3**	**$95**	**$3**	**$13**	**$15**	**$282**	**$17**	**$184**	**$267**	**$1,031**

Table 8a. Nonnearshore fixed gear landings by groundish species or species group (mt), 2003-2012.

Year	Sablefish	Rougheye Rockfish	Spiny Dogfish	Blackgill Rockfish	Other Slope Rockfish	Shelf Rockfish	Thorny heads	Other Roundfish	Other Rockfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	2,445	11	149	80	26	4	159	9	2	7	104	55	3,051
2004	2,604	20	99	47	27	3	161	14	4	5	81	58	3,122
2005	3,085	30	135	26	36	5	158	15	6	7	80	52	3,637
2006	3,007	41	101	48	26	6	170	16	9	5	52	57	3,537
2007	2,243	38	107	16	23	4	152	12	8	5	55	50	2,712
2008	2,419	41	125	24	22	3	155	20	8	8	96	45	2,965
2009	3,421	69	29	58	26	2	150	17	9	10	60	17	3,867
2010	3,521	49	10	67	32	1	172	15	15	8	73	6	3,969
2011	3,024	39	10	114	24	1	192	12	17	8	71	6	3,518
2012	2,247	36	2	80	37	4	146	11	8	8	91	11	2,680
Total	**28,016**	**374**	**766**	**560**	**278**	**34**	**1,615**	**140**	**84**	**70**	**764**	**359**	**33,058**

Table 8b. Nonnearshore fixed gear ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Year	Sablefish	Rougheye Rockfish	Spiny Dogfish	Blackgill Rockfish	Other Slope Rockfish	Shelf Rockfish	Thorny heads	Other Roundfish	Other Rockfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	$11,895	$13	$77	$256	$48	$7	$1,221	$17	$2	$6	$58	$352	$13,953
2004	$10,651	$20	$51	$162	$43	$7	$1,252	$20	$6	$6	$37	$355	$12,611
2005	$13,572	$36	$77	$77	$46	$9	$1,246	$27	$8	$6	$44	$302	$15,450
2006	$14,335	$45	$59	$137	$40	$15	$1,361	$29	$13	$4	$26	$428	$16,494
2007	$11,134	$43	$62	$46	$29	$4	$1,268	$24	$11	$3	$29	$446	$13,100
2008	$13,528	$49	$64	$75	$30	$6	$1,318	$49	$13	$5	$52	$414	$15,603
2009	$18,946	$82	$12	$154	$42	$3	$1,187	$41	$15	$6	$32	$152	$20,671
2010	$21,343	$71	$5	$179	$48	$2	$1,362	$36	$28	$5	$48	$56	$23,183
2011	$23,699	$61	$4	$323	$42	$5	$1,540	$29	$37	$7	$45	$57	$25,847
2012	$13,956	$63	$1	$251	$73	$13	$1,168	$29	$18	$13	$71	$79	$15,735
Total	**$153,058**	**$483**	**$413**	**$1,660**	**$441**	**$72**	**$12,923**	**$301**	**$151**	**$63**	**$441**	**$2,642**	**$172,647**

Table 9a. Nearshore fixed gear landings by groundish species or species group (mt), 2003-2012.

Year	Black Rockfish	Cabezon	Lingcod	Other Nearshore Rockfish	Brown Rockfish	Kelp Greenling	Gopher Rockfish	Other Rockfish	Blue Rockfish	Nongroundfish	Flatfish	Other Groundfish	Thorny heads	Total
2003	172	64	55	45	20	25	13	13	13	4	<0.5	<0.5		**424**
2004	182	75	63	50	24	25	16	24	18	5	<0.5	<0.5		**482**
2005	170	58	52	50	22	23	18	24	23	3	<0.5	1		**444**
2006	153	49	52	53	21	16	15	26	24	4	<0.5	2		**415**
2007	184	46	54	59	22	20	19	26	17	3	<0.5	1	*	**451**
2008	181	47	56	57	24	23	24	23	30	4	2	1		**470**
2009	225	47	45	50	24	22	23	21	11	4	1	1		**473**
2010	152	45	38	39	26	20	27	14	9	4	1	1		**375**
2011	123	60	51	44	28	23	30	17	14	4	1	<0.5		**395**
2012	119	57	57	45	26	24	22	18	11	4	3	1		**386**
Total	**1,661**	**548**	**521**	**491**	**236**	**220**	**206**	**205**	**169**	**39**	**9**	**8**	**<0.5**	**4,314**

Table 9b. Nearshore fixed gear ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Year	Black Rockfish	Blue Rockfish	Brown Rockfish	Cabezon	Flatfish	Gopher Rockfish	Kelp Greenling	Lingcod	Nongroundfish	Other Groundfish	Other Nearshore Rockfish	Other Rockfish	Thorny heads	Total
2003	$583	$43	$249	$723	$1	$188	$279	$248	$31	<$1	$723	$71		**$3,139**
2004	$632	$64	$345	$821	$2	$243	$283	$271	$38	$1	$809	$135		**$3,645**
2005	$621	$77	$327	$639	$2	$299	$267	$226	$20	$2	$820	$132		**$3,433**
2006	$652	$87	$303	$550	$2	$268	$189	$237	$21	$3	$918	$143		**$3,373**
2007	$810	$71	$319	$515	$2	$328	$217	$256	$14	$2	$1,004	$152	*	**$3,691**
2008	$796	$123	$355	$515	$7	$412	$273	$281	$24	$1	$953	$133		**$3,876**
2009	$959	$44	$346	$467	$4	$365	$236	$230	$26	$1	$770	$123		**$3,570**
2010	$668	$32	$346	$451	$8	$404	$210	$192	$33	$1	$625	$88		**$3,062**
2011	$569	$49	$382	$604	$10	$466	$233	$263	$32	$1	$687	$107		**$3,403**
2012	$589	$37	$359	$557	$21	$348	$260	$311	$22	$1	$699	$127		**$3,331**
Total	**$6,879**	**$628**	**$3,330**	**$5,843**	**$61**	**$3,321**	**$2,447**	**$2,514**	**$261**	**$14**	**$8,009**	**$1,211**	**$4**	**$34,522**

Other roundfish excluded for data confidentiality

Table 10a. Incidental open access landings by groundish species or species group (mt), 2003-2012.

Year	Sablefish	Roundfish	Rockfish	Flatfish	Other Groundfish	CPS	Crab	HMS	Other	Salmon	Shrimp	Total
2003	78	230	262	51	72	18	61	49	248	228	8	**1,305**
2004	72	219	303	49	64	21	45	42	254	258	6	**1,333**
2005	52	179	296	40	59	16	35	36	226	253	3	**1,195**
2006	64	141	199	41	63	27	42	37	202	144	4	**964**
2007	50	132	193	40	69	23	42	43	206	140	6	**944**
2008	46	96	101	33	46	25	33	32	149	15	8	**584**
2009	41	98	91	33	40	18	36	18	149	23	6	**553**
2010	21	120	132	22	31	10	30	24	152	81	5	**628**
2011	35	160	126	55	47	13	36	20	180	89	5	**766**
2012	38	194	177	62	36	15	37	25	197	110	4	**895**
Total	**497**	**1,569**	**1,880**	**426**	**527**	**186**	**397**	**326**	**1,963**	**1,341**	**55**	**9,167**

Table 10b. Incidental open access ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Year	Sablefish	Roundfish	Rockfish	Flatfish	Other Groundfish	CPS	Crab	HMS	Other	Salmon	Shrimp	Total
2003	$99	$44	$33	$2	$21	$4	$181	$72	$1,169	$934	$260	**$2,820**
2004	$72	$44	$38	$4	$32	$1	$85	$51	$1,267	$1,267	$104	**$2,965**
2005	$83	$24	$42	$1	$18	$1	$36	$27	$1,246	$1,125	$74	**$2,677**
2006	$85	$27	$23	$2	$23	$39	$58	$55	$1,345	$510	$158	**$2,325**
2007	$101	$27	$17	$2	$25	$685	$67	$59	$1,452	$389	$133	**$2,958**
2008	$64	$23	$15	<$1	$10	$1,622	$52	$48	$868	$40	$64	**$2,805**
2009	$57	$18	$13	$1	$5	$695	$50	$14	$651	$98	$43	**$1,644**
2010	$18	$28	$27	$1	$7	$624	$40	$23	$843	$363	$76	**$2,049**
2011	$48	$36	$35	$1	$5	$389	$92	$84	$1,212	$415	$53	**$2,370**
2012	$32	$44	$38	$3	$5	$528	$96	$24	$1,125	$619	$46	**$2,560**
Total	**$658**	**$315**	**$281**	**$18**	**$152**	**$4,588**	**$756**	**$456**	**$11,179**	**$5,760**	**$1,009**	**$25,174**

Table 11a. Nonnearshore Nonsablefish landings by groundish species or species group (mt), 2003-2012.

Year	Blackgill Rockfish	Rougheye Rockfish	Thorny heads	Spiny Dogfish	Other Slope Rockfish	Shelf Rockfish	Other Rockfish	Other Roundfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	42	<0.5	21		2	3	2	11	2	13	1	97
2004	19	*	7	78	3	14	2	13	4	14	*	155
2005	9	*	4	98	4	12	1	17	1	8	*	155
2006	6	<0.5	4	90	1	17	5	17	2	4	2	148
2007	7		23	91	1	19	4	20	3	6	2	177
2008	12	<0.5	45	67	2	16	3	21	2	3	1	172
2009	21	1	57	<0.5	6	11	2	14	2	2	2	116
2010	21	1	67		1	9	1	10	3	1	1	114
2011	16	1	65	*	1	13	2	11	4	2	1	116
2012	26	1	40	*	3	15	2	17	5	7	2	115
Total	**177**	**4**	**332**	**425**	**23**	**128**	**23**	**151**	**28**	**59**	**14**	**1,364**

Table 11b. Nonnearshore nonsablefish ex-vessel revenue by groundish species or species group in current (2012) dollars, $1,000s, 2003-2012.

Year	Blackgill Rockfish	Rougheye Rockfish	Thorny heads	Spiny Dogfish	Other Slope Rockfish	Shelf Rockfish	Other Rockfish	Other Roundfish	Flatfish	Other Groundfish	Nonground fish	Total
2003	$141	<$1	$195		$7	$10	$6	$44	$15	$15	$6	$439
2004	$66	*	$64	$42	$8	$66	$6	$52	$19	$17	$11	$351
2005	$35	*	$37	$57	$13	$55	$6	$67	$5	$12	$5	$290
2006	$20	<$1	$37	$51	$4	$76	$20	$72	$15	$9	$11	$315
2007	$39		$196	$55	$4	$97	$17	$86	$22	$10	$11	$537
2008	$55	<$1	$400	$36	$7	$82	$13	$113	$14	$3	$10	$732
2009	$62	$2	$471	<$1	$18	$63	$7	$78	$9	$3	$9	$724
2010	$60	$1	$580		$2	$50	$3	$54	$20	$2	$6	$779
2011	$48	$3	$549	*	$2	$66	$8	$61	$24	$2	$9	$773
2012	$83	$2	$334	*	$9	$80	$9	$98	$32	$7	$15	$669
Total	**$609**	**$8**	**$2,862**	**$241**	**$76**	**$645**	**$96**	**$725**	**$174**	**$79**	**$93**	**$5,607**

Table 12a. Groundish landings by shoreside commercial fishery sectors (mt), 2003-2012.

Year	Shoreside IFQ Trawl (Nonwhiting)	Shoreside IFQ Trawl (Whiting)	Shoreside IFQ Nontrawl	Non Nearshore Fixed Gear	Nearshore Fixed Gear	Non Fixed Gear Open Access	Incidental Open Access	Exempted trawl, EFP/Research, Misc.	Grand Total
2003	18,638	51,297		3,092	420	69	54	3,747	**77,317**
2004	17,765	89,999		3,217	476	62	53	1,982	**113,554**
2005	19,342	98,141		3,739	441	48	52	293	**122,054**
2006	17,896	97,552		3,625	411	52	44	121	**119,701**
2007	20,552	73,667		2,837	448	38	49	116	**97,707**
2008	24,270	50,977		3,090	466	28	26	156	**79,013**
2009	26,143	40,580		3,964	469	14	25	136	**71,331**
2010	22,401	63,200		4,076	371	7	17	304	**90,375**
2011	17,108	90,596	1,203	3,626	391	9	20	1,850	**114,804**
2012	17,107	65,823	971	2,783	382	14	23	786	**87,890**
Total	**201,220**	**721,831**	**2,175**	**34,049**	**4,275**	**341**	**363**	**9,490**	**973,745**
Pct of total	21%	74%	0%	3%	0%	0%	0%	1%	**100%**
Ann Average	20,122	72,183	1,087	3,405	428	34	36	949	**97,375**

Table 12b. Groundish ex-vessel revenue in current (2012) dollars, $1,000s, by shoreside commercial fishery sectors, 2003-2012.

Year	Shoreside IFQ Trawl (Nonwhiting)	Shoreside IFQ Trawl (Whiting)	Shoreside IFQ Nontrawl	Non Nearshore Fixed Gear	Nearshore Fixed Gear	Non Fixed Gear Open Access	Incidental Open Access	Exempted trawl, EFP/Research, Misc.	Grand Total
2003	$26,902	$6,083		$14,033	$3,108	$137	$200	$3,731	**$54,194**
2004	$23,889	$8,531		$12,597	$3,607	$142	$190	$1,766	**$50,721**
2005	$25,189	$12,790		$15,433	$3,413	$103	$169	$615	**$57,712**
2006	$25,571	$14,264		$16,369	$3,353	$127	$160	$333	**$60,177**
2007	$27,503	$12,587		$13,179	$3,678	$125	$171	$243	**$57,485**
2008	$33,544	$12,420		$15,912	$3,850	$64	$111	$324	**$66,225**
2009	$32,096	$5,751		$21,235	$3,543	$23	$93	$421	**$63,162**
2010	$26,359	$10,430		$23,901	$3,027	$25	$80	$1,132	**$64,955**
2011	$24,626	$22,802	$7,821	$26,553	$3,372	$35	$126	$904	**$86,239**
2012	$22,359	$20,796	$4,982	$16,308	$3,309	$47	$123	$616	**$68,538**
Total	**$268,037**	**$126,454**	**$12,803**	**$175,519**	**$34,259**	**$827**	**$1,423**	**$10,084**	**$629,407**
Pct of total	43%	20%	2%	28%	5%	0%	0%	2%	**100%**
Ann Average	$26,803.8	$12,645.4	$6,401.5	$17,552.0	$3,426.0	$82.8	$142.3	$1,008.5	**$62,941**

Table 13a. Treaty nonwhiting groundfish sector landings (groundfish only) by gear group (mt), 2003-2012.

Year	Hook-and-Line	Pot	Shrimp Trawl	Other Trawl	Total
2003	629		10	758	**1,397**
2004	754		16	1,071	**1,841**
2005	679		25	1,242	**1,946**
2006	654	<0.5	30	865	**1,548**
2007	535		11	935	**1,481**
2008	669		13	726	**1,408**
2009	759		2	1,046	**1,807**
2010	598	34	12	1,050	**1,693**
2011	557	20	7	1,431	**2,014**
2012	552	47	10	1,273	**1,881**
Total	**6,386**	**101**	**135**	**10,395**	**17,017**

Table 13b. Treaty nonwhiting groundfish sector ex-vessel revenue (groundfish only), current (2012) dollars, $1,000s, 2003-2012.

Year	Hook-and-Line	Pot	Shrimp Trawl	Other Trawl	Total
2003	$2,652		$13	$1,101	**$3,766**
2004	$2,938		$21	$1,341	**$4,300**
2005	$2,620		$35	$1,452	**$4,107**
2006	$2,754	<$1	$47	$932	**$3,733**
2007	$2,483		$18	$998	**$3,499**
2008	$3,014		$21	$912	**$3,947**
2009	$3,902		$3	$1,250	**$5,155**
2010	$3,609	$214	$15	$1,254	**$5,092**
2011	$4,235	$140	$9	$1,814	**$6,198**
2012	$3,048	$164	$16	$1,550	**$4,777**
Total	**$31,255**	**$518**	**$197**	**$12,603**	**$44,574**

Table 14a. Landings (mt) by whiting sectors, 2003-2012.

Sector / Species Group	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Catcher-Processor Subtotal	**41,434**	**71,004**	**79,333**	**79,096**	**74,304**	**109,134**	**38,748**	**54,787**	**72,759**	**55,669**	**676,267**
P. Whiting	41,215	69,412	78,890	78,865	73,264	108,240	34,801	54,292	71,680	55,264	665,922
Other Groundfish	101	401	204	97	211	718	49	219	835	290	3,125
Nongroundfish	118	1,192	239	134	829	175	3,898	277	244	114	7,220
Mothership Subtotal	**26,040**	**24,163**	**49,295**	**55,601**	**47,986**	**57,687**	**24,297**	**35,935**	**50,331**	**38,604**	**409,939**
P. Whiting	26,022	24,102	48,597	55,355	47,811	57,498	24,091	35,714	50,051	38,442	407,683
Other Groundfish	5	53	123	176	157	162	199	175	192	108	1,350
Nongroundfish	13	8	575	70	18	26	7	47	88	54	906
Shoreside Whiting Trawl Subtotal	**51,385**	**90,204**	**98,420**	**97,622**	**73,864**	**51,857**	**40,605**	**63,377**	**90,674**	**66,065**	**724,072**
P. Whiting	51,183	89,641	97,559	97,267	73,277	50,760	40,294	62,655	89,826	65,171	717,634
Other Groundfish	115	358	582	285	390	217	287	545	770	651	4,198
Nongroundfish	88	205	280	71	197	880	24	177	78	242	2,241
Treaty Shoreside Whiting Trawl Subtotal	**4,196**	**6,909**	**11,457**	**30,026**	**18,321**	**17,516**	**9,158**	**1,977**	**11,766**	**613**	**111,938**
P. Whiting	4,079	6,848	11,422	29,896	18,158	16,972	8,929	1,968	11,756	613	110,642
Other Groundfish	113	61	32	115	149	275	127	9	10		889
Nongroundfish	5	<0.5	2	15	14	269	102	<0.5	<0.5		407
Treaty Mothership Subtotal	**20,684**	**23,950**	**24,356**	**5,661**	**5,275**	**15,152**	**14,107**	**16,530**	**6,438**	**33**	**132,186**
P. Whiting	19,376	23,459	23,582	5,568	5,167	14,944	13,458	16,309	6,344	31	128,239
Other Groundfish	1,270	470	746	91	82	205	142	218	89	2	3,316
Nongroundfish	38	20	28	2	26	3	507	3	5	<0.5	631
Grand Total	**143,739**	**216,230**	**262,861**	**268,006**	**219,750**	**251,346**	**126,915**	**172,606**	**231,968**	**160,984**	**2,054,402**

Table 14b. Ex-vessel revenue, current (2012) dollars, $1,000s, by whiting sectors, 2003-2012.

Sector / Species Group	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
Catcher-Processor Subtotal	**$6,542**	**$11,760**	**$9,987**	**$10,670**	**$11,910**	**$26,610**	**$4,178**	**$9,995**	**$16,263**	**$16,376**	**$124,291**
P. Whiting	$6,372	$11,567	$9,823	$10,582	$11,775	$26,299	$4,163	$9,937	$16,022	$16,259	$122,799
Other Groundfish	$131	$85	$96	$42	$121	$264	$13	$46	$160	$86	$1,044
Nongroundfish	$38	$109	$68	$46	$14	$47	$3	$12	$81	$31	$448
Mothership Subtotal	**$6,041**	**$3,185**	**$6,057**	**$7,271**	**$7,423**	**$17,355**	**$2,959**	**$6,437**	**$12,331**	**$11,016**	**$80,075**
P. Whiting	$6,039	$3,133	$5,948	$7,199	$7,356	$17,274	$2,818	$6,356	$12,275	$10,974	$79,373
Other Groundfish	$1	$47	$79	$67	$64	$76	$139	$81	$35	$38	$627
Nongroundfish	<1$	$4	$31	$5	$3	$4	$2	<1$	$21	$4	$76
Shoreside Whiting Trawl Subtotal	**$6,100**	**$8,558**	**$12,813**	**$14,276**	**$12,627**	**$12,444**	**$5,751**	**$10,436**	**$22,814**	**$20,820**	**$126,639**
P. Whiting	$5,966	$8,271	$12,413	$14,018	$12,305	$12,305	$5,590	$10,116	$22,027	$20,199	$123,210
Other Groundfish	$116	$260	$378	$247	$282	$115	$161	$314	$776	$597	$3,245
Nongroundfish	$17	$27	$23	$11	$40	$24	<1$	$6	$12	$24	$185
Treaty Shoreside Whiting Trawl Subtotal	**$680**	**$554**	**$1,418**	**$3,823**	**$3,000**	**$4,010**	**$1,132**	**$209**	**$1,708**	**$133**	**$16,668**
P. Whiting	$507	$524	$1,389	$3,756	$2,908	$3,799	$1,061	$205	$1,701	$133	$15,985
Other Groundfish	$165	$29	$29	$67	$91	$148	$48	$4	$7		$588
Nongroundfish	$7	<1$	<1$	<1$	$2	$62	$23	<1$	<1$		$95
Treaty Mothership Subtotal	**$2,860**	**$2,123**	**$3,119**	**$834**	**$921**	**$3,523**	**$1,308**	**$1,841**	**$1,512**	**$10**	**$18,051**
P. Whiting	$2,237	$2,036	$3,026	$779	$911	$3,477	$1,296	$1,738	$1,479	$10	$16,989
Other Groundfish	$624	$87	$93	$55	$10	$46	$12	$98	$30	<1$	$1,055
Nongroundfish	<1$	<1$	<1$	<1$	<1$	<1$	<1$	$4	$3	<1$	$7
Grand Total	**$22,223**	**$26,180**	**$33,394**	**$36,874**	**$35,881**	**$63,942**	**$15,328**	**$28,918**	**$54,628**	**$48,355**	**$365,724**

Table 15a. Average monthly landings (mt) by commercial fishery sectors, 5 years, 2008-2012 (except as noted).

Sector /Species	January	February	March	April	May	June	July	August	September	October	November	December
At-Sea Catch-Processor (Whiting)					**15,132**	**4,226**	**56**	**4,860**	**9,904**	**11,412**	**12,914**	**6,773**
P. Whiting					15,074	4,190	56	4,845	9,872	11,386	12,833	6,599
Other Groundfish					58	36	<0.5	15	32	26	82	174
At-Sea Mothership (Whiting)					**16,346**	**6,871**	**1,624**	**1,820**	**2,395**	**8,696**	**3,259**	**316**
P. Whiting					16,253	6,846	1,621	1,816	2,385	8,679	3,250	310
Other Groundfish					93	25	3	5	11	17	9	6
Shoreside IFQ Trawl (Whiting)					**1,829**	**10,966**	**11,276**	**17,855**	**7,008**	**8,611**	**4,062**	**628**
P. Whiting					1,815	10,888	11,167	17,719	6,947	8,576	4,011	618
Other Groundfish					14	78	109	136	61	34	51	11
Shoreside IFQ Trawl (Nonwhiting)	**1,303**	**1,897**	**2,003**	**2,287**	**2,131**	**1,796**	**1,805**	**1,816**	**1,674**	**1,745**	**1,508**	**1,440**
P. Whiting	<0.5	<0.5	1	1	2	1	1	1	2	1	1	1
Other Groundfish	1,302	1,897	2,001	2,286	2,130	1,795	1,805	1,816	1,672	1,745	1,508	1,439
Non Nearshore Fixed Gear	**97**	**104**	**131**	**339**	**414**	**423**	**406**	**443**	**517**	**352**	**164**	**118**
P. Whiting	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Other Groundfish	97	104	131	339	414	423	406	443	517	352	164	118
Nearshore Fixed Gear	**19**	**16**	**11**	**23**	**58**	**53**	**57**	**53**	**56**	**34**	**21**	**14**
Other Groundfish	19	16	11	23	58	53	57	53	56	34	21	14
Non Fixed Gear Open Access	**1**	**1**	**<0.5**	**1**	**1**	**1**	**1**	**5**	**2**	**1**	**<0.5**	**<0.5**
Other Groundfish	1	1	<0.5	1	1	1	1	5	2	1	<0.5	<0.5
Incidental Open Access	**1**	**1**	**<0.5**	**1**	**2**	**7**	**6**	**1**	**1**	**1**	**1**	**1**
P. Whiting		*					*					
Other Groundfish	1	1	<0.5	1	2	7	6	1	1	1	1	1
Exempted trawl, EFP/Research, Misc.	**7**	**6**	**5**	**6**	**19**	**179**	**117**	**64**	**192**	**40**	**6**	**5**
P. Whiting		*	<0.5		*	136	87	25	*	28	*	
Other Groundfish	**7**	**6**	**5**	**6**	**19**	**43**	**30**	**39**	*****	**12**	**6**	**5**
Shoreside IFQ Nontrawl**	*****	*****	**33**	**64**	**6**	**57**	**69**	**95**	**265**	**281**	**128**	**77**
Other Groundfish	*	*	33	64	6	57	69	95	265	281	128	77

Table 15b. Average monthly ex-vessel revenue in nominal dollars, $1,000s, by commercial fishery sectors, 5 years, 2008-2012 (except as noted).

Sector /Species	January	February	March	April	May	June	July	August	September	October	November	December
At-Sea Catch-Processor (Whiting)					**$3,434**	**$1,362**	**$9**	**$1,040**	**$2,045**	**$2,576**	**$2,756**	**939**
P. Whiting					$3,405	$1,337	$9	$1,039	$2,038	$2,569	$2,744	910
Other Groundfish					$29	$25	<1$	$1	$7	$7	$11	29
At-Sea Mothership (Whiting)					**$2,936**	**$1,954**	**$534**	**$525**	**$617**	**$2,242**	**$836**	**43**
P. Whiting					$2,886	$1,944	$534	$524	$616	$2,238	$832	41
Other Groundfish					$50	$10	<1$	$1	$1	$4	$4	$1
Shoreside IFQ Trawl (Whiting)					**$338**	**$1,965**	**$2,651**	**$4,222**	**$1,619**	**$2,131**	**$1,056**	**$93**
P. Whiting					$333	$1,908	$2,533	$4,107	$1,574	$2,113	$1,032	$90
Other Groundfish					$5	$57	$118	$116	$45	$17	$24	$2
Shoreside IFQ Trawl (Nonwhiting)	**$1,797**	**$2,285**	**$2,238**	**$2,420**	**$2,472**	**$2,266**	**$2,409**	**$2,314**	**$2,226**	**$2,251**	**$2,074**	**$2,036**
P. Whiting	<1$	<1$	$1	<1$	<1$	<1$	<1$	<1$	$1	$1	<1$	<1$
Other Groundfish	$1,797	$2,285	$2,238	$2,420	$2,471	$2,266	$2,409	$2,314	$2,224	$2,251	$2,074	$2,036
Non Nearshore Fixed Gear	**$494**	**$511**	**$685**	**$1,835**	**$2,452**	**$2,523**	**$2,438**	**$2,643**	**$2,965**	**$2,052**	**$879**	**$626**
P. Whiting	<1$	<1$	<1$	<1$	<1$	<1$	<1$	<1$	<1$	<1$	<1$	<1$
Other Groundfish	$494	$511	$685	$1,835	$2,452	$2,523	$2,438	$2,643	$2,965	$2,052	$879	$626
Nearshore Fixed Gear	**$200**	**$160**	**$71**	**$130**	**$432**	**$393**	**$448**	**$398**	**$426**	**$282**	**$207**	**$157**
Other Groundfish	$200	$160	$71	$130	$432	$393	$448	$398	$426	$282	$207	$157
Non Fixed Gear Open Access	**$2**	**$2**	**$1**	**$1**	**$3**	**$3**	**$5**	**$8**	**$5**	**$5**	**$1**	**<1$**
Other Groundfish	$2	$2	$1	$1	$3	$3	$5	$8	$5	$5	$1	<1$
Incidental Open Access	$7	$4	$1	$2	$9	$28	$26	$8	$4	$5	$4	$5
P. Whiting		*					*					
Other Groundfish	**$7**	**$4**	**$1**	**$2**	**$9**	**$28**	**$26**	**$8**	**$4**	**$5**	**$4**	**$5**
Exempted trawl, EFP/Research, Misc.	$16	$13	$8	$18	$45	$116	$131	$110	$110	$47	$26	$20
P. Whiting		*	<1$		*	$30	$26	$8	*	$7	*	
Other Groundfish	**$16**	**$13**	**$8**	**$18**	**$45**	**$85**	**$105**	**$102**	*	**$40**	**$26**	**$20**
Shoreside IFQ Nontrawl**	*	*	**$131**	**$382**	**$40**	**$174**	**$294**	**$565**	**$1,649**	**$1,841**	**$764**	**$475**
Other Groundfish	*	*	$131	$382	$40	$174	$294	$565	$1,649	$1,841	$764	$475

Table 16a. Average monthly landings (mt) by Treaty fishery sectors, 5 years, 2008-2012.

Sector/ Species	January	February	March	April	May	June	July	August	September	October	November	December
Treaty Whiting Mothership						**6,426**	**10,541**	**5,769**	**3,312**	**5,013**	**1,869**	**630**
P. Whiting						6,063	10,222	5,618	3,267	4,859	1,824	625
Other Groundfish						362	319	151	44	154	45	6
Treaty Shoreside Whiting Trawl					**17**	**4**	**2,125**	**1,269**	**1,102**	**2,090**	**990**	**535**
P. Whiting					14	4	2,112	1,266	1,098	2,070	965	520
Other Groundfish					3		14	3	5	20	25	14
Treaty Shoreside Nonwhiting Groundfish	**40**	**47**	**107**	**247**	**236**	**204**	**165**	**146**	**202**	**198**	**93**	**77**
Other Groundfish	40	47	107	247	236	204	165	146	202	198	93	77

Table 16b. Average monthly ex-vessel revenue in nominal dollars, $1,000s, by Treaty fishery sectors, 5 years, 2008-2012.

Sector/ Species	January	February	March	April	May	June	July	August	September	October	November	December
Treaty Whiting Mothership						**$676**	**$1,086**	**$659**	**$524**	**$778**	**$252**	**$22**
P. Whiting						$571	$1,024	$607	$492	$732	$249	$21
Other Groundfish						$106	$62	$52	$32	$46	$2	$1
Treaty Shoreside Whiting Trawl					**$6**	**$1**	**$282**	**$175**	**$250**	**$417**	**$148**	**$77**
P. Whiting					$3	$1	$277	$173	$248	$408	$138	$70
Other Groundfish					$3		$5	$2	$3	$9	$10	$7
Treaty Shoreside Nonwhiting Groundfish	**$46**	**$53**	**$315**	**$931**	**$649**	**$601**	**$438**	**$290**	**$503**	**$559**	**$280**	**$209**
Other Groundfish	$46	$53	$315	$931	$649	$601	$438	$290	$503	$559	$280	$209

Table 17a. Average monthly groundfish landings (mt) by species and species groups, 5 years, 2008-2012.

Month	P. Whiting	Sablefish	P. Cod	Other Roundfish	Rockfish	Thorny heads	Arrowtooth Flounder	Dover Sole	English Sole	Lingcod	Other Flatfish	Other Groundfish	Petrale Sole
January	<0.5	186	6	6	73	132	118	562	11	6	33	82	255
February	1	225	12	4	78	192	254	864	18	13	41	130	244
March	2	312	14	3	97	175	257	1,062	18	20	42	127	143
April	1	645	37	5	123	235	398	1,196	19	11	56	155	50
May	1,831	661	61	11	228	249	420	877	23	36	79	162	73
June	11,029	683	59	8	260	220	277	672	35	40	108	181	85
July	13,366	687	58	11	289	194	260	670	38	48	102	177	86
August	19,010	669	46	8	295	192	235	769	35	41	110	197	83
September	8,209	821	22	10	311	215	152	776	20	38	72	150	62
October	10,675	687	38	6	238	227	189	806	16	25	64	163	52
November	4,977	418	5	4	143	184	141	743	13	14	43	136	77
December	1,139	318	13	3	141	140	155	638	14	18	32	85	154

Table 17b. Average monthly groundfish ex-vessel revenue in nominal dollars, $1,000s, by species and species groups, 5 years, 2008-2012.

Month	P. Whiting	Sablefish	P. Cod	Other Roundfish	Rockfish	Thorny heads	Arrowtooth Flounder	Dover Sole	English Sole	Lingcod	Other Flatfish	Other Groundfish	Petrale Sole
January	<$1	$838	$7	$63	$230	$295	$26	$444	$8	$9	$31	$48	$564
February	<$1	$1,019	$13	$46	$212	$326	$56	$654	$13	$24	$39	$73	$559
March	<$1	$1,481	$16	$29	$160	$336	$58	$815	$13	$34	$37	$68	$323
April	<$1	$3,461	$43	$41	$237	$378	$93	$943	$14	$21	$52	$85	$124
May	$336	$3,708	$69	$112	$515	$400	$96	$694	$16	$101	$75	$96	$203
June	$1,939	$3,782	$69	$82	$553	$372	$62	$530	$24	$106	$109	$113	$224
July	$2,837	$3,772	$65	$83	$633	$367	$58	$548	$27	$115	$105	$102	$234
August	$4,288	$3,767	$56	$77	$597	$339	$52	$641	$25	$104	$110	$111	$226
September	$1,865	$4,616	$24	$98	$649	$394	$36	$644	$15	$99	$68	$87	$176
October	$2,529	$3,926	$45	$58	$469	$399	$41	$644	$12	$70	$57	$87	$150
November	$1,170	$2,102	$6	$37	$317	$364	$30	$586	$10	$44	$41	$59	$214
December	$161	$1,551	$14	$31	$294	$302	$34	$513	$10	$29	$30	$49	$394

Table 18a. Groundfish landings (mt) by "IOPAC port groups", 2003-2012

Port	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Washington Subtotal	**23,997**	**39,341**	**50,471**	**65,430**	**50,139**	**39,386**	**24,516**	**35,645**	**39,393**	**22,311**
Puget Sound	3,580	3,465	2,983	1,959	1,462	1,138	1,565	1,403	706	804
North WA coast	2,284	2,128	2,438	1,891	1,592	1,522	1,829	1,642	1,833	1,819
South and central WA coast	18,133	33,748	45,049	61,580	47,086	36,726	21,123	32,600	36,855	19,688
Oregon Subtotal	**48,266**	**70,680**	**73,807**	**73,743**	**56,807**	**45,077**	**47,330**	**48,236**	**81,822**	**61,727**
Astoria	19,136	21,556	23,145	31,489	25,734	18,441	22,662	21,567	49,935	30,672
Tillamook	107	88	46	73	49	41	62	37	30	30
Newport	22,679	41,380	43,304	33,647	24,066	19,074	17,347	20,702	26,459	27,211
Coos Bay	5,110	6,857	6,203	7,458	5,570	5,850	5,515	4,148	3,962	2,377
Brookings	1,234	799	1,109	1,075	1,389	1,671	1,743	1,783	1,436	1,437
California Subtotal	**10,643**	**12,282**	**11,176**	**12,087**	**10,549**	**13,204**	**10,349**	**10,164**	**7,368**	**6,342**
Crescent City	1,024	2,177	1,568	2,140	1,642	4,284	2,666	2,746	386	178
Eureka	3,817	4,950	5,166	6,223	5,213	4,738	3,152	2,726	2,229	1,935
Fort Bragg	1,597	1,616	1,902	1,446	1,470	1,758	1,956	1,857	1,670	1,484
Bodega Bay	212	41	13	62	95	118	82	75	73	53
San Francisco	1,031	1,208	690	714	1,119	1,027	774	723	521	373
Monterey	1,585	1,009	989	916	457	541	476	566	585	618
Morro Bay	956	893	507	244	223	393	874	937	1,275	1,162
Santa Barbara	97	100	92	107	91	80	126	266	332	257
Los Angeles	200	221	160	111	165	145	144	151	181	146
San Diego	123	67	89	122	76	122	100	119	117	136
Grand Total	**82,905**	**122,303**	**135,454**	**151,260**	**117,495**	**97,667**	**82,195**	**94,045**	**128,583**	**90,380**

Table 18b. Groundish ex-vessel revenue in current (2012) dollars, $1,000s, by "IOPAC port groups", 2003-2012.

Port	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Washington Subtotal	**$14,862**	**$14,787**	**$18,601**	**$20,137**	**$17,254**	**$17,949**	**$14,786**	**$16,529**	**$23,224**	**$17,007**
Puget Sound	$4,801	$4,599	$5,071	$4,545	$3,033	$2,594	$2,838	$2,011	$2,030	$1,605
North WA coast	$4,840	$4,662	$4,614	$4,099	$3,852	$3,844	$4,822	$4,659	$5,706	$4,377
South and central WA coast	$5,221	$5,526	$8,916	$11,492	$10,369	$11,511	$7,125	$9,859	$15,487	$11,025
Oregon Subtotal	**$25,349**	**$24,362**	**$28,649**	**$31,188**	**$29,321**	**$35,882**	**$33,590**	**$32,309**	**$45,760**	**$38,443**
Astoria	$8,813	$9,257	$10,741	$12,470	$11,317	$12,840	$11,577	$9,675	$20,217	$17,527
Tillamook	$265	$239	$140	$236	$201	$180	$198	$144	$171	$150
Newport	$7,542	$8,316	$9,536	$9,593	$8,734	$11,478	$10,607	$10,902	$14,237	$12,829
Coos Bay	$5,663	$4,397	$5,222	$5,989	$5,797	$7,193	$6,416	$6,962	$6,221	$4,260
Brookings	$3,065	$2,152	$3,011	$2,900	$3,273	$4,191	$4,792	$4,626	$4,914	$3,678
California Subtotal	**$18,421**	**$16,425**	**$15,986**	**$16,407**	**$17,408**	**$20,288**	**$21,050**	**$21,418**	**$25,151**	**$17,993**
Crescent City	$2,108	$1,291	$1,661	$1,863	$1,903	$2,708	$2,520	$1,296	$897	$563
Eureka	$3,692	$3,303	$3,616	$4,278	$4,826	$5,403	$4,505	$4,494	$4,314	$3,284
Fort Bragg	$2,933	$2,897	$3,400	$2,730	$2,987	$3,637	$4,356	$4,113	$4,834	$3,330
Bodega Bay	$385	$151	$103	$155	$261	$325	$271	$380	$444	$358
San Francisco	$1,865	$2,070	$1,451	$1,703	$2,161	$2,055	$1,538	$1,484	$1,991	$1,096
Monterey	$2,847	$2,115	$2,067	$2,080	$1,434	$1,556	$1,364	$1,569	$1,899	$1,428
Morro Bay	$2,362	$2,411	$1,675	$1,502	$1,597	$2,086	$3,932	$4,669	$6,796	$4,305
Santa Barbara	$489	$538	$469	$560	$617	$563	$790	$1,531	$2,111	$1,883
Los Angeles	$1,090	$1,350	$967	$688	$1,059	$982	$1,027	$1,063	$1,158	$924
San Diego	$651	$300	$579	$848	$564	$972	$746	$819	$705	$822
Grand Total	**$58,633**	**$55,574**	**$63,236**	**$67,732**	**$63,983**	**$74,120**	**$69,427**	**$70,256**	**$94,135**	**$73,443**

Table 19. Landings (mt) ex-vessel revenue in current (2012) dollars, $1,000s, by "IOPAC port groups" and species and species groups, 2010-2012

	P. Whiting		Sablefish		Other Roundfish		Rockfish		Flatfish		Other Groundfish	
	metric tons	$000s	metric tons	$000s	metric tons	$000s	metric tons	$000s	metric tons	$000s	metric tons	$000s
2010												
Washington Subtotal	**30,688**	**$4,270**	**1,473**	**$9,653**	**340**	**$379**	**984**	**$1,092**	**1,946**	**$1,077**	**215**	**$57**
Puget Sound			192	$1,275	47	$51	74	$79	1,035	$579	55	$28
North WA coast			497	$3,324	287	$322	649	$806	175	$194	34	$12
South and central WA coast	30,688	$4,270	784	$5,054	6	$6	261	$206	736	$304	125	$18
Oregon Subtotal	**31,539**	**$5,628**	**2,858**	**$15,665**	**175**	**$672**	**2,194**	**$2,618**	**10,365**	**$7,133**	**1,105**	**$593**
Astoria	14,099	$2,176	681	$2,895	83	$106	853	$829	5,392	$3,436	458	$233
Tillamook			2	$13	6	$39	20	$78	*	*	*	*
Newport	17,304	$3,439	926	$5,482	13	$52	572	$586	1,590	$1,186	295	$158
Coos Bay	135	$13	761	$4,453	17	$55	463	$458	2,474	$1,806	297	$177
Brookings			487	$2,822	55	$421	287	$667	901	$691	53	$25
California Subtotal	**2,427**	**$430**	**2,498**	**$11,956**	**71**	**$481**	**1,814**	**$5,717**	**3,077**	**$2,704**	**276**	**$129**
Crescent City	2,343	$419	86	$395	8	$43	134	$298	163	$136	12	$4
Eureka	84	$11	523	$2,629	4	$11	402	$560	1,598	$1,247	115	$36
Fort Bragg			504	$2,588	23	$109	546	$786	752	$620	32	$10
Bodega Bay			41	$262	2	$10	17	$65	*	*	*	*
San Francisco			109	$660	5	$23	170	$349	400	$433	39	$19
Monterey			212	$896	6	$48	159	$436	127	$146	63	$42
Morro Bay	*	*	773	$3,288	19	$161	134	$1,200	7	$15	5	$5
Santa Barbara	<0.5	<$1	174	$794	5	$68	80	$655	4	$11	3	$4
Los Angeles	*	*	53	$311	<0.5	$2	80	$692	11	$52	6	$6
San Diego			25	$133	1	$6	93	$677	*	*	1	$3
2011												
Washington Subtotal	**34,482**	**$7,319**	**1,535**	**$12,457**	**505**	**$663**	**1,063**	**$1,204**	**1,496**	**$1,387**	**314**	**$195**
Puget Sound	*	*	159	$1,446	76	$135	32	$38	407	$390	30	$21
North WA coast			486	$4,027	392	$472	530	$661	375	$525	49	$22
South and central WA coast	34,480	$7,319	889	$6,984	37	$57	501	$505	714	$471	235	$152
Oregon Subtotal	**68,704**	**$16,813**	**2,305**	**$17,662**	**497**	**$1,217**	**1,812**	**$2,517**	**7,478**	**$6,901**	**1,027**	**$651**
Astoria	42,444	$10,373	590	$3,592	391	$539	1,085	$1,190	4,700	$4,037	726	$486
Tillamook			7	$48	8	$50	15	$72				
Newport	24,722	$6,095	785	$7,103	15	$60	224	$259	638	$681	76	$40
Coos Bay	1,538	$345	522	$3,906	12	$54	247	$299	1,473	$1,522	169	$94
Brookings	<0.5	<$1	401	$3,012	71	$514	240	$696	667	$661	56	$31
California Subtotal	**5**	**$5**	**2,566**	**$15,411**	**67**	**$574**	**1,581**	**$5,818**	**2,852**	**$3,136**	**296**	**$207**
Crescent City			72	$457	7	$41	54	$160	*	*	11	$9
Eureka	<0.5	<$1	363	$2,391	3	$9	282	$417	1,459	$1,404	123	$92
Fort Bragg	*	*	462	$3,185	14	$95	503	$796	636	$720	51	$33
Bodega Bay			67	$412	1	$5	4	$26	1	$1	*	*
San Francisco	*	*	175	$1,341	4	$28	77	$234	248	$375	18	$13
Monterey	*	*	221	$1,223	5	$55	121	$370	176	$220	62	$31
Morro Bay			875	$4,618	28	$254	282	$1,796	69	$113	22	$15
Santa Barbara	<0.5	<$1	244	$1,318	6	$78	73	$699	6	$11	4	$5
Los Angeles	<0.5	<$1	58	$316	<0.5	$4	102	$772	16	$61	6	$6
San Diego			30	$150	1	$5	85	$548	*	*	*	*
2012												
Washington Subtotal	**17,535**	**$5,882**	**1,316**	**$7,514**	**406**	**$558**	**1,276**	**$1,492**	**1,511**	**$1,385**	**269**	**$175**
Puget Sound	*	*	142	$911	31	$57	170	$205	400	$380	62	$52
North WA coast			483	$2,766	285	$355	620	$783	344	$419	87	$55
South and central WA coast	17,535	$5,882	691	$3,837	89	$147	486	$504	767	$587	120	$69
Oregon Subtotal	**48,831**	**$14,611**	**2,152**	**$11,529**	**709**	**$1,550**	**1,857**	**$2,660**	**7,188**	**$7,315**	**990**	**$779**
Astoria	23,518	$7,558	596	$3,150	598	$841	1,107	$1,225	4,189	$4,171	665	$582
Tillamook			*	*	12	$66	18	$81				
Newport	25,312	$7,053	741	$4,512	17	$69	246	$295	774	$829	121	$71
Coos Bay	1	<$1	464	$2,159	13	$58	231	$328	1,510	$1,618	158	$98
Brookings	<0.5	<$1	352	$1,705	70	$515	255	$731	714	$699	46	$28
California Subtotal	**4**	**$6**	**1,778**	**$8,989**	**83**	**$639**	**1,577**	**$5,231**	**2,582**	**$2,891**	**318**	**$238**
Crescent City	*	*	63	$318	6	$38	60	$162	*	*	6	$2
Eureka	<0.5	<$1	318	$1,515	6	$19	291	$413	1,198	$1,241	122	$97
Fort Bragg	2	$2	392	$1,845	18	$86	475	$728	546	$634	52	$36
Bodega Bay			*	*	1	$12	5	$50	*	*	*	*
San Francisco	*	*	98	$498	6	$35	90	$261	170	$294	11	$8
Monterey	*	*	164	$728	8	$79	98	$345	284	$242	66	$35
Morro Bay	2	$2	426	$1,982	30	$271	340	$1,656	318	$352	47	$43
Santa Barbara			169	$1,121	7	$85	64	$649	10	$18	7	$10
Los Angeles	<0.5	$2	47	$277	1	$8	79	$568	12	$64	7	$6
San Diego			57	$411	1	$6	76	$400	1	$3	1	$2

Table 20a. Landings (mt) ex-vessel revenue in current (2012) dollars, $1,000s, by "IOPAC port groups" and commercial fishery sectors, 2010-2012 (Washington and Oregon).

	2010				2011				2012			
	P. Whiting		Other Groundfish		P. Whiting		Other Groundfish		P. Whiting		Other Groundfish	
	mt	$1,000s	mt	$1,000s	mt	$1,000s	mt	$1,000s	mt	$1,000s	mt	$1,000s
Puget Sound			**1,399**	**1,979**	*****	*****	**703**	**2,022**	*****	*****	**804**	**1,604**
Shoreside IFQ Trawl (Nonwhiting)			1,250	1,016	*	*	551	698	*	*	*	*
Shoreside IFQ Nontrawl							*	*			*	*
Non Nearshore Fixed Gear			142	941			131	1,141			108	626
Incidental Open Access			*	*							*	*
Exempted trawl, EFP/Research, Misc.			*	*			*	*			*	*
North WA coast			**172**	**947**			**154**	**1,124**			**154**	**846**
Shoreside IFQ Trawl (Nonwhiting)			*	*								
Non Nearshore Fixed Gear			159	927			153	1,121			150	829
Non Fixed Gear Open Access			*	*							2	13
Incidental Open Access			1	2			1	3			1	4
South and central WA coast	**28,721**	**4,065**	**1,684**	**4,237**	**22,724**	**5,617**	**2,032**	**6,563**	**16,922**	**5,749**	**1,940**	**3,899**
Shoreside IFQ Trawl (Whiting)	28,720	4,065	254	96	22,063	5,456	219	179	16,813	5,715	157	98
Shoreside IFQ Trawl (Nonwhiting)	<0.5	<$1	866	570	*	*	1,172	1,867	*	*	1,346	1,524
Shoreside IFQ Nontrawl							297	1,814			183	857
Non Nearshore Fixed Gear			*	*			332	2,677			249	1,399
Non Fixed Gear Open Access			1	7			*	*			1	4
Incidental Open Access			2	6			*	*			3	12
Exempted trawl, EFP/Research, Misc.			*	*	*	*	10	12	*	*	3	6
Astoria	**14,099**	**2,176**	**7,468**	**7,499**	**42,444**	**10,373**	**7,492**	**9,843**	**23,518**	**7,558**	**7,154**	**9,969**
Shoreside IFQ Trawl (Whiting)	14,077	2,171	102	106	41,631	10,160	415	344	23,117	7,440	297	229
Shoreside IFQ Trawl (Nonwhiting)	*	*	7,331	7,190	18	3	6,805	8,188	14	3	6,433	7,635
Shoreside IFQ Nontrawl							45	389			257	1,591
Non Nearshore Fixed Gear			31	195			90	759			64	390
Nearshore Fixed Gear							*	*				
Non Fixed Gear Open Access			*	*								
Incidental Open Access			*	*			2	9			3	8
Exempted trawl, EFP/Research, Misc.	*	*	4	6	795	210	135	155	387	115	100	116
Tillamook			**37**	**144**			**30**	**171**			**30**	**150**
Shoreside IFQ Trawl (Nonwhiting)			*	*								
Non Nearshore Fixed Gear			4	19			9	60			4	21
Nearshore Fixed Gear			24	109			21	110			25	126
Non Fixed Gear Open Access			<0.5	1			*	*			*	*
Incidental Open Access			*	*			<0.5	<$1			<0.5	2
Exempted trawl, EFP/Research, Misc.							*	*			*	*
Newport	**17,304**	**3,439**	**3,397**	**7,464**	**24,722**	**6,095**	**1,737**	**8,143**	**25,312**	**7,052**	**1,899**	**5,776**
Shoreside IFQ Trawl (Whiting)	*	*	157	102	24,595	6,066	132	250	25,242	7,044	198	271
Shoreside IFQ Trawl (Nonwhiting)	*	*	2,723	3,808	<0.5	<$1	890	1,435	<0.5	<$1	1,052	1,532
Shoreside IFQ Nontrawl							260	2,291			216	1,174
Non Nearshore Fixed Gear			500	3,486			409	4,035			377	2,656
Nearshore Fixed Gear			13	47			7	30			11	49
Non Fixed Gear Open Access			<0.5	<$1			<0.5	3			<0.5	1
Incidental Open Access			2	9			2	15			3	14
Exempted trawl, EFP/Research, Misc.			3	11	*	*	37	82	*	*	41	80
Coos Bay	**135**	**13**	**4,012**	**6,949**	**1,538**	**345**	**2,423**	**5,876**	**1**	**<$1**	**2,377**	**4,260**
Shoreside IFQ Trawl (Whiting)	*	*	1	<$1	*	*	*	*				
Shoreside IFQ Trawl (Nonwhiting)	*	*	3,616	4,247	1	<$1	2,094	3,101	*	*	2,138	2,836
Shoreside IFQ Nontrawl							20	132			*	*
Non Nearshore Fixed Gear			388	2,656	*	*	286	2,541			207	1,269
Nearshore Fixed Gear			5	37			8	57			11	81
Non Fixed Gear Open Access			<0.5	1			*	*			*	*
Incidental Open Access			1	2			3	15			1	5
Exempted trawl, EFP/Research, Misc.			1	5			8	25	*	*	9	12
Brookings			**1,783**	**4,626**	**<0.5**	**<$1**	**1,436**	**4,914**	**<0.5**	**<$1**	**1,437**	**3,678**
Shoreside IFQ Trawl (Nonwhiting)			1,321	1,867	<0.5	<$1	967	1,621	<0.5	<$1	1,070	1,527
Non Nearshore Fixed Gear			322	1,912	*	*	285	2,240			207	1,124
Nearshore Fixed Gear			133	835			163	1,012			154	1,014
Non Fixed Gear Open Access							*	*			<0.5	<$1
Incidental Open Access			<0.5	<$1			*	*			1	6
Exempted trawl, EFP/Research, Misc.			6	12	*	*	21	39			5	7

Table 20b. Landings (mt) ex-vessel revenue in current (2012) dollars, $1,000s, by "IOPAC port groups" and commercial fishery sectors, 2010-2012 (California).

	2010				2011				2012			
	P. Whiting		Other Groundfish		P. Whiting		Other Groundfish		P. Whiting		Other Groundfish	
	mt	$1,000s	mt	$1,000s	mt	$1,000s	mt	$1,000s	mt	$1,000s	mt	$1,000s
Crescent City	**2,343**	**419**	**403**	**876**			**386**	**897**	*****	*****	**178**	**563**
Shoreside IFQ Trawl (Whiting)	*	*	29	7								
Shoreside IFQ Trawl (Nonwhiting)			259	403			*	*	*	*	*	*
Non Nearshore Fixed Gear			40	181			52	344			36	202
Nearshore Fixed Gear			59	272			36	165			32	155
Incidental Open Access			*	*			<0.5	1			<0.5	1
Exempted trawl, EFP/Research, Misc.	*	*	*	*			*	*			*	*
Eureka	**84**	**11**	**2,641**	**4,483**	**<0.5**	**<$1**	**2,229**	**4,314**	**<0.5**	**<$1**	**1,935**	**3,284**
Shoreside IFQ Trawl (Whiting)	79	9	2	3								
Shoreside IFQ Trawl (Nonwhiting)	6	2	2,441	3,450	<0.5	<$1	2,120	3,415	<0.5	<$1	1,855	2,722
Non Nearshore Fixed Gear			194	1,009			105	874			77	540
Nearshore Fixed Gear			4	20			4	17			3	20
Non Fixed Gear Open Access			*	*			*	*			*	*
Incidental Open Access			*	*			*	*			<0.5	<$1
Fort Bragg			**1,857**	**4,113**	*****	*****	**1,665**	**4,829**	**2**	**2**	**1,482**	**3,329**
Shoreside IFQ Trawl (Nonwhiting)			1,572	2,338	*	*	1,331	2,401	2	2	1,195	1,843
Shoreside IFQ Nontrawl							*	*			*	*
Non Nearshore Fixed Gear			268	1,586			286	2,004			254	1,306
Nearshore Fixed Gear			15	178			17	210			10	104
Non Fixed Gear Open Access							*	*			<0.5	2
Incidental Open Access			*	*			<0.5	1			*	*
Exempted trawl, EFP/Research, Misc.			*	*			<0.5	2			1	3
Bodega Bay			**75**	**380**			**73**	**444**			**53**	**358**
Shoreside IFQ Trawl (Nonwhiting)			*	*			*	*			*	*
Non Nearshore Fixed Gear			41	265			68	420			47	312
Nearshore Fixed Gear			3	48			1	18			3	43
Non Fixed Gear Open Access							<0.5	2				
Incidental Open Access			<0.5	1			<0.5	1			<0.5	<$1
Exempted trawl, EFP/Research, Misc.			*	*							*	*
San Francisco			**722**	**1,484**	*****	*****	**521**	**1,991**	*****	*****	**373**	**1,096**
Shoreside IFQ Trawl (Nonwhiting)			625	820	*	*	335	557	*	*	251	420
Shoreside IFQ Nontrawl							54	323			27	49
Non Nearshore Fixed Gear			72	509			107	935			60	381
Nearshore Fixed Gear			10	119			11	136			12	140
Non Fixed Gear Open Access			*	*			<0.5	5			1	4
Incidental Open Access			*	*			<0.5	4			1	5
Exempted trawl, EFP/Research, Misc.			15	27			14	31			23	97
Monterey			**566**	**1,569**	*****	*****	**584**	**1,899**	*****	*****	**618**	**1,428**
Shoreside IFQ Trawl (Nonwhiting)			*	*			*	*			*	*
Shoreside IFQ Nontrawl							*	*			14	60
Non Nearshore Fixed Gear			214	865	*	*	195	928	*	*	169	682
Nearshore Fixed Gear			13	147			12	149			14	173
Non Fixed Gear Open Access			*	*			*	*			3	9
Incidental Open Access			<0.5	1			1	4			<0.5	2
Exempted trawl, EFP/Research, Misc.			*	*			5	15			*	*
Morro Bay	*****	*****	**937**	**4,668**			**1,275**	**6,796**	**2**	**2**	**1,161**	**4,303**
Shoreside IFQ Trawl (Nonwhiting)							*	*	*	*	*	*
Shoreside IFQ Nontrawl							454	2,336			209	964
Non Nearshore Fixed Gear	*	*	655	2,764			549	2,890	*	*	296	1,374
Nearshore Fixed Gear			74	945			96	1,243			86	1,124
Non Fixed Gear Open Access			*	*			*	*			*	*
Incidental Open Access			1	5			1	4			1	6
Exempted trawl, EFP/Research, Misc.			207	955			8	37			11	41
Santa Barbara	**<0.5**	**<$1**	**266**	**1,531**	*****	*****	**332**	**2,111**			**257**	**1,883**
Non Nearshore Fixed Gear	<0.5	<$1	239	1,241	*	*	300	1,827			222	1,584
Nearshore Fixed Gear			14	229			10	178			14	212
Non Fixed Gear Open Access			1	2			3	9			*	*
Incidental Open Access			4	29			4	37			*	*
Exempted trawl, EFP/Research, Misc.			9	29			15	61			17	50
Los Angeles	*****	*****	**151**	**1,063**	*****	*****	**181**	**1,158**	**<0.5**	**2**	**146**	**922**
Non Nearshore Fixed Gear	*	*	132	991	*	*	158	1,065	<0.5	2	125	810
Nearshore Fixed Gear			4	33			5	40			7	65
Non Fixed Gear Open Access			3	3			3	3			3	3
Incidental Open Access			3	5			3	6			3	9
Exempted trawl, EFP/Research, Misc.			9	31			13	43			8	36
San Diego			**119**	**819**			**117**	**705**			**136**	**821**
Non Nearshore Fixed Gear			116	800			114	690			131	798
Nearshore Fixed Gear			1	8			*	*			1	5
Non Fixed Gear Open Access			*	*			1	1			1	4
Incidental Open Access			1	9			1	8			2	11
Exempted trawl, EFP/Research, Misc.			*	*			*	*			1	3

Table 21. Number of vessels making at least one groundfish landing by "IOPAC port groups" and commercial fishery sectors, 5 years 2008-2012.

Fishery / Port	Vessels
Shoreside IFQ Trawl (Whiting)	
Washington	**21**
South and central WA coast	21
Oregon	**32**
Astoria	26
Newport	20
Coos Bay	4
California	**12**
Crescent City	11
Eureka	7
Coastwide	**41**
Shoreside IFQ Trawl (Nonwhiting)	
Washington	**20**
Puget Sound	8
North WA coast	3
South and central WA coast	13
Oregon	**84**
Astoria	42
Tillamook	3
Newport	29
Coos Bay	29
Brookings	14
California	**42**
Crescent City	13
Eureka	16
Fort Bragg	7
Bodega Bay	3
San Francisco	13
Monterey	3
Morro Bay	2
Santa Barbara	1
Coastwide	**125**
Shoreside IFQ Nontrawl	
Washington	**10**
Puget Sound	3
South and central WA coast	10
Oregon	**17**
Astoria	7
Newport	8
Coos Bay	4
California	**22**
Fort Bragg	1
San Francisco	4
Monterey	4
Morro Bay	15
Coastwide	**40**
Non Nearshore Fixed Gear	
Washington	**124**
Puget Sound	23
North WA coast	40
South and central WA coast	87
Oregon	**317**
Astoria	33
Tillamook	43
Newport	123
Coos Bay	97
Brookings	64
California	**722**
Crescent City	21
Eureka	61
Fort Bragg	91
Bodega Bay	32
San Francisco	126
Monterey	142
Morro Bay	182
Santa Barbara	85
Los Angeles	75
San Diego	61
Coastwide	**1129**

Fishery / Port	Vessels
Nearshore Fixed Gear	
Oregon	**216**
Astoria	1
Tillamook	42
Newport	35
Coos Bay	36
Brookings	132
California	**382**
Crescent City	27
Eureka	18
Fort Bragg	36
Bodega Bay	20
San Francisco	49
Monterey	56
Morro Bay	113
Santa Barbara	61
Los Angeles	23
San Diego	13
Coastwide	**597**
Non Fixed Gear Open Access	
Washington	**18**
North WA coast	6
South and central WA coast	12
Oregon	**44**
Astoria	3
Tillamook	5
Newport	11
Coos Bay	19
Brookings	7
California	**88**
Eureka	3
Fort Bragg	7
Bodega Bay	3
San Francisco	12
Monterey	10
Morro Bay	7
Santa Barbara	18
Los Angeles	26
San Diego	6
Coastwide	**150**
Incidental Open Access	
Washington	**46**
Puget Sound	2
North WA coast	22
South and central WA coast	34
Oregon	**200**
Astoria	25
Tillamook	27
Newport	59
Coos Bay	76
Brookings	29
California	**367**
Crescent City	11
Eureka	10
Fort Bragg	16
Bodega Bay	20
San Francisco	51
Monterey	49
Morro Bay	70
Santa Barbara	64
Los Angeles	62
San Diego	46
Coastwide	**604**

Fishery / Port	Vessels
Exempted trawl, EFP/Research, Mi	
Washington	**19**
Puget Sound	4
South and central WA coast	16
Oregon	**76**
Astoria	23
Tillamook	2
Newport	28
Coos Bay	16
Brookings	29
California	**133**
Crescent City	5
Eureka	2
Fort Bragg	17
Bodega Bay	2
San Francisco	23
Monterey	8
Morro Bay	35
Santa Barbara	38
Los Angeles	24
San Diego	8
Coastwide	**218**

Table 22. Number of vessels making at least one groundfish landing by commercial fishery sector and length category (feet), 5 years 2008-2012.

	Length category)				
Fishery	**<= 40**	**41-50**	**51-60**	**61-70**	**71-150**
Shoreside IFQ Trawl (Whiting)			2	8	35
Shoreside IFQ Trawl (Nonwhiting)	1	15	34	34	50
Shoreside IFQ Nontrawl	9	10	7	12	5
Non Nearshore Fixed Gear	831	211	65	26	9
Nearshore Fixed Gear	563	30	2		1
Non Fixed Gear Open Access	102	41	6		1
Incidental Open Access	437	124	27	8	10
Exempted trawl, EFP/Research, Misc.	109	47	27	15	22

Table 23. Engagement (groundfish ex-vessel revenue in port as percent of ex-vessel coastwide revenue) and dependence (groundfishex-vessel revenue in port as percent of total ex-vessel revenue in port), using current (2012) dollars, 2003-2012.

	Engagement	Dependence
Puget Sound	5%	44%
North WA coast	7%	45%
South and central WA coast	14%	14%
Washington	**25%**	**20%**
Astoria	18%	37%
Tillamook	0%	5%
Newport	15%	30%
Coos Bay	8%	22%
Brookings	5%	32%
Oregon	**47%**	**30%**
Crescent City	2%	10%
Eureka	6%	26%
Fort Bragg	5%	36%
Bodega Bay	0%	4%
San Francisco	3%	9%
Monterey	3%	16%
Morro Bay	5%	65%
Santa Barbara	1%	3%
Los Angeles	1%	3%
San Diego	1%	10%
California	**28%**	**12%**
Coastwide		**19%**

Table 24. Groundfish landings (mt) on the west coast (Washington-Oregon-California) from inside and outside the Pacific Council management area.

Year	Area		Council Area		Area	
	metric tons	percent	metric tons	percent	metric tons	percent
1981	103,344	85%	8,254	7%	9,827	8%
1982	119,356	85%	10,051	7%	10,579	8%
1983	98,978	80%	10,114	8%	14,352	12%
1984	89,804	73%	18,483	15%	14,353	12%
1985	90,923	77%	8,969	8%	17,760	15%
1986	82,480	76%	5,185	5%	20,488	19%
1987	91,982	77%	553	<1%	26,633	22%
1988	92,248	85%	270	<1%	16,123	15%
1989	99,372	84%	131	<1%	18,456	16%
1990	94,539	86%	1,755	2%	13,416	12%
1991	105,547	83%	3,711	3%	17,425	14%
1992	132,555	85%	379	<1%	22,179	14%
1993	116,394	87%	437	<1%	17,125	13%
1994	135,677	91%	569	<1%	12,093	8%
1995	134,493	92%	485	<1%	10,523	7%
1996	146,452	92%	459	<1%	12,956	8%
1997	143,571	93%	346	<1%	10,488	7%
1998	131,011	93%	363	<1%	9,729	7%
1999	125,883	95%	251	<1%	6,364	5%
2000	123,031	97%	191	<1%	3,586	3%
2001	103,556	97%	93	<1%	3,154	3%
2002	75,056	97%	94	<1%	2,058	3%
2003	82,905	97%	91	<1%	2,532	3%
2004	122,303	97%	87	<1%	3,301	3%
2005	135,454	98%	28	<1%	2,898	2%
2006	151,260	100%	39	<1%	484	<1%
2007	117,495	100%	48	<1%	356	<1%
2008	97,667	100%	31	<1%	158	<1%
2009	82,194	100%	23	<1%	125	<1%
2010	94,045	100%	23	<1%	79	<1%
2011	128,585	100%	18	<1%	136	<1%
2012	90,384	98%	15	<1%	1,732	2%

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PROPOSED GROUNDFISH FMP AMENDMENT LANGUAGE FOR DEFAULT HARVEST CONTROL RULES AND FOR DESIGNATION OF ECOSYSTEM COMPONENT SPECIES UNDER AMENDMENT 24

This document presents proposed Groundfish FMP amendment language being considered as Amendment 24. The 2015-16 and Beyond Biennial Harvest Specifications EIS describes the three alternatives under consideration in addition to the alternative of No Action. Under No Action the FMP is not amended. Amendment language consistent with the objectives of these alternatives is presented below. Separate from the alternatives, designation of Ecosystem Component Species and a number of technical changes and updates to the FMP are proposed under Amendment 24.

- ~~Strikethrough~~ indicates text moved or deleted
- Underline indicates new text

Double underline indicates moved text at its new location

Alternative 1 – Default HCRs Use a P* Value of 0.45

Under this alternative the Groundfish FMP is amended to describe the harvest control rule (HCR) framework and establish new criteria for management measures that may be considered during the biennial process.

Default ACLs would be computed using the HCRs currently in place and used to compute ACLs for the previous biennial period except that, where applicable, a P* value of 0.45 would be used.

Amendment Language

5.1 General Overview of the Harvest Specifications and Management Process

The specifications and management process, in general terms, occurs as follows:

1. The Council will determine the MSY or MSY proxy and OFL for each major stock. Typically, the MSY proxy will be in terms of a fishing mortality rate ($F_{x\%}$,) and OFL will be the $F_{x\%}$ applied to the current biomass estimate. The MSY is the maximum long-term average yield expected from annual application of the MSY (or proxy) harvest policy under prevailing ecological and environmental conditions.
2. The Council and SSC will determine an appropriate scientific uncertainty buffer to set the ABC below the OFL. The ABC accommodates the uncertainty in estimating the OFL and may be determined using either a straight percentage reduction of the OFL as recommended by the SSC or by the P* approach.
3. Every species will either have its own designated ACL or be included in a multispecies ACL. Species which are included in a multispecies ACL may also have individual ACLs, have individual HGs, or be included in a HG for a subgroup of the multispecies ACL.
4. To determine the ACL for each stock, the Council will determine the best estimate of current abundance and its relation to its precautionary and overfished thresholds. If the abundance is above the precautionary threshold, the ACL will be equal to or less than the ABC. If abundance falls below the precautionary threshold, the ACL will be reduced according to the harvest control rule for that stock. If abundance falls below the overfished/rebuilding threshold, the ACL will be

set according to the interim rebuilding rule until the Council develops a formal rebuilding plan for that species.

5. For any stock or stock complex where the Secretary identifies that overfishing is occurring, the Council will take remedial action to end overfishing and prevent the stock or stock complex from falling below the minimum stock size threshold. For any stock the Secretary has declared overfished or approaching the overfished condition, or for any stock the Council determines is in need of rebuilding, the Council will implement such periodic management measures as are necessary to rebuild the stock by controlling harvest mortality, habitat impacts, or other effects of fishing activities that are subject to regulation under this biennial process. These management measures will be consistent with any approved rebuilding plan.
6. The Council may reserve and deduct a portion of the ACL of any stock to provide for compensation for vessels conducting scientific research authorized by NMFS. Prior to the research activities, the Council will authorize amounts to be made available to a research reserve. However, the deduction from the ACL will be made in the year after the "compensation fishing"; the amounts deducted from the ACL will reflect the actual catch during compensation fishing activities.
7. The Council will identify stocks which are likely to be fully harvested (i.e., the ACL or ACT/HG achieved) in the absence of specific management measures and for which allocation between LE and open access sectors of the fishery is appropriate.
8. The groundfish resource is fully utilized by U.S. fishing vessels and seafood processors. The Council may entertain applications for foreign or joint venture fishing or processing at any time, but fishing opportunities may be established only through amendment to this FMP. This section supersedes other provisions of this FMP relating to foreign and joint venture fishing.

Notwithstanding the above, the harvest controls from the previous biennium (referred to as default harvest control rules, or default HCRs) are applied to the best available scientific information to determine the numerical values of the harvest specifications for the next biennial period. The default HCR would establish the harvest specifications based on the F_{MSY} (or proxy value) used in the previous biennium applied to the best current estimate of stock biomass to determine the OFL (as in bullet #1). The ABC is determined by applying the uncertainty buffer (as in bullet #2) used in the previous biennium except that if the P* approach was used, a value of 0.45 is applied. The ACL is determined as described in bullet #4 using the appropriate method for current stock status, if known. Thus, if based on the best available science, it is determined that stock status has changed from healthy to the precautionary zone, the methods outlined in Section 4.6.1 would be applied. If a stock has recovered such that stock size is now above the MSY biomass target, the default harvest control sets the ACL equal to the ABC using a P* value of 0.45, if applicable. If the status is not known, the same method used in the previous cycle is used to compute the default HCR. In the case of a stock managed under a rebuilding plan, the default HCR is the one described in the current rebuilding plan (see Appendix F). The SSC will advise the Council on whether adequate progress toward ending overfishing and rebuilding the affected fish stock is being made.

For any stock (or other management units) the Council may take action to depart from the default harvest control rules described in the previous paragraph, after considering the harvest specifications or other relevant factors as long as such changes are consistent with the framework described in Chapter 4 of this FMP, the MSA, and other applicable law.

Current harvest control rules (and related harvest policies as applicable) will be listed in the SAFE document, which will be presented to the Council and the public (and in Appendix F for stocks managed under rebuilding plans).

6.2 General Procedures for Establishing and Adjusting Management Measures

…

C. Management Measures Rulemaking For Actions Developed Through the Three-Council-Meeting Biennial Specifications Process and Two *Federal Register* Rules

These include (1) management action developed through During the biennial specifications process the Council may propose: (21) management measures being to be classified as routine the first time these measures are used; or (32) adjustments to measures previously classified as routine, such as trip limits that vary by gear type, closed seasons or areas, and in the recreational fishery, bag limits, size limits, time/area closures, boat limits, hook limits, and dressing requirements the first time these measures are used. These also; or (3) new management measures, which are those management measures where the impacts have not been previously analyzed and/or have not been previously implemented in regulations. Examples of new measures that may be proposed during the biennial process include: changes to or imposition of gear regulations; imposition of landings limits, frequency limits, or limits that differ by gear type; closed areas or seasons used for the first time on any species or species group or gear type.

The Council will develop and analyze the proposed management actions over the span of at least two Council meetings (usually April and June) and provide the public advance notice and opportunity to comment on both the proposals and the analysis prior to and at the second Council meeting. If a management measure is designated as routine under this procedure, specific adjustments of that measure can subsequently be announced in the *Federal Register* by notice, as described in the previous paragraphs. The Secretary will publish a proposed rule in the *Federal Register* with an appropriate period for public comment followed by publication of a final rule in the *Federal Register*.

As described in Section 5.4, the three-Council-meeting biennial specifications process refers to two the following decision-making schedule: meetings.

1. The Council will develop proposed harvest specifications during the first meeting (usually November). They will finish drafting harvest specifications and develop the management measures during the second meeting (usually April).

2. The Council will develop and analyze the proposed management actions over the span of at least two Council meetings (usually April and June) and provide the public advance notice and opportunity to comment on both the proposals and the analysis prior to and at the second Council meeting.

3. Finally, at the third meeting, the Council will make final recommendations to the Secretary on the complete harvest specifications and management measures biennial management package (usually June). For the Council to have adequate information to identify proposed management measures for public comment at the first management measures meeting, the identification of issues and the development of proposals normally must begin at a prior Council meeting.

If a management measure is designated as routine under this procedure, specific adjustments of that measure can subsequently be announced in the *Federal Register* by notice, as described in the previous paragraphs. The Secretary will publish a proposed rule in the *Federal Register* with an appropriate period for public comment followed by publication of a final rule in the *Federal Register*.

D. Full Rulemaking For Actions Normally Requiring at Least Two Council Meetings and Two *Federal Register* Rules (Regulatory Amendment)

These include any proposed new management measures to be classified as routine, including those considered ~~that is~~ highly controversial, or any measure that directly allocates the resource. ~~These also include management measures that are intended to have permanent effect and are discretionary, and for which the impacts have not been previously analyzed.~~ These ~~Full~~ full rulemakings will normally use a two-Council-meeting process, although additional meetings may be required to fully develop the Council's recommendations on a full rulemaking issue. Regulatory measures to implement an FMP amendment will be developed through the full rulemaking process. The Secretary will publish a proposed rule in the *Federal Register* with an appropriate period for public comment followed by publication of a final rule in the *Federal Register*.

Alternative 2 – Default HCRs Use a P* Value of 0.25

Under this alternative the Groundfish FMP is amended to describe the HCR framework and establish new criteria for management measures that may be considered during the biennial process.

Default ACLs would be computed using the HCRs currently in place and used to compute ACLs for the previous biennial period except that, where applicable, a P* value of 0.25 would be used.

The same revisions to Section 6.2 (General Procedures for Establishing and Adjusting Management Measures) described above for Alternative 1 would be made under Alternative 2.

Amendment Language

5.1 General Overview of the Harvest Specifications and Management Process

The specifications and management process, in general terms, occurs as follows:

1. The Council will determine the MSY or MSY proxy and OFL for each major stock. Typically, the MSY proxy will be in terms of a fishing mortality rate ($F_{x\%}$,) and OFL will be the $F_{x\%}$ applied to the current biomass estimate. The MSY is the maximum long-term average yield expected from annual application of the MSY (or proxy) harvest policy under prevailing ecological and environmental conditions.
2. The Council and SSC will determine an appropriate scientific uncertainty buffer to set the ABC below the OFL. The ABC accommodates the uncertainty in estimating the OFL and may be determined using either a straight percentage reduction of the OFL as recommended by the SSC or by the P* approach.
3. Every species will either have its own designated ACL or be included in a multispecies ACL. Species which are included in a multispecies ACL may also have individual ACLs, have individual HGs, or be included in a HG for a subgroup of the multispecies ACL.
4. To determine the ACL for each stock, the Council will determine the best estimate of current abundance and its relation to its precautionary and overfished thresholds. If the abundance is above the precautionary threshold, the ACL will be equal to or less than the ABC. If abundance falls below the precautionary threshold, the ACL will be reduced according to the harvest control rule for that stock. If abundance falls below the overfished/rebuilding threshold, the ACL will be set according to the interim rebuilding rule until the Council develops a formal rebuilding plan for that species.
5. For any stock or stock complex where the Secretary identifies that overfishing is occurring, the Council will take remedial action to end overfishing and prevent the stock or stock complex from falling below the minimum stock size threshold. For any stock the Secretary has declared overfished or approaching the overfished condition, or for any stock the Council determines is in

need of rebuilding, the Council will implement such periodic management measures as are necessary to rebuild the stock by controlling harvest mortality, habitat impacts, or other effects of fishing activities that are subject to regulation under this biennial process. These management measures will be consistent with any approved rebuilding plan.

6. The Council may reserve and deduct a portion of the ACL of any stock to provide for compensation for vessels conducting scientific research authorized by NMFS. Prior to the research activities, the Council will authorize amounts to be made available to a research reserve. However, the deduction from the ACL will be made in the year after the "compensation fishing"; the amounts deducted from the ACL will reflect the actual catch during compensation fishing activities.
7. The Council will identify stocks which are likely to be fully harvested (i.e., the ACL or ACT/HG achieved) in the absence of specific management measures and for which allocation between LE and open access sectors of the fishery is appropriate.
8. The groundfish resource is fully utilized by U.S. fishing vessels and seafood processors. The Council may entertain applications for foreign or joint venture fishing or processing at any time, but fishing opportunities may be established only through amendment to this FMP. This section supersedes other provisions of this FMP relating to foreign and joint venture fishing.

Notwithstanding the above, the harvest controls from the previous biennium (referred to as default harvest control rules, or default HCRs) are applied to the best available scientific information to determine the numerical values of the harvest specifications for the next biennial period. The default HCR would establish the harvest specifications based on the F_{MSY} (or proxy value) used in the previous biennium applied to the best current estimate of stock biomass to determine the OFL (as in bullet #1). The ABC is determined by applying the uncertainty buffer (as in bullet #2) used in the previous biennium except that if the P* approach was used, a value of 0.25 is applied. The ACL is determined as described in bullet #4 using the appropriate method for current stock status, if known. Thus, if based on the best available science, it is determined that stock status has changed from healthy to the precautionary zone, the methods outlined in Section 4.6.1 would be applied. If a stock has recovered such that stock size is now above the MSY biomass target, the default harvest control sets the ACL equal to the ABC using a P* value of 0.25, if applicable. If the status is not known, the same method used in the previous cycle is used to compute the default HCR. In the case of a stock managed under a rebuilding plan, the default HCR is the one described in the current rebuilding plan (see Appendix F). The SSC will advise the Council on whether adequate progress toward ending overfishing and rebuilding the affected fish stock is being made.

For any stock (or other management units) the Council may take action to depart from the default harvest control rules described in the previous paragraph, after considering the harvest specifications or other relevant factors as long as such changes are consistent with the framework described in Chapter 4 of this FMP, the MSA, and other applicable law.

Current harvest control rules (and related harvest policies as applicable) will be listed in the SAFE document, which will be presented to the Council and the public (and Appendix F for stocks managed under rebuilding plans).

Alternative 3 – Use the HCRs in Place in the Previous Period as the Defaults

Section 5.1 of the FMP would be amended in the same way as under Alternative 1, except that P* values in place during the previous biennium would be substituted for the references to a P* value of 0.45 in the first paragraph

The same revisions to Section 6.2 (General Procedures for Establishing and Adjusting Management Measures) described above for Alternative 1 would be made under Alternative 3.

Amendment Language

5.1 General Overview of the Harvest Specifications and Management Process

The specifications and management process, in general terms, occurs as follows:

1. The Council will determine the MSY or MSY proxy and OFL for each major stock. Typically, the MSY proxy will be in terms of a fishing mortality rate ($F_{x\%}$,) and OFL will be the $F_{x\%}$ applied to the current biomass estimate. The MSY is the maximum long-term average yield expected from annual application of the MSY (or proxy) harvest policy under prevailing ecological and environmental conditions.
2. The Council and SSC will determine an appropriate scientific uncertainty buffer to set the ABC below the OFL. The ABC accommodates the uncertainty in estimating the OFL and may be determined using either a straight percentage reduction of the OFL as recommended by the SSC or by the P* approach.
3. Every species will either have its own designated ACL or be included in a multispecies ACL. Species which are included in a multispecies ACL may also have individual ACLs, have individual HGs, or be included in a HG for a subgroup of the multispecies ACL.
4. To determine the ACL for each stock, the Council will determine the best estimate of current abundance and its relation to its precautionary and overfished thresholds. If the abundance is above the precautionary threshold, the ACL will be equal to or less than the ABC. If abundance falls below the precautionary threshold, the ACL will be reduced according to the harvest control rule for that stock. If abundance falls below the overfished/rebuilding threshold, the ACL will be set according to the interim rebuilding rule until the Council develops a formal rebuilding plan for that species.
5. For any stock or stock complex where the Secretary identifies that overfishing is occurring, the Council will take remedial action to end overfishing and prevent the stock or stock complex from falling below the minimum stock size threshold. For any stock the Secretary has declared overfished or approaching the overfished condition, or for any stock the Council determines is in need of rebuilding, the Council will implement such periodic management measures as are necessary to rebuild the stock by controlling harvest mortality, habitat impacts, or other effects of fishing activities that are subject to regulation under this biennial process. These management measures will be consistent with any approved rebuilding plan.
6. The Council may reserve and deduct a portion of the ACL of any stock to provide for compensation for vessels conducting scientific research authorized by NMFS. Prior to the research activities, the Council will authorize amounts to be made available to a research reserve. However, the deduction from the ACL will be made in the year after the “compensation fishing”; the amounts deducted from the ACL will reflect the actual catch during compensation fishing activities.
7. The Council will identify stocks which are likely to be fully harvested (i.e., the ACL or ACT/HG achieved) in the absence of specific management measures and for which allocation between LE and open access sectors of the fishery is appropriate.
8. The groundfish resource is fully utilized by U.S. fishing vessels and seafood processors. The Council may entertain applications for foreign or joint venture fishing or processing at any time, but fishing opportunities may be established only through amendment to this FMP. This section supersedes other provisions of this FMP relating to foreign and joint venture fishing.

Notwithstanding the above, the harvest controls from the previous biennium (referred to as default harvest control rules, or default HCRs) are applied to the best available scientific information to determine the numerical values of the harvest specifications for the next biennial period. The default HCR would establish the harvest specifications based on the F_{MSY} (or proxy value) used in the previous biennium applied to the best current estimate of stock biomass to determine the OFL (as in bullet #1). The ABC is determined by applying the uncertainty buffer (as in bullet #2) used in the previous biennium. The ACL is determined as described in bullet #4 using the appropriate method for current stock status, if known. Thus, if based on the best available science, it is determined that stock status has changed from healthy to the precautionary zone, the methods outlined in Section 4.6.1 would be applied. If a stock has recovered such that stock size is now above the MSY biomass target, the default harvest control sets the ACL equal to the ABC using the P* value used in the previous biennium, if applicable. If the status is not known, the same method used in the previous cycle is used to compute the default HCR. In the case of a stock managed under a rebuilding plan, the default HCR is the one described in the current rebuilding plan (see Appendix F). The SSC will advise the Council on whether adequate progress toward ending overfishing and rebuilding the affected fish stock is being made.

For any stock (or other management units) the Council may take action to depart from the default harvest control rules described in the previous paragraph, after considering the harvest specifications or other relevant factors as long as such changes are consistent with the framework described in Chapter 4 of this FMP, the MSA, and other applicable law.

Current harvest control rules (and related harvest policies as applicable) will be listed in the SAFE document, which will be presented to the Council and the public (and in Appendix F for stocks managed under rebuilding plans).

Other Technical Changes and Updates Proposed to be Included in Amendment 24

1.1 History of the FMP

…

Amendment 24 was approved in [insert date] to describe the use of default harvest control rules in the biennial harvest specifications process and to clarify the descriptions of new and routine management measures that may be implemented during the biennial process. Amendment 24 also designated some species as Ecosystem Component Species and incorporated a variety of technical changes to the FMP.

2.2 Operational Definition of Terms

…

Ecosystem Component Species are FMP species that are not actively managed in the fishery (i.e., no harvest specifications are specified for these species). Ecosystem component species are not targeted, are not generally retained for sale or personal use, are not subject to overfishing, and are not overfished or approaching an overfished condition (see section 4.4.4 for more detail).

$F_{SPR\ x\%}$ is the fishing mortality rate that will produce a given spawning potential ratio. The SPR is the average fecundity of a recruit over its lifetime when the stock is fished divided by the average fecundity of a recruit over its lifetime when the stock is unfished. The SPR is based on the principle that a certain biomass of fish has to survive in order to spawn and replenish the stock at a sustainable level.

Set-aside is the amount of yield of an actively managed stock or stock complex that is deducted from an ACL or sector allocation. A set-aside deducted from an ACL is designed to accommodate catch in Tribal fisheries, research fisheries, exempted fishing permit activities, and bycatch in non-groundfish fisheries. A set-aside deducted from a sector allocation is designed to accommodate catch for a portion of the sector where within-sector allocations are not specified (e.g., set-asides for the at-sea whiting sectors for many stocks are deducted from formal trawl allocations to accommodate expected bycatch).

3.1 Species Managed by this Fishery Management Plan

Table 3-1 in the FMP is proposed to be modified to remove those species designated as Ecosystem Component species and to include more of the actively managed rockfish explicitly in the table (e.g., blackspotted rockfish). Inclusion of text (see below) and a new Table 3-2 is added to list the Ecosystem Component species, including the endemic skates in the family *Arhynchobatidae* and the endemic grenadiers in the family *Macrouridae* as FMP species.

…

Table 3-1 is the listing of species actively managed under this FMP.

Table 3-1. Common and scientific names of species ~~included~~ actively managed in this FMP.

Common Name	Scientific Name
SHARKS	
~~Big skate~~	~~*Raja binoculata*~~
~~California skate~~	~~*R. inornata*~~
Leopard shark	*Triakis semifasciata*
Longnose skate	~~*R.*~~ *Raja rhina*
~~Soupfin shark~~	~~*Galeorhinus zyopterus*~~
Spiny dogfish	*Squalus* ~~*acanthias*~~*suckleyi*
~~**RATFISH**~~	
~~Ratfish~~	~~*Hydrolagus colliei*~~
~~**MORIDS**~~	
~~Finescale codling (Pacific flatnose)~~	~~*Antimora microlepis*~~
~~**GRENADIERS**~~	
~~Pacific rattail (Pacific grenadier)~~	~~*Coryphaenoides acrolepis*~~
ROUNDFISH	
Cabezon	*Scorpaenichthys marmoratus*
Kelp greenling	*Hexagrammos decagrammus*
Lingcod	*Ophiodon elongatus*
Pacific cod	*Gadus macrocephalus*
Pacific whiting (hake)	*Merluccius productus*
Sablefish	*Anoplopoma fimbria*
ROCKFISH[a/]	
Aurora rockfish	*Sebastes aurora*
Bank rockfish	*S. rufus*
Black rockfish	*S. melanops*
Black and yellow rockfish	*S. chrysomelas*
Blackgill rockfish	*S. melanostomus*
Blackspotted rockfish	*S. melanostictus*
Blue rockfish	*S. mystinus*
Bocaccio	*S. paucispinis*
Bronzespotted rockfish	*S. gilli*
Brown rockfish	*S. auriculatus*
Calico rockfish	*S. dallii*
California scorpionfish	*Scorpaena gutatta*
Canary rockfish	*Sebastes pinniger*
Chameleon rockfish	*S. phillipsi*

Common Name	Scientific Name
Chilipepper rockfish	*S. goodei*
China rockfish	*S. nebulosus*
Copper rockfish	*S. caurinus*
Cowcod	*S. levis*
Darkblotched rockfish	*S. crameri*
Dusky rockfish	*S. ciliatus*
Dwarf-red rockfish	*S. rufinanus*
Flag rockfish	*S. rubrivinctus*
Freckled rockfish	*S lentiginosus*
Gopher rockfish	*S. carnatus*
Grass rockfish	*S. rastrelliger*
Greenblotched rockfish	*S. rosenblatti*
Greenspotted rockfish	*S. chlorostictus*
Greenstriped rockfish	*S. elongatus*
Halfbanded rockfish	*S. semicinctus*
Harlequin rockfish	*S. variegatus*
Honeycomb rockfish	*S. umbrosus*
Kelp rockfish	*S. atrovirens*
Longspine thornyhead	*Sebastolobus altivelis*
Mexican rockfish	*Sebastes macdonaldi*
Olive rockfish	*S. serranoides*
Pink rockfish	*S. eos*
Pinkrose rockfish	*S. simulator*
Pygmy rockfish	*S. wilsoni*
Pacific ocean perch	*S. alutus*
Quillback rockfish	*S. maliger*
Redbanded rockfish	*S. babcocki*
Redstripe rockfish	*S. proriger*
Rosethorn rockfish	*S. helvomaculatus*
Rosy rockfish	*S. rosaceus*
Rougheye rockfish	*S. aleutianus*
Sharpchin rockfish	*S. zacentrus*
Shortbelly rockfish	*S. jordani*
Shortraker rockfish	*S. borealis*
Shortspine thornyhead	*Sebastolobus alascanus*
Silvergray rockfish	*Sebastes brevispinis*
Speckled rockfish	*S. ovalis*
Splitnose rockfish	*S. diploproa*
Squarespot rockfish	*S. hopkinsi*
Sunset rockfish	*S. crocotulus*
Starry rockfish	*S. constellatus*
Stripetail rockfish	*S. saxicola*
Swordspine rockfish	*S. ensifer*
Tiger rockfish	*S. nigrocinctus*
Treefish	*S. serriceps*
Vermilion rockfish	*S. miniatus*
Widow rockfish	*S. entomelas*
Yelloweye rockfish	*S. ruberrimus*
Yellowmouth rockfish	*S. reedi*
Yellowtail rockfish	*S. flavidus*
FLATFISH	
Arrowtooth flounder (turbot)	*Atheresthes stomias*
Butter sole	*Isopsetta isolepis*
Curlfin sole	*Pleuronichthys decurrens*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*
Flathead sole	*Hippoglossoides elassodon*
Pacific sanddab	*Citharichthys sordidus*
Petrale sole	*Eopsetta jordani*
Rex sole	*Glyptocephalus zachirus*
Rock sole	*Lepidopsetta bilineata*

Common Name	Scientific Name
Sand sole	*Psettichthys melanostictus*
Starry flounder	*Platichthys stellatus*

The species in Table 3-2 are designated Ecosystem Component Species (see section 4.4.4 for more details). The inclusion of all endemic skates and all endemic grenadiers will allow more precise catch monitoring without the need for a sorting requirement for these species since skates and grenadiers are generally landed in unidentified species market categories (e.g., Unidentified Skates).

Table 3-2. Groundfish species designated as Ecosystem Component Species.

Common Name	**Scientific Name**
Aleutian skate	*Bathyraja aleutica*
Bering/sandpaper skate	*B. interrupta*
Big skate	*Raja binoculata*
California skate	*R. inornata*
Roughtail/black skate	*Bathyraja trachura*
All other skates	Endemic species in the family *Arhynchobatidae*
Pacific grenadier	*Coryphaenoides acrolepis*
Giant grenadier	*Albatrossia pectoralis*
All other grenadiers	Endemic species in the family *Macrouridae*
Finescale codling (aka Pacific flatnose)	*Antimora microlepis*
Ratfish	*Hydrolagus colliei*
Soupfin shark	*Galeorhinus zyopterus*

4.3 Determination of MSY, or MSY Proxy and B_{MSY}

As a description of the current proxy F_{MSY} harvest rates by taxa used to calculate OFLs, the following language responsive to the SSC's and Council's decision to change the proxy F_{MSY} harvest rate for elasmobranchs is recommended in the second paragraph in section 4.3:

…

The problem with an F_{MSY} control rule is that it is tightly linked to an assumed level of density-dependence in recruitment, and there is insufficient information to determine the level of density-dependence in recruitment for many west coast groundfish stocks. Therefore, the use of approximations or proxies is necessary. Absent a more accurate determination of F_{MSY}, the Council will apply default MSY proxies. The 2015 ~~current (2011)~~ default F_{MSY} proxies are: $F_{30\%}$ for flatfish, $F_{40\%}$ for whiting, $F_{50\%}$ for rockfish (including thornyheads), $F_{50\%}$ for elasmobranchs, and $F_{45\%}$ for all species such as sablefish and lingcod. ~~However,~~ The default F_{MSY} proxies ~~values~~ ($F_{30\%}$, $F_{40\%}$, $F_{45\%}$, and $F_{50\%}$) are science-based values that are ~~provided here as examples only and are~~ expected to be modified from time to time as scientific knowledge improves. The default F_{MSY} proxies in use for the current biennial harvest specifications period can be found in the Groundfish Stock Assessment and Fishery Evaluation (SAFE) document. If available information is sufficient, values of F_{MSY}, B_{MSY}, and more appropriate harvest control rules may be developed for any species or species group.

Agenda Item F.7.a
Supplemental Attachment 9
June 2014

ECONOMIC IMPACTS UNDER THE HARVEST GUIDELINE OPTIONS FOR MINOR NEARSHORE ROCKFISH NORTH OF 40^0 10' NORTH LATITUDE

Economic impacts under the harvest guideline (HG) options for the minor nearshore rockfish complex north of 40^0 10´ North latitude were analyzed for the affected commercial and recreational fisheries. Under certain annual catch limit (ACL) alternatives, the GMT projects that the HG options would impact landings by portions of the Nearshore Open Access (OA) commercial fishery sector operating in Oregon and Northern California waters; and also on effort levels in recreational fisheries in Northern California, Oregon and, Washington.

Description of Harvest Guideline Options for Minor Nearshore Rockfish

- Option 1 ("No Action"): Continue to manage the Nearshore Rockfish complex, holding impacts to the complex-level ACL in each region.
- Option 2: Manage the Nearshore Rockfish complex according to state-specific harvest guidelines stratified at 40°10′ N. latitude reflecting apportionment based on the miles of coastline in each state.
- Option 3: Manage the Nearshore Rockfish complex according to state-specific harvest guidelines stratified at 40°10′ N. latitude reflecting apportionment based on the historical recreational and commercial catch between 2004 and 2012.
- Option 4: Manage the Nearshore Rockfish complex according to state-specific harvest guidelines stratified at 40°10′ N. latitude reflecting a hybrid method of apportionment based on miles of coastline for China, quillback and copper rockfish and historical recreational and commercial catch between 2004 and 2012 for the remaining species in the complex.

Economic Impact Measures

Nearshore Open Access Commercial Fishery

Impacts on projected landings of minor nearshore rockfish by the commercial Nearshore OA sector by area (Oregon and Northern California) were translated into ex-vessel revenue impacts using average ex-vessel value per landed roundweight pound observed in 2013. Ex-vessel revenue impacts were distributed to likely landings ports (port areas) using the 2013 distribution of minor nearshore rockfish landings in port areas north of $40^0$10´ North latitude. The projected ex-vessel revenue impacts were translated into income impacts using IO-PAC commercial fishery income impact coefficients for West Coast port areas developed for analyzing commercial fisheries impacts under the 2015-16 Groundfish harvest specifications alternatives[1].

Recreational Fisheries

Where available, the GMT's projections for recreational angler effort (number of angler-trips) under the relevant HG options were translated into income impacts using IO-PAC recreational fishery income impact multipliers for angler-trips originating from West Coast port areas. These multipliers were developed for analyzing recreational fishery impacts under the 2015-16 Groundfish harvest specifications alternatives. In cases where impacts on recreational fishing effort are expected but are currently not

[1] IO-PAC is set of models used for estimating commercial and recreational fishery-related economic impacts. Fisheries industry detail in IO-PAC is estimated from economic data surveys of expenditures by vessels and processors and by recreational anglers participating in West Coast groundfish fisheries. The model is maintained by Northwest Fisheries Science Center and used by the Pacific Fishery Management Council to estimate economic impacts of West Coast fishery management actions (Leonard and Watson 2011).

quantifiable due to outstanding uncertainties in how HG options would be implemented, qualitative indicators of the direction and magnitude of expected impacts are presented.

Economic Impact Results

The GMT projected a range of commercial fisheries landings impacts under the HG options, depending on how successful Nearshore OA fishery participants may be in avoiding encounters with minor nearshore rockfish. The endpoints of the range are labeled "best case" and "worst case", respectively. If harvesters are able to avoid discarding so that all nearshore rockfish catch were landed, then the best case landings scenario would result. However if nearshore rockfish encounter rates are high so that discarding is necessary, then in order to accommodate the additional discard mortality the lower, worst case nearshore rockfish landings scenario would result.

Impacts were projected for affected commercial fisheries port areas and/or recreational fisheries management areas for each relevant minor nearshore rockfish HG option under the Council's Preferred ACL Alternative. Indicators are also presented for expected impacts under the minor nearshore rockfish harvest HG with respect to ACL Alternative 2 (P*=0.25). Ex-vessel revenue and personal income impacts resulting from effects of the minor nearshore rockfish HG options on landings by the nearshore OA sector in affected port areas are shown in Table 1 and Table 2. Table 1 shows projected impacts under the HG options on affected port areas in Oregon and Northern California compared with impacts if the Preferred ACL alternative were selected. Table 2 compares impacts on the same list of affected port areas compared with projected impacts if the P*=0.25 ACL Alternative (Alternative 2) were selected. In both cases the baseline values against which the changes (gains or losses) are measured represent ex-vessel revenue and income impacts from the entire range of species caught by the Nearshore OA fishery, not just the portion attributable to harvest of nearshore rockfish complex species.

Nearshore Open Access Commercial Fishery Impacts

Table 1 shows all Oregon port areas would be adversely affected under all four HG options, with the greatest impacts projected under HG Option 2. The most heavily impacted port area under HG Option 2 is Coos Bay-Brookings, which is projected to lose up to 8.5 percent (worst case) of its Preferred Alternative ex-vessel revenue and income from Nearshore OA fisheries. Table 2 shows additional reductions in ex-vessel revenue and income from the already lower levels under Alternative 2 of approximately six percent for Coos Bay-Brookings under all four HG options. Ex-vessel revenue and income from Nearshore OA fisheries in the Crescent City-Eureka Port Area are projected to increase from their levels under Alternative 2 by up to approximately 10 percent under HG Option 3 (best case).

Table 1. Projected change in ex-vessel revenue and personal income impacts by affected Port Area under the Minor Nearshore Rockfish HG Options compared with corresponding levels projected for the entire range of species caught in the fishery under the Preferred ACL Alternative.

	Astoria-	**Newport**	**Coos Bay-**	**Crescent City-**
Ex-vessel Revenue Impacts ($,000)				
Nearshore OA Exvessel Rev under PA	***151***	***65***	***1,170***	***420***
HG Option 1	-0	-1	-29	+17
HG Option 2				
worst case	-1	-2	-99	+2
best case	-1	-1	-77	+29
HG Option 3				
worst case	-1	-1	-78	-14
best case	-1	-1	-63	+40
HG Option 4				
worst case	-1	-2	-86	+2
best case	-1	-1	-69	+38
Income Impacts ($,000)				
Nearshore OA Inc Impact under PA	***85***	***76***	***921***	***331***
HG Option 1	-0	-1	-23	+16
HG Option 2				
worst case	-1	-2	-78	+2
best case	-1	-2	-61	+28
HG Option 3				
worst case	-1	-2	-61	-13
best case	-0	-1	-49	+38
HG Option 4				
worst case	-1	-2	-68	+2
best case	-0	-1	-54	+36

Table 2. Projected change in ex-vessel revenue and personal income impacts by affected Port Area under the Minor Nearshore Rockfish HG Options compared with corresponding levels projected for the entire range of species caught in the fishery under ACL Alternative 2 (P*=0.25).

	Astoria-	**Newport**	**Coos Bay-**	**Crescent City-**
Ex-vessel Revenue Impacts ($,000)				
Nearshore OA Exvessel Rev under	***137***	***60***	***948***	***412***
HG Option 1	-1	-1	-56	+19
HG Option 2				
worst case	-1	-1	-56	+4
best case	-1	-1	-56	+32
HG Option 3				
worst case	-1	-1	-56	-12
best case	-1	-1	-56	+42
HG Option 4				
worst case	-1	-1	-56	+4
best case	-1	-1	-56	+41
Income Impacts ($,000)				
Nearshore OA Inc Impact under	***78***	***70***	***746***	***324***
HG Option 1	-0	-1	-44	+18
HG Option 2				
worst case	-0	-1	-44	+4
best case	-0	-1	-44	+31
HG Option 3				
worst case	-0	-1	-44	-12
best case	-0	-1	-44	+41
HG Option 4				
worst case	-0	-1	-44	+4
best case	-0	-1	-44	+39

Recreational Fishery Impacts

Table 3 and Table 4 show estimated recreational angler-trips and associated personal income impacts for areas where effects on recreational effort under the HG options are quantifiable. Table 3 shows projected effort and income impacts under the HG options for the Northern California Management Area compared with the corresponding quantities under the Preferred ACL alternative, season option 1 and status quo nearshore rockfish HG. Table 4 compares projected impacts for all Washington Coast Port Areas compared with ACL Alternative 2 (P*=0.25) and nearshore rockfish HG Option 3, compared with ACL Alternative 2 (P*=0.25) and status quo nearshore rockfish HG. Preliminary analysis of the Oregon recreational fishery[2] indicates that under ACL Alternative 2 (P*=0.25), even prohibiting retention of nearshore rockfish year-round would still result in exceeding the recreational share of the Oregon HG by approximately 2 percent. Reducing recreational harvest of nearshore rockfish to stay within the HG would require closing the Oregon recreational fishery one or more months during the year (Table 5).

Results in Table 3 indicate projected declines in Northern California Management Area effort and income impacts compared with the Preferred Alternative under all four nearshore rockfish HG options, ranging from -4,400 angler-trips and $327 thousand (-18 percent) in personal income impacts under HG Option 1 to -2,600 angler-trips and $191 thousand (-11 percent) in personal income impacts under HG Option 3.

[2] Once state-specified harvest guidelines are chosen by the Council, Oregon will need to conduct its state process to determine the commercial and recreational sharing of that HG. This preliminary analysis was done assuming the sharing percentages currently in place in Oregon regulations.

Results in Table 4 show projected declines under HG Option 3 compared with Alternative 2 (P*=0.25) for all Washington Coast Port Areas of 19.4 thousand angler-trips (-58 percent) and $3.6 million income impact (-64 percent)[3].

It is difficult to quantify the effects on Washington and Oregon angler effort under scenarios where nearshore rockfish retention is prohibited for one or more months. Since nearshore rockfish species are not targeted by most anglers (average catch is less than one per angler-trip), non-retention of nearshore rockfish by itself may not have much impact on angler effort. However, the cumulative effect of new management measures needed to stay within the nearshore rockfish HGs on top of management measures already in place to reduce encounters with overfished species may combine to discourage anglers from participating in recreational fisheries.

To illustrate the potential economic impact resulting from prohibition of nearshore rockfish retention in Washington and Oregon recreational fisheries under certain HG options, it is thought that impacts ranging from a 10 percent reduction under the less restrictive HG options to a 20 percent reduction in angler-trips targeting groundfish under the most restrictive HG option may be expected. By comparison, in 2012 there were 24,200 recreational bottomfish trips originating from Washington coastal ports and 72,500 recreational bottomfish trips originating from Oregon coastal ports. Together these trips generated an estimated $10.6 million in personal income impacts in Washington and Oregon coastal communities, an average of about $110 personal income impacts per angler-trip.

Table 3. Projected change in recreational angler-trips and personal income impacts for the Northern California Management Area under the Nearshore Rockfish HG Options compared with corresponding levels projected under the Preferred ACL Alternative and Season Option 1.

	No Action	***Preferred Alt Season Op 1***	**PPA Season Op 1 + NS RF HG Option 1**	**PPA Season Op 1 + NS RF HG Option 2**	**PPA Season Op 1 + NS RF HG Option 3**	**PPA Season Op 1 + NS RF HG Option 4**
North California Coast: Del Norte and Humboldt Counties						
Angler-trips (thousand)	*20.1*	*24.5*	*-4.4*	*-4.2*	*-2.6*	*-3.8*
Income Impacts ($,000)	*1,498*	*1,825*	*-327*	*-312*	*-191*	*-283*

[3] Base level angler-trips and income impacts reported in Table 4 under *No Action*, the *Preferred Alternative* and *Alternative 2* include about 9,400 Washington Coast Pacific halibut angler-trips.

Table 4. Projected change in recreational angler-trips and personal income impacts for all Washington Coast Port Areas under Minor Nearshore Rockfish HG Option 3 compared with corresponding levels projected under ACL Alternative 2 (P*=0.25)t.

	No Action	***Preferred Alt Season Op 1***	***Alt 2 Season Op 1***	**Alt 2 (P*=.25) Season Op 1 + NS RF HG Option 3**
Washington Coast: Neah Bay-La Push to Ilwaco-Chinook				
Angler-trips (thousand)	*33.6*	*33.6*	*33.6*	*-19.4*
Income Impacts ($,000)	*5,606*	*5,606*	*5,606*	*-3,608*

t Base level angler-trips and income impacts reported under *No Action*, the *Preferred Alternative* and *Alternative 2* include about 9,400 Washington Coast Pacific halibut angler-trips.

Table 5. Potential change in Oregon recreational angler-trips from Status Quo (SQ) based on example closure periods that may be required under Minor Nearshore Rockfish HG Option 1 and ACL Alternative 2 (P*=0.25).

Closed Months	**Total SQ Angler-trips**	**Change in Angler-trips from SQ**	**Percent Change**
Jan-Feb	79,016	-2,789	-3.5%
Oct-Dec	80,251	-1,554	-1.9%

References

Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific coast fisheries. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

SUPPLMENTAL ANALYSES FOR APPENDIX B OF THE PRELIMINARY DRAFT 2015-2016 GROUNDFISH HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES

The following attachments contain a revision and an addition to Appendix B of the Preliminary Draft 2015-2016 Groundfish Harvest Specifications and Management Measures, provided by members of the Groundfish Management Team (Agenda Item F.7.a, Attachment 5 – Electronic Only and Agenda Item F.7.a, Attachment 6 - Excerpts). The first analysis, B.7 Non-Trawl: Lingcod Trip Limit Increases, is intended to replace the analysis contained in Appendix B. The second, Lingcod Bag Limit Analyses, is an addition to Appendix B.

Year	Washington [1/]	Oregon		California N. 40°10′ N. Lat.	
	Recreational	**Recreational**	**Commercial**	**Commercial**	**Recreational**
	South Coast, 30 fm March 15-June 15				
2011	year-round season; 10 rockfish bag limit; North Coast, 20 fm June 1 - Sept 30; South Coast, 30 fm March 15-June 15	year round season; 20 and 40 fm Apr- Sept; 7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased & restructured	20 fm, 10 fish, May 15 - Oct 31
2012	year-round season; 10 rockfish bag limit; North Coast, 20 fm June 1 - Sept 30; South Coast 30 fm March 15-June 15	year round season; 30 fm Apr- Sept; 7 fish	20 fm South[/2] 30 fm North[/2]	20 fm Trip limits increased	20 fm, 10 fish, May 15 - Oct 31

[1/] Washington has not had a commercial nearshore fishery since 1995

[2/] The shoreward RCA was 20 fm from the California border to 43° N latitude, and 30 fm from 43° N. latitude to Washington border.

B.6 Non-Trawl: Slope Rockfish Trip Limit Reductions

Analysis of this management measure was not received by the Advanced Briefing Book deadline; it is expected to be delivered as a Supplemental GMT Report.

B.7 Non-Trawl: Lingcod Trip Limit Increases

Need for Action

For 2013-2014 groundfish fisheries, lingcod has been managed, in part, by cumulative bi-monthly trip limits designed to keep catches within the respective ACLs. Trip limits may be adjusted inseason as a result of inseason tracking patterns (higher/lower than projected). This applies to lingcod taken in both the non-nearshore (all three states) and nearshore fisheries (Oregon and California only).

At its April 2014 meeting, the Pacific Fishery Management Council (Council) directed the Groundfish Management Team (GMT) to complete an analysis of various lingcod trip limit and open season options for the west coast commercial non-trawl fixed-gear fishery to estimate economic and biological impacts. Current trip limits and open seasons are given in (No Action = Option 1a). The proposed trip limit and open season configurations (Options 1b and 1c) are summarized in Table B-32, with all trip limits reported in lb per vessel.

Initial analyses were provided to the Council at the April meeting for trip limit options during the open season (Agenda Item C.4.b, REVISED GMT Report, April 2014; pages 39-52 and below in Section B.8) and options for lingcod retention during the currently closed periods (Agenda Item C.4.b, REVISED

GMT Report, April 2014; pages 52-63). This document combines results of those previous, separate analyses. Additional details can be found in that April 2014 GMT statement.

Table B-37. No Action Option (Option 1a) for the limited entry and open access non-trawl fixed-gear trip limits (in lb) in effect in 2014 that apply to both north and south of 40°10' N. latitude.

Fleet	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec[a]
Limited entry	closed	closed	800	800	800	400/closed
Open access	closed	closed	400/month			400/closed

[a]The lingcod commercial fishery is closed from December 1st of a given year through April 30th of the subsequent year (five months total). Therefore, the Nov/Dec trip limit applies only to November.

A critical point in the analysis of lingcod trip limits is how proposed increases in the coastwide trip limit structure may affect the mortality of overfished species (OFS) – primarily the OFS rockfish species, in both the non-nearshore and nearshore fisheries. The approach to these proposed trip limit increases does assume that OFS mortality will not be affected in the non-nearshore fishery because any lingcod catch is mostly incidental to the targeting of sablefish; fishing behavior will likely not change because the main target will continue to be sablefish, the much more lucrative fishery. Therefore, it is assumed that any increase in lingcod mortality (landings) will only affect OFS mortality in the Oregon and California nearshore fisheries (Washington has not had a commercial nearshore fishery since 1995).

Additionally, it is prudent to point out that there is probably little to no chance of increased China rockfish impacts under Alternative 1b and 2a (below). Opening the closed season for lingcod retention will not cause increase catch of any rockfish species (OFS or China), because the proposed increases are equal to or less than average encounter rates of lingcod during the closed season (based on WCGOP bycatch rates during December-April). Increasing the lingcod trip limit during the open season showed some increase in OFS for the 50% increase. On the other hand, the increase in canary rockfish was significant when lingcod was increased by 100%. It is expected that other nearshore rockfish mortality to also increase under that scenario (2b).

Table B-38. Lingcod commercial coastwide trip limits (reported in lb per vessel) comparing the No Action Option (Option 1a) to options that increase the bi-monthly trip limit to 1,200 lb and 1,600 lb for the limited entry sector and increases to 600 lb per month and 800 lb per month for the open access sector (Options 1b, and 1c). Also presented are proposed trip limits that establish trip limits for periods 1 and 2 and December, with period 2 closed south of 40°10' N. latitude for both sectors (Options 2a and 2b).

Proposed lingcod trip limits based on the No Action Option (1a) and Options 1b and 1c						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 1a	closed	closed	800	800	800	400 (Nov only)
Option 1b	closed	closed	1,200	1,200	1,200	600 (Nov only)
Option 1c	closed	closed	1,600	1,600	1,600	800 (Nov only)
Open access						
Option 1a	closed	closed	400 lb/month (Dec closed)			
Option 1b	closed	closed	600 lb/month (Dec closed)			
Option 1c	closed	closed	800 lb/month (Dec closed)			
Proposed lingcod trip limits that apply to the area **NORTH** of 40°10' N. latitude with a year-long season structure						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 2a	200 lb/2 months	200 lb/2 months	1,200 lb	1,200 lb	1,200 lb	600 lb for Nov (200 lb for Dec)
Option 2b	200 lb/2 months	200 lb/2 months	1,600 lb	1,600 lb	1,600 lb	800 lb for Nov (200 lb for Dec)
Open access						
Option 2a	100 lb/month	100 lb/month	600 lb/month (100 lb for Dec)			
Option 2b	100 lb/month	100 lb/month	800 lb/month (100 lb for Dec)			
Proposed lingcod trip limits that apply to the area **SOUTH** of 40°10' N. latitude with March/April closed						
Limited entry	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Option 2a	200 lb/2 months	closed	800 lb	800 lb	800 lb	400 lb for Nov (200 lb for Dec)
Option 2b	200 lb/2 months	closed	800 lb	800 lb	800 lb	400 lb for Nov (200 lb for Dec)
Open access						
Option 2a	100 lb/month	closed	400 lb/month (100 lb for Dec)			
Option 2b	100 lb/month	closed	400 lb/month (100 lb for Dec)			

Background

Lingcod was declared overfished in 1999. In 2005, the stock was designated as rebuilt and a coastwide trip limit structure was established that has essentially stayed the same since. Lingcod trip limits have not been modified since 2005 for the limited entry (LE) sector and since 2007 for the open access sector (OA). Since 2007, no inseason adjustments have been made due to fishing mortality concerns for lingcod. At least one industry request was made for an inseason trip limit increase but was not supported by the GMT (Agenda Item E.2.b, Supplemental GMT Report 2, April 2008). This was because the GMT was concerned that any increase in lingcod trip limits and subsequent targeting could have resulted in increased bycatch of canary and yelloweye rockfish. Regarding the OA sector, the GMT expressed concerns that since the number of participants in that fishery was unlimited (as is still the case), any increase in lingcod trip limits could have led to a rapid expansion in the fishery, without any corresponding accountability measures for bycatch of overfished species. And finally, since the trip limits at that time weren't being attained in either the LE or OA fisheries, the GMT did not support an increase.

Since 2008, the coastwide commercial non-trawl fixed-gear catch of lingcod averaged 82.9 mt (Figure B-22) with the majority of landings made by the OA sector. In 2011 and 2012, total mortality by the non-trawl fixed-gear fleet was 3.0 percent and 3.5 percent, respectively, of the non-trawl allocation. For the 2015-2016 biennial management cycle, the Council is considering increases in lingcod trip limits for both the LE and OA non-trawl fixed-gear sectors to provide more fishing opportunity to the fishing communities in the three states. Additionally, a request was made by industry to explore the possibility of allowing the fleet to land modest amounts during those periods, or months, that are currently closed. This analysis estimates the potential harvest mortality under the various trip limit scenarios and open seasons to assist the Council in its decision for a Preferred Alternative. It also provides estimated mortality

amounts for overfished species that are taken in the nearshore commercial fisheries for Oregon and California when lingcod are also taken (Washington does not have a commercial nearshore fishery).

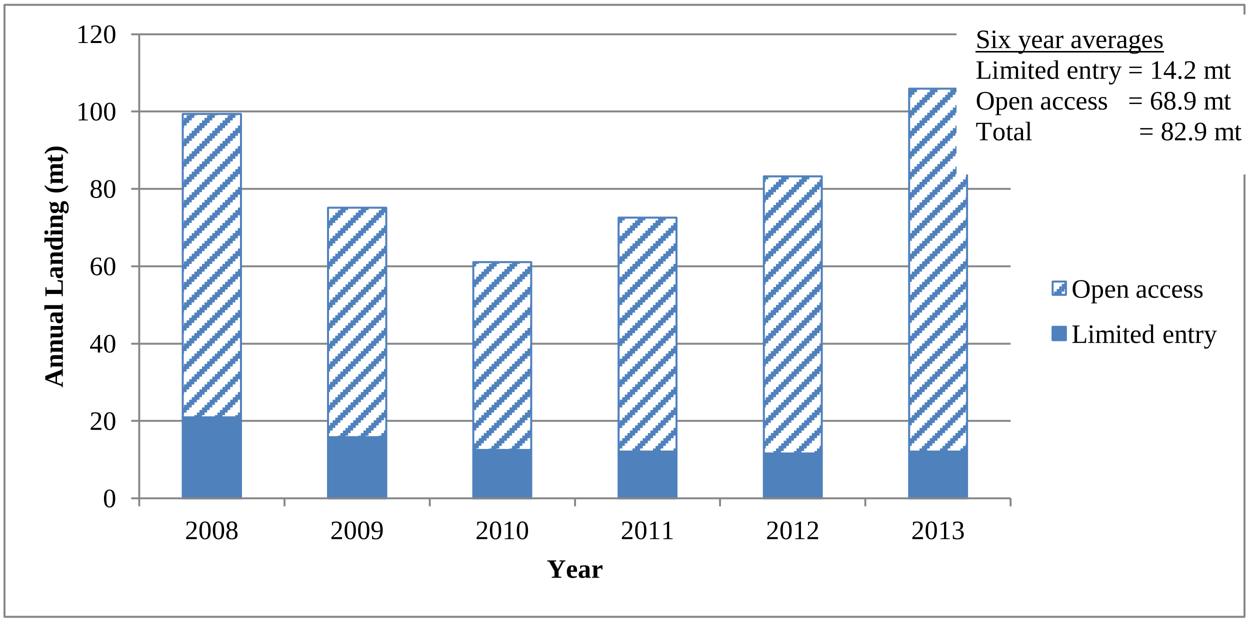

Figure B-22. Coastwide landings of lingcod by the commercial non-trawl fixed-gear fleet for both the limited entry and open access sectors from 2008 to 2013. The 2013 data are preliminary (data source: PacFIN vdrfd).

Methods

A catch-based fleet capacity trip limit model was used, and based on the years from 2008 to 2012. Commercial landings data from PacFIN's vdrfd table were extracted on April 22, 2014 for analysis. Filters were applied to only include: 1) landings made by non-IFQ, shorebased vessels (this applied to 2011 and 2012), 2) hook-and-line or trap gear, 3) Dahl sectors 5 to 10, 12, and 15[16], 4) for the nearshore bycatch model, only those Oregon and California lingcod landings that also showed nearshore species landings, and 5) port of landing north and south of 40°10' N. latitude to identify management area. The model uses a method that establishes a proportion for each participating vessel per period whereby that vessel's actual harvest mortality, as reported from the commercial dealer receipts, is compared to the theoretical maximum that that vessel could have taken. This proportion percentage is then applied to the proposed trip limit for each vessel for each period of allowable fishing. After completing this for all vessels for all periods, the estimated harvest for the fleet is summed for a final annual estimate which is then compared to the annual ACL and/or the non-trawl allocation portion of the ACL.

In addition to the above routine, a portion of the estimated landings under the various trip limit scenarios was identified as those made in conjunction with landings of nearshore species (above). These estimated lingcod landings then inputted into the GMT's nearshore bycatch model to provide estimates of the mortality of overfished species.

More details on methods can be found in Agenda Item C.4.b, REVISED GMT Report, April 2014 (pages 39-52).

[16] Dahl sectors are: 5 nearshore (limited entry), 6 nearshore (open access), 7 non-nearshore (limited entry), 8 non-nearshore (open access), 9 non-nearshore non-sablefish (limited entry), 10 non-nearshore non-sablefish (open access), 12 incidental open access, and 15 commercial non-groundfish.

Results

Lingcod mortality estimates are provided in Table B-34 and Table B-35 for the combined sector options under the different P* values for 2015 and 2016. A final LE and OA sector summary is presented in Table B-36, and lastly overfished species mortality estimates are provided in Table B-37. More detail regarding these estimates is provided below. Also, a comprehensive discussion about trip limits for periods 1 and 2 and December is included in Agenda Item C.4.b, REVISED GMT Report, April 2014, pages 52-63).

Table B-39. Lingcod coastwide commercial mortality estimates using the status quo season structure (closed during periods 1, 2 and December coastwide) comparing No Action (Option 1a) to Options 1b and 1c. The limited entry bimonthly trip limits are shown, along with open access monthly trip limits in parentheses.

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.45						
	Proposed Bimonthly and Monthly Trip Limits (lb)	Estimated Take (mt)	2015		2016	
			Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 1a	800 (400)	88.9	1,950.7	4.6%	1,857.8	4.8%
Option 1b	1,200 (600)	122.3	1,950.7	6.3%	1,857.8	6.6%
Option 1c	1,600 (800)	155.1	1,950.7	8.0%	1,857.8	8.3%

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.25						
	Proposed Bimonthly and monthly Trip Limits (lb)	Estimated Take (mt)	2015		2016	
			Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 1a	800 (400)	88.9	1,444.1	6.2%	1,375.4	6.5%
Option 1b	1,200 (600)	122.3	1,444.1	8.5%	1,375.4	8.9%
Option 1c	1,600 (800)	155.1	1,444.1	10.7%	1,375.4	11.3%

Note: For the limited entry sector, the November trip limits are 400 lb under Option 1a, 600 lb under Option 1b, and 800 lb under Option 1c. The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a, Supplemental REVISED Attachment 2:, April 2014.

Table B-40. Lingcod coastwide commercial mortality estimates under Options 2a and 2b. Season structure modifications for each sector are shown in Table B-33.

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.45					
		2015		2016	
Option	Estimated Take (mt)	Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 2a	135.1	1,950.7	6.9%	1,857.8	7.3%
Option 2b	173.4	1,950.7	8.9%	1,857.8	9.3%

LIMITED ENTRY + OPEN ACCESS (coastwide) at P* = 0.25					
		2015		2016	
Option	Estimated Take (mt)	Non-trawl Allocation (mt)	Percent of Allocation	Non-trawl Allocation (mt)	Percent of Allocation
Option 2a	135.1	1,444.1	9.4%	1,375.4	9.8%
Option 2b	173.4	1,444.1	12.0%	1,375.4	12.6%

Notes: South of 40°10' N. latitude the fishery will continue to be closed. The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a Supplement REVISED Attachment 2, April 2014.

Table B-41. Summary of overall coastwide commercial lingcod mortality estimates for the limited entry and open access sectors for Options 1a, 1b, 1c, 2a, and 2b.

	Trip Limits		Mortality Estimates		
Option	Limited Entry (bi-monthly)	Open Access (monthly)	Limited Entry	Open Access	Total
1a (No Action)	800	400	16.9	72.0	88.9
1b	1,200	600	24.7	97.6	122.3
1c	1,600	800	31.8	123.3	155.1
2a	1,200	600	30.2	104.9	135.1
2b	1,600	800	37.9	135.5	173.4

Note: These trip limit amounts in this table refer to the bi-monthly limited entry sector, whereas the OA sector trip limits are set on a per month basis at one-half the limited entry amount. Refer to Table B-33 for the detailed summary of the actual trip limit amounts.

Table B-42. Overfished species mortality estimates (mt) under the No Action Option (1a), Option 1b, and Option 1c (season structure maintained with periods 1 and 2 and December closed), and under the 2a and 2b options that reflect the season structure modification (i.e., open January – December). These values were calculated by using the five-year commercial averages (2008-2012) of the nearshore species inserted into the nearshore bycatch model.

	Estimated mortality under options with the current season structure in place		
	Option 1a – 800 lb	Option 1b – 1,200 lb	Option 1c – 1,600 lb
Bocaccio	0.4	0.4	0.4
Canary rockfish	6.5	6.6	6.7
Cowcod	0.0	0.0	0.0
Darkblotched rockfish	0.2	0.2	0.2
Yelloweye rockfish	1.1	1.2	1.3

	Estimated mortality under options with an expanded season structure	
	Option 2a – 1,200 lb	Option 2b – 1,600 lb
Bocaccio	0.4	0.4
Canary rockfish	6.7	6.8
Cowcod	0.0	0.0
Darkblotched rockfish	0.2	0.2
Yelloweye rockfish	1.2	1.3

Comparison of Options (Options 1a, 1b, and 1c)

Under Options 1a, 1b and 1c, the coastwide bi-monthly trip limit structure would be maintained whereby commercial retention of lingcod is permitted during periods 3 (May/June), 4 (July/August), 5 (September/October) and November. Retention of lingcod would not be allowed during period 1 (January/February), period 2 (March/April) and in December. Under these three options, trip limit adjustments are considered only for the management area north of 40°10' N. latitude. South of 40°10' N. latitude, the status quo trip limits and season structure would remain in effect for all three options.

No Action (Option 1a)

For 2014, the lingcod commercial bi-monthly non-trawl fixed-gear trip limit for the LE sector is 800 lb per period with 400 lb for November. Fishing would continue to be closed during periods 1 and 2 and December. For the OA sector, trip limits are set at 400 lb per month. Again, periods 1 and 2 and December are closed. These amounts apply on a per vessel basis and apply to all three states. Under the No Action Option (Option 1a), the expected harvest mortality, for both the P* = 0.45 and P* = 0.25 approach, would be less than 10 percent of the non-trawl allocation (Table B-34). The total combined LE and OA mortality would be 88.9 mt.

Fishing Activity Under Option 1a

Under the No Action Option, fishing activity is not expected to change. The number of vessels that will fish would be expected to be about the same as have participated in the fishery over the last few years (Table B-38). In addition, fishing effort per vessel and fishing area are expected to be similar under Option 1a.

Table B-43. Number of vessels in the non-nearshore and nearshore fisheries that made lingcod landings (regardless of the amount) for the three states from 2008 to 2012. Includes both LE and OA vessels.

State	2008	2009	2010	2011	2012	5-Year Avg.
Washington	44	32	37	31	41	37
Oregon	228	219	196	200	202	209
California	251	222	206	223	264	233

Biological Impacts Under Option 1a

With no expected increase in mortality, there are no anticipated biological impacts.

Projected Overfished Species Mortality Under Option 1a

A critical consideration in the lingcod fishery are those catches (landings) that are made in conjunction with nearshore species. These nearshore fishery landings are those that are applied to the nearshore bycatch model as a component necessary for the estimation of overfished species (OFS) mortality. With no expected increase in the take of lingcod and no expected change in fishing behavior under this option, it is also expected that no increase in OFS mortality will be experienced.

Stock Status

Currently, the coastwide lingcod stock is considered healthy. As of the last stock assessment, the point estimate for the depletion of the spawning output (= spawning biomass) at the start of 2009 was 61.9 percent for north of 40°10' N. latitude , 73.7 percent south of 40°10' N. latitude, and 67.0 percent coast wide (Hamel et al. 2009).

Socioeconomic Impacts Under Option 1a

None are expected.

Option 1b

Option 1b maintains the closures during periods 1 and 2 and December. This option also increases the current LE sector trip limit from 800 lb per two months to 1,200 lb per two months and increases the November trip limit from 400 lb to 600 lb. The OA sector trip limit would increase from 400 lb per month to 600 lb per month. The original management measure consideration for this option was to analyze trip limit increases only for the fishery north of 40°10' N. latitude. Trip limit amounts south of 40°10' N. latitude are to be left as is (i.e., remain status quo). Mortality would be expected to increase from 88.9 mt. Under No Action Option 1a to 122.3 mt (37.6 percent increase) under Option 1b, with the majority of this increase coming from the OA sector. Here too, the expected landings mortality would be less than 10 percent of the non-trawl allocation amount at both the P* = 0.45 and P* = 0.25 levels.

Fishing Activity Under Option 1b

With larger trip limits (from 800 lb to 1,200 lb per period for the LE sector and from 400 lb to 600 lb per month for the OA sector) it is reasonable to expect an increase in overall mortality. Table B-36 shows mortality will increase from 88.9 mt (No Action) to 122.3 mt under Option 1b. Despite this expected increase, the total annual mortality will still be substantially less than the non-trawl allocation amount. It is speculated that this modest increase would not generate a surge in fishing activity.

Biological Impacts Under Option 1b

Because the stock is considered very healthy, the 37.6 percent increase (33.4 mt) will have a relatively minor effect on the stock's status. A total mortality of 122.3 mt represents < 10 percent of the non-trawl fixed gear allocation. Projected mortality would not jeopardize the stock's status nor cause the fishery to exceed the non-trawl allocation portion of the annual ACL.

Projected Overfished Species Mortality Under Option 1b
Two overfished species are of major concern: canary and yelloweye rockfish. These two species have been (and will continue to be) the most constraining component of the lingcod fishery and largest concern when considering lingcod trip limit increases. Under this option, both species will experience an approximate 0.1 mt increase from the No Action Option. As per the Preferred Alternative, canary rockfish has a directed nearshore allocation of 6.7 mt (2015) and 6.9 mt (2016) and yelloweye rockfish has a directed nearshore allocation of 1.2 mt (2015) and 1.3 mt (2016). The projected mortality under this option (6.6 mt for canary and 1.2 mt for yelloweye) are equal to or less than the Preferred Alternative nearshore allocations.

Stock Status

Similar to the No Action Option 1a, the stock is expected to remain healthy with no adverse effects from this modest increase in harvest mortality.

Socioeconomic Impacts Under Option 1b

Under this option, the projected increase in total annual landings for both the non-nearshore and nearshore fisheries would be approximately 75,200 lb (34.1 mt). Using the most recent commercial landings data from 2013 as a benchmark, the average coastwide price is $2.50 per pound. Applied to the projected increase of 75,200 lb, the fishery could earn an additional $188,000 compared to the No Action status quo amount – all else being equal.

Option 1c
Option 1c maintains the closures during periods 1 and 2 and December. This option also increases the current LE sector trip limit from 800 lb per two months to 1,600 lb per two months and increases the OA sector trip limit from 400 lb per month to 800 lb per month. The original management measure consideration for this option was to analyze trip limit increases only for the fishery north of 40°10' N. latitude. Trip limit amounts south of 40°10' N. latitude are to remain status quo. Mortality would be expected to increase from 88.9 mt under No Action Option 1a to 155.1 mt (a 74.5 percent increase), with the majority of this increase, again coming from the OA sector. Under this option the projected landings mortality would be less than 10 percent of the non-trawl allocation amount at P* = 0.45 but would be just over 10% (for both 2015 and 2016) for P* = 0.25 (Table B-34).

Fishing Activity Under Option 1c

With larger trip limits (from 800 lb to 1,600 lb per period for the LE sector and from 400 lb to 800 lb per month for the OA sector), it is reasonable to expect an increase in overall mortality. It is possible that there may be a change in fishing behavior with more participants participating in the fishery, but presently it is difficult to estimate what that number may be. Table B-36 shows mortality will increase from 88.9 mt (No Action) to 155.1 mt under Option 1c. Despite this expected increase, the total annual mortality will still be substantially less than the non-trawl allocation amount.

Biological Impacts Under Option 1c

Because the stock is considered very healthy, the 74.5 percent increase (66 mt) compared to the No Action Option will have a relatively minor effect on the stock's status. A total mortality of 155.1 mt under this option represents 10.7 percent of the non-trawl allocation for 2015.

Projected Overfished Species Mortality Under Option 1c
As is the case under Option 1b canary and yelloweye rockfish are the two species that have been (and will continue to be) the most constraining component of the lingcod fishery and largest concern when considering lingcod trip limit increases. Under this option, both species will experience an approximate 0.2 mt increase from the No Action option projection. As per the Preferred Alternative, canary rockfish

has a directed nearshore allocation of 6.7 mt (2015) and 6.9 mt (2016) and yelloweye rockfish has a directed nearshore allocation of 1.2 mt (2015) and 1.3 mt (2016). The projected mortality of canary under this option is 6.7 mt, which is equal to the Preferred Alternative nearshore allocation (this mortality is 0.2 mt more than the nearshore allocation under than the No Action option estimate of 6.5 mt). For yelloweye, projected mortality under this option is 1.3 mt, which exceeds the Preferred Alternative nearshore allocation for 2015 by 0.1 and equals the Preferred Alternative nearshore allocation for 2016. A mortality of 1.3 mt exceeds the mortality under No Action estimated impact by 0.2 mt.

Stock Status

Similar to the No Action Option 1a, the stock is expected to remain healthy with no adverse effects from this increase in harvest mortality.

Socioeconomic Impacts Under Option 1c

Under this option, the projected increase compared to the No Action Option in total annual coastwide landings would be approximately 146,000 lb (66 mt). Applying the $2.50 per pound value described above provides an estimate that the fishery could earn an additional $365,000 compared to the No Action status quo amount – all else being equal.

Options Overview (Options 2a and 2b)

Under Options 2a and 2b, the coastwide trip limit structure would be modified to accommodate modest trip limits for periods 1 and 2 and December for both the LE and OA sectors (Table B-32). Under these two options, the take of lingcod would be allowed during all periods and months during the year, but only for the management area north of 40°10' N. latitude. South of 40°10' N. latitude, retention of lingcod would continue to be prohibited for both sectors during March and April. Trip limits would also be increased from May-November under these options relative to No Action (Option 1). See Table B-33for trip limit details.

Option 2a

The intent of Option 2a is to allow retention and landings of lingcod that would otherwise be discarded during the closed season, in addition to increasing trip limits during the currently open season to increase attainment of the non-trawl allocation. Under this option north of 40°10' N. latitude, the LE sector would have a 200 pound trip limit per two months for periods 1 and 2 and 200 lb for December. This sector would also have a 1,200 pound trip limit for periods 3 through 5 and 600 lb in November. South of 40°10' N. latitude, the LE sector would have a 200 lb per two-month limit for periods 1 and 200 pounds for December. The sector would continue to have an 800 lb per two-month limit for periods 3 through 5 and 400 lb for November. Period 2 would remain closed.

For the OA sector north of 40°10' N. latitude, the monthly trip limit would be 100 lb during periods 1 and 2 and 100 lb in December. Additionally, this sector would have a 600 pound monthly trip limit for periods 3 through 5 and November. For the OA sector south of 40°10' N. latitude, a 100 lb per month trip limit would apply for period 1 and for December. Period 2 would remain closed and all the other months would continue to have a 400 lb per month trip limit.

Under this option south of 40°10' N. latitude, March and April would continue to be closed to the retention of lingcod for both the LE and OA sectors. This is proposed because the additional opportunity to fish for lingcod south of 40°10′ N. latitude in period 2, when rockfish is closed, presents the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. See Table B-33 for a summary of trip limit details.

Fishing Activity Under Option 2a

With larger trip limits compared to the No Action Option it is reasonable to expect a modest increase in overall annual lingcod mortality. Compared to the projection for the No Action Option (88.9 mt), the projected mortality would be 135.1 mt, an increase of 46.2 mt (52 percent). Despite this projected increase, the total annual mortality will still be substantially less than the non-trawl allocation amounts (Table B-35). For 2015 and 2016, with a P* = 0.45, the projected percent of the non-trawl allocation would be 6.9 percent and 7.3 percent, respectively. Under a P* = 0.25 scenario, the projected percent of the non-trawl allocation for 2015 and 2016 would be 9.4 percent and 9.8 percent, respectively.

Biological Impacts Under Option 2a

Because the stock is considered very healthy, the 46.2 mt increase will have a relatively minor effect on the stock's status. Lingcod mortality is expected to increase, though encounter rates are not, as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (with an estimated 7 percent mortality). For example, the increased trip limit during the open season is not expected to change fishing behavior (i.e., fishing effort or fishing area). Likewise, allowing retention during December-April at the amounts shown in Table B-33 is not expected to cause increased fishing effort or change in fishing locations (see Agenda Item C.4.b, REVISED GMT Report, April 2014; pages 52-63). Hence, there would be no expected increase in lingcod encounter rates under this option relative to the No Action Option.

Projected Overfished Species Mortality Under Option 2a

With the combination of higher trip limits for the traditional fishing periods coupled with the modest trip limits for the periods that before were closed, projected mortality for canary rockfish is expected to increase. Under the No Action Option 1a, the projected canary rockfish mortality is 6.5 mt (Table B-37), whereas under Option 2a that mortality amount would be 6.7 mt. This projected canary rockfish mortality would equal the Preferred Alternative nearshore allocation of 6.7 mt in 2015 and not exceed the 6.9 mt in 2016~~)~~ but would exceed the No Action mortality estimate (6.5 mt). Yelloweye rockfish mortality under Option 2a is 1.2 mt, which is the same as shown under Option 1b and equal to the Preferred Alternative nearshore allocation for 2015, but 0.1 mt higher than expected under No Action (1a).

Stock Status

Under Option 2a, no adverse changes to lingcod stock status are expected compared to the No Action Option since lingcod mortality has been far below the non-trawl allocation and is expected to remain so under Option 2a. Estimated lingcod mortality under this option is expected to range between 7.8 percent and 11.0 percent of the non-trawl allocation (Table B-35). Given This level of increase in mortality is far below levels that would result in overfishing and are not expected to adversely affect stock status.

Socioeconomic Impacts Under Option 2a

Allowing fishery participants to retain incidentally encountered lingcod that were previously discarded would increase revenue from current operations targeting other species within incidental lingcod encounters. In 2013, the average price per pound coast wide averaged $2.50 per pound. This amount, applied to the projected increase (approximately 102,000 lb) would result in a coastwide gross estimated ex-vessel increase of approximately $255,000. While low trip limits make it unlikely that fishery participants will choose to target lingcod, such targeting may become worthwhile if the price per pound makes the trip profitable, despite the relatively low trip limits. If trip limits cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod may be unlikely. However, it needs to be pointed out that some vessels do target lingcod on some trips, so any increase would benefit these participants.

Option 2b

The intent of Option 2b is also to allow retention and landings of lingcod that would otherwise be discarded during the closed season, in addition to increasing trip limits during the currently open season. Under this option north of 40°10' N. latitude the LE sector would have a 200 pound trip limit per 2 months periods 1 and 2 and 200 lb for December (the same as for Option 2a). However, this sector would also have a 1,600 pound trip limit for periods 3 through 5 and 800 lb in November. For the OA sector north of 40°10' N. latitude, the monthly trip limit would be 100 lb during periods 1 and 2 and 100 lb in December, but the sector would have an 800 pound monthly trip limit for periods 3 through 5 and November. For the OA sector south of 40°10' N. latitude, a 100 lb per month trip limit would apply for period 1 and for December. All the other months would continue to have a 400 lb per month trip limit. Again, as per Option 2a, south of 40°10' N. latitude, the retention of lingcod would be prohibited for both the LE and OA sectors during March and April to prevent the possibility of additional mortality of overfished rockfish as well as discarding of other healthy rockfish species while targeting lingcod. See Table B-33 for a summary of trip limit details.

Fishing Activity Under Option 2b

With larger trip limits compared to the No Action (Option 1a) and Option 2a, it is reasonable to expect an increase in overall annual lingcod mortality. Compared to the projection for the No Action Option (88.9 mt), the projected mortality would be 173.4 mt for Option 2b, an increase of 84.5 mt. Despite this projected increase, the total annual mortality will be substantially less than the non-trawl allocation amounts (Table B-35). For 2015 and 2016, with a P* = 0.45, the projected percent of the non-trawl allocation would be 8.9 percent and 9.3 percent, respectively. Under a P* = 0.25 scenario, the projected percent of the non-trawl allocation for 2015 and 2016 would be 12.0 percent and 12.6 percent, respectively. This assumes that no new OA participants would enter the fishery. However, given that this trip limit option would provide a modest increase to potential OA participants, it is reasonable to assume that an increase in the number of participants could occur.

Biological Impacts Under Option 2b

Because the stock is considered healthy, the 84.5 mt increase compared to the No Action Option will have a relatively minor effect on the stock's status. Lingcod mortality is expected to increase as participants in the fishery will retain some lingcod encountered (at 100 percent mortality) rather than discard all lingcod encountered (with an estimated 7 percent mortality), as occurs now during the closed season. There may be an increase in lingcod encounter rates under this option relative to the No Action Option, because trip limits during the currently open season would double (Table B-33). The likelihood and impact of this potential increase in effort would be very difficult to quantify. Despite this, however, it is probable that additional sets during a trip may occur to target lingcod (after catching trip limits for other species). This could increase impacts to OFS, as well as China rockfish.

Projected Overfished Species Mortality Under Option 2b

With the combination of higher trip limits for the traditional fishing periods coupled with the modest trip limits for those periods that before were closed, projected mortality for canary is expected to increase. Under Option 1c, the projected canary rockfish mortality is 6.7 mt (Table B-37), whereas under Option 2b that projected mortality amount would also be 6.8 mt. This projected canary mortality is 0.3 mt higher than shown under No Action (Table B-37) and 0.4 mt higher than the Preferred Alternative allocation. For yelloweye rockfish, the projected mortality under this option will be 1.3 mt, whereas it is 1.2 mt for Option 2a. This projected yelloweye mortality is 0.2 mt higher than shown under No Action, exceeds the Preferred Alternative nearshore allocation for 2015 by 0.1, and equals the Preferred Alternative nearshore allocation for 2016.

Stock Status

Under Option 2b, no changes to lingcod stock status are expected compared to the No Action Option since lingcod mortality has been far below the non-trawl allocation and expected to remain so under Option 2b. Estimated lingcod mortality under this option is expected to range between 10.1 percent and 14.3 percent of the non-trawl allocation (Table B-35). Given the projected increase in mortality that is projected to occur, the level of increase is still expected to be far below levels that would result in overfishing and are not expected to adversely affect stock status.

Socioeconomic Impacts Under Option 2b

Allowing fishery participants to retain more lingcod (some of which were incidentally caught and discarded under status quo) would increase revenue from current operations targeting other species within incidental lingcod encounters. This may also increase revenue by incentivizing increased targeting or change in behavior during the May-November period when trip limits double relative to No Action (Table B-33). In 2013, the average price per pound coast wide averaged $2.50 per pound. This amount, applied to the projected total (approximately 186,000 lbs.) compared to the No Action Option total would result in a coastwide gross estimated ex-vessel amount of approximately $465,000 more than the No Action Option total. While moderate trip limits make it feasible that fishery participants will choose to target lingcod, such targeting may become more worthwhile if an increase in the overall average price per pound makes the trip profitable. It is speculated that if trip limits cannot be attained or if fuel or other variable costs make it unprofitable, or alternatively opportunity costs are too high to justify changing targets, directed effort may not be economically viable and trips targeting lingcod could be unlikely.

B.8 Non-Trawl: Allow Lingcod retention in Periods 1, 2, and 6

Need for Action

Lingcod retention is prohibited in Periods 1, 2, and part of 6 for both limited entry and open access fixed gears under the status quo regulations. In recent years, lingcod mortality has been far below the ACL north and south of 42° N. latitude with 25 percent and 13 percent attainment in 2011 and 34 percent and 16 percent in 2012, respectively. Public testimony at the September 2013 Council meeting requesting some level of retention during periods 1, 2, and 6. The request was made to land lingcod that are incidentally caught and discarded, with the suggestion that trip limits might be set low enough to prevent changes in fishermen’s behavior (i.e., prevent targeting). Higher trip limits than those needed to allow for incidental take may further increase attainment of the non-trawl allocation of the ACL, but bycatch of overfished species while targeting lingcod is a consideration. The proposed change would allow lingcod retention in the restricted access state permitted nearshore fishery in California and Oregon, the open access nearshore fishery in Oregon, and the limited-entry and open access non-nearshore fixed gear fisheries in California, Oregon and Washington.

Background

The prohibition on retention of lingcod during specific periods has been in effect for commercial fixed gear fisheries since the 1990s to improve the conservation of lingcod after being declared overfished. The closure was put in place to minimize impacts on lingcod during their spawning season, which is from December to April (Hamel et al. 2009). Females move in to depths shallower than 50 fm to spawn and males guard nests from predation. Although females do not spend much time in the spawning area, males are concentrated in these shallow waters guarding the eggs during winter and spring months (Love 1996). The season closure for the fixed gear fishery was presumably designed to reduce catch of these males while concentrated during the nest-guarding season to facilitate rebuilding of the stock.

Lingcod was declared rebuilt in 2009, when the status was determined to be 61.9 percent for the northern component and 73.7 percent for the southern component. The coastwide status was 67.0 percent at the beginning of 2009, well above the 40 percent target spawning stock biomass (Hamel *et al.* 2009). As a

LINGCOD BAG LIMIT ANALYSIS

Background:

For 2013-2014 recreational groundfish fisheries, lingcod have been managed within a non-trawl allocation of 1186 mt in 2014; lingcod does not have a recreational harvest guideline specified in regulation. In recent years mortality of lingcod south of 42° N. latitude has been far below the non-trawl allocation. In 2012, approximately 27 percent (314 mt) of the allocation was attained. Within the non-trawl sector, the recreational fishery comprised approximately 24 percent of the total mortality in 2012. Total mortality reports from the West Coast Groundfish Observer Program indicate that the majority of mortality in the non-trawl sector is attributed to the recreational fishery (Table 1).

Currently lingcod are subject to a two fish bag limit; other recreational management measures include the same season and depth restrictions as many other groundfish, as well as a minimum size limit of 22 inches. The current size limit was implemented in 2012 and access to higher lingcod abundance in deeper waters has been limited due to the need to protect overfished species. As a result, few management measures are available to increase the harvest of lingcod.

Table 1. Total mortality (in metric tons) of lingcod south of 42° N. latitude in the non-trawl sectors, 2009-2012 (source: West Coast Groundfish Total Mortality Reports).

Year	Commercial (non-Trawl)	Recreational	Total non-Trawl
2009	37.7	129.6	167.3
2010	26.8	94.6	121.4
2011	29.8	225.2	255.0
2012	33.0	281.4	314.4

2015-2016 Management Considerations:
Lingcod south of 42° N. latitude is a healthy stock which has been underutilized in recent years. Utilization of the stock has been limited somewhat by restrictive depth constraints and season structures implemented to protect overfished stocks. In order to more fully utilize the non-trawl lingcod allocation, the Council requested analysis of increasing the lingcod bag limit from two fish to a three fish bag limit.

Range of Management Options for Consideration

Option 1- No Action: Maintain current two fish bag limit for lingcod
Under Option 1, the lingcod bag limit would remain two fish. Anglers will be forced to discard lingcod in excess of the bag limit, increasing the likelihood of encounters with overfished species.

Biological Impacts Under Option 1
Projected Impacts
Under Option 1, the projected mortality to lingcod in the recreational fishery under a two fish bag limit is 244.4 mt. Table 2 summarizes projected mortality to all overfished species.

Table 2. Projected mortality to overfished species under No Action.

Species	Projected Mortality (mt)
Bocaccio	100.1
Canary Rockfish	16.3
Cowcod	1.0
Yelloweye Rockfish	1.7

Stock Status
The stock was declared rebuilt in 2005 (Jagielo and Wallace, 2005) and the recent assessment indicates the sock remains above target biomass, with increasing abundance (Hamel et. al. 2009). Under Option 1, no change to stock status is expected.

Option 2: Increase the bag limit from two to three fish
Under Option 2, the lingcod bag limit would be increased statewide from two to three fish.

RecFIN data from 2011 to 2012 were used to analyze lingcod mortality as a result of increasing the bag limit. Using the RecFIN Hypothetical Bag Limit Analysis tool, estimates of increased mortality were calculated using A+B1+B2 fish. For the purpose of this analysis, A fish include sampled dead fish, B1 fish includes both fillets and fish discarded dead, and B2 fish includes mainly live discarded fish in excess of bag limits or undersized fish. Since the bag analysis tool does not estimate the proportion of fish that were undersized, this analysis assumes that all discarded fish were of legal size, biasing mortality estimates high. As the most conservative estimate, the analysis also assumes that all B2 fish would be available if the bag limit were increased.

Biological Impacts Under Option 2
Projected Impacts
Under Option 2, projected mortality to lingcod is expected to increase by approximately 20 percent (399.7 mt) under a three fish bag limit and PPA season structure[1]. The increase in projected mortality (155.3 mt) as a result of Option 2 can be accommodated within the non-trawl allocation, especially given historically low attainment.

Additional changes to management measures related to lingcod in the non-trawl sector are also being considered – specifically modifications to the spawning closure for the commercial non-trawl sectors. The cumulative mortality of both proposed changes is not expected to exceed the non-trawl allocation let alone the ACL.

Impacts on Overfished Species
Table 3 summarizes mortality of overfished species under Option 2. If anglers spend more time on the water fishing for an additional lingcod, the number of encounters with overfished species may increase, although any increase is difficult to quantify. While some increase in overfished species mortality can be expected over Option 1, sufficient buffer is available to accommodate the increased impacts (if realized) without exceeding the respective recreational HGs or the non-trawl allocation for cowcod.

[1] The PPA season structure corresponds to Alternative 1 (Option1).

Table 3. California recreational projected mortality of overfished species for 2015-2016 under Option 2.

Species	Projected Mortality (mt)
Bocaccio	117.5
Canary Rockfish	26.7
Cowcod	1.2
Yelloweye Rockfish	2.9

Stock status
Under Option 2**,** no change to stock status is expected compared to Option 1.

Socioeconomic Impacts
Increasing the lingcod bag limit would provide anglers with increased opportunity, which may encourage anglers to take more trips. As a result, coastal communities and business that support recreational fishing could experience minor increases to revenue compared to No Action, though such increases are difficult to quantify or attribute solely to the increased bag limit.

Note: This is an updated version of Section 4.4 in *Preliminary Draft of "Groundfish Harvest Specifications and Management Measures and Amendment 24: Draft Environmental Impact Statement"* included in the June 2014 Briefing Book as Agenda Item F.7.a, Attachment 4.

4.4 Impacts of 2015-2016 Harvest Specifications and Management Measures on Essential Fish Habitat

4.4.1 Impact Mechanism

Setting harvest specifications does not directly affect essential fish habitat (EFH). Furthermore, an analysis of groundfish trawl logbook data does not reveal any clear relationship between catch limits and fishing effort (see Appendix A). As discussed in Section 3.3.3.3, fishing effort in the shoreside trawl fishery has declined substantially since 2010 while catch generally increased. This change in fishing effort is likely a function of the introduction of IFQ management and related changes in fishery operations. Section 3.2.3 reports participation trends in groundfish fixed gear and trawl fisheries during the baseline period. Non-nearshore fixed gear fishery participation has remained relatively stable while nearshore fixed gear fishery participation has declined. The trend in effective fishing effort is not directly related to participation, but it is unlikely that fishing effort increased during the baseline period, based on information on participation presented in Section 3.2.3 and the analysis of trawl logbook data presented in Section 3.3.3.3. Alternative harvest specifications proposed for the 2015-2016 biennial period are indistinguishable with respect to the effect on EFH. To the degree that the amount and spatio-temporal distribution of gear-specific fishing effort does not change from historical patterns, adverse impacts to EFH from the groundfish fishery are likely to be equivalent to the historical impacts described in Section 3.3, which serves as a proxy for describing the impacts of the No Action Alternative (summarized below).

The proposed action does indirectly mitigate adverse impacts to EFH from fishing through the use of time/area closures. As discussed in Section 3.3, Groundfish Conservation Areas (GCAs), established as top-down measures to reduce bycatch of overfish species, have an ancillary mitigating impact on the adverse impacts of groundfish fisheries on EFH by prohibiting fishing within these areas.[1] If an area is closed for an extended period of time, the EFH within it may recover from these adverse impacts. Estimates of recovery times for EFH are shown in Table 3-24 by habitat and gear type causing the impact. These range from less than a year to decades. Although the maximum recovery time shown in the table is 56 years (the upper end of the range of recovery times for offshore biogenic habitat impacted by trawl gear), estimates range into centuries for some deepwater coral species.

4.4.2 NMFS Implementation of Council Recommendation on Trawl RCA in 2014

Under the action alternatives the trawl RCA boundaries would be changed to 100 to 150 fathoms year round in the area north of 40°10' N lat. to 48°10' N lat. (the RCA south of this latitude already has 100-150 fm boundaries). As discussed in Section 3.3, the Council originally proposed this change in April 2013 as an inseason action. NMFS prepared an environmental assessment (EA) to evaluate the impacts to EFH of this proposal (NMFS 2014b). The Council reviewed a draft of the EA at their September 2013 meeting and reiterated the proposed change. In April 2014 NMFS published a final rule (79 FR 21639) that partially implemented the Council proposal but established the seaward boundary between 40°10' N lat. and 45°46'

[1] Other closed areas, principally EFH Conservation Areas, were established with the objective of mitigating such impacts or (in the case of MPAs) addressing a variety of objectives closely related to habitat protection. However, establishing or modifying these areas is not part of the proposed action.

N lat. at 200 fathoms.[2] This configuration thus represents No Action with respect to the trawl RCA. The difference between the No Action Alternative and the action alternatives is therefore only the area between the 150 fm depth contour and 200 fm seaward boundary between 40°10' N lat. and 45°46' N lat. Under all of the action alternatives the 150-200 fm (modified) zone of the trawl RCA would be opened to bottom trawl fishing.

The preamble to the final rule identifies several reasons for the decision not to open the aforementioned portion of the trawl RCA. An overarching reason is that "there is insufficient record to conclude that the seaward boundary modification … minimizes adverse effects on groundfish EFH caused by fishing to the extent practicable." NMFS notes that the area has been closed to bottom trawling since 2004 and "benethic habitats may have, to some extent, recovered from previous groundfish bottom trawling impacts." NMFS also cites the Council's ongoing 5-year review of groundfish EFH identification and related ~~mitigated~~ mitigation measures implemented by Amendment 19 to the Groundfish FMP. As part of this process proposals have come to light for new EFH conservation areas that impinge on the 150-200 fm (modified) zone. For this reason, NMFS concluded that opening this area would be "premature." In response to a comment NMFS provides still another reason for keeping this portion of the RCA in place: "…it may have greater conservation value than portions of the actual 'core' RCA (between the 100 fm and 150 fm lines…)" which would remain closed under the Council's proposal. Although this core area has been continuously closed to bottom trawl since September 2002, pink shrimp trawl gear has been allowed in this area (along with a few other activities, such as NMFS trawl surveys, which also occur in other depth zones). Pink shrimp trawling occurs shallower than 150 fathoms and thus not in the 150-200 fathom area proposed to be opened.

NMFS states that the Council did not "sufficiently acknowledge or contribute additional analysis to minimize the potential for adverse impacts on the identified area as compared to other recommended areas, and did not provide sufficient rationale when they made their initial recommendation…" (April 17, 2014 letter from William W. Stelle, Jr., Regional Administrator, to Dorothy Lowman, Pacific Council Chair). NMFS explains that the Council needs to consider the MSA's requirement to "minimize to the extent practicable adverse effects" to EFH as part of a fishery management plan (MSA Sec. 303(a)(7)). To do so, the Council needs to demonstrate that the economic impact is "substantial enough" to outweigh potential adverse impacts to EFH. This evaluation standard is based on the description of practicability in Federal regulations at 50 CFR 600.815(a)(2)(iii): "…Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with National Standard 7" ("Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication").[3]

These findings by NMFS have implications for evaluating Council recommendations for changes to RCA boundaries in the context of considering "routine" management measures. Even though the trawl RCA boundaries have been changed frequently in the past (see Table 4-6 in NMFS 2014b) in cases where this management measure has allowed areas of EFH to recover from the adverse effects of fishing, sufficient rationale is expected to demonstrate that the benefits of an RCA change outweigh the adverse effects of potentially subjecting a recovered area to renewed adverse effects.

A problem with this rationale is that neither the characteristics of EFH (with respect to vulnerability and recovery time) nor the distribution of fishing effort are spatially uniform, as mentioned in the NMFS EA

[2] During November through February (bimonthly periods 6 and 1) the modified 200 fathom line is implemented. These modifications allow access to areas where petrale sole are abundant.

[3] "Practicable" has a narrower definition the "practical." Something is practical if it is useful or convenient while practicable means doable or feasible.

(NMFS 2014b). This makes it difficult to assess the conservation value of the area as a whole and likewise the actual adverse impact that might occur if the area was opened to bottom trawling.

To investigate the question of the benefits to EFH afforded by the 150-200 fm area an analysis was undertaken using ArcGIS™ geographic information software (version 10.2). Polygons were created representing the three depth-based portions of the RCA in the area between 40°10' N lat. and 45°46' N lat. using waypoint lines for the 75 fm, 100 fm, 150 fm, and 200 fm (modified by "cutouts" to allow access to petrale sole fishing grounds) depth contours and the adjacent areas outside of the RCA. When these lines are combined to generate a single polygon feature class additional polygons are formed by the 200 fm modified line crossing the 150 fm line. In some cases, especially where the sea bottom drops off steeply, these could be errors resulting from one line being drawn without reference to the other. Another possibility is that these represent intentional "cutouts" to increase fishing opportunity.

The polygon feature layer representing RCA zones was then intersected with the Habitat Weighted Cumulative Fishing Effort layer created as part of the EFH 5-year review and available at http://efh-catalog.coas.oregonstate.edu/effort/. The Habitat Weighted Cumulative Fishing Effort layer is composed of 2 x 2 km polygon grid cells with an index score assigned to each grid cell (NMFS 2013a).[4] A high cell score may be interpreted as more fishing effort directed at more sensitive areas. (It should be noted that the habitat weighting does not take into account occurrence of hard corals.) Since the intersection resulted in grid cells along the RCA lines to be split, the index values were normalized by adjusting impact index values proportionately (i.e., impact value * (cell area / 4 sq. km.)).

As noted above, impacts are unevenly distributed spatially. This results in a highly skewed distribution of impact index values. This is illustrated in Figure 4-35, which shows the frequency distribution of adjusted (area normalized) impact metric values. The bins used in this distribution are based on multiples of the standard deviation of the population. The standard deviation is greater than the mean and 69% of the cells have values equal to or less than the mean. Ninety-nine percent of the values are less than five standard deviations above the mean. This demonstrates that there are a few outlier values with very high scores relative to the mean. In other words, there are a few grid cells where fishing effort and habitat sensitivity combine to produce high values. Keeping an entire area closed while only a few discrete areas may exceed the putative "conservation value" threshold may not justifying continued closure of an entire area.

Table 4-159 presents a range of summary statistics based on the GIS analysis. The first row shows the unadjusted values while all the remaining rows use the adjusted impact metric. The percent of grid cells clipped in the overlay operation is shown to demonstrate why the area adjustment to the impact metric was made. The impact value is presented as a total (the sum of values within an RCA zone) and an average (the sum divided by the area of the RCA zone). The last three rows present the impact metric only for values

[4] The feature class metadata abstract states "We overlaid commercial groundfish fishing effort (based on West Coast Observer Program data, 2002 - 2010) for the bottom trawl, midwater trawl and select fixed-gear fleets with benthic habitat types off the coast or WA,OR, and CA, out to the 1,600 m isobath. Benthic habitat was classified into nine categories, which combined attributes of three depth strata and three bottom hardness categories. The depth strata were shelf, upper slope and lower slope. Bottom hardness was classified as hard, mixed or soft. Weighting for each of the nine benthic habitat categories was assigned based on fleet type (bottom, midwater, fixed line and fixed point). The model grain was a gridded 2 x 2 km surface. Each gridcell represent data from three or more unique vessels over the modeling time frame (2002 - 2010). Details of this model can be found in the EFH Phase II report and associated appendices." Although not stated explicitly, the impact metric column, ALL_IMPACT is defined as "Cumulative groundfish fishery effort X weighted benthic habitat types" indicating that multiplication was the operation used.

less than five standard deviations above the mean. This excludes potential outlier values to better represent “average” impact levels within a zone.

The~~se data~~ average index values contradict the conclusion reached by NMFS and discussed in the Final Rule that the 150- 200 (modified) zone is less impacted than the 100-150 fm zone, based on the magnitude of the summed impact values for each zone. The average index value for the 100-150 fm zone is 15,711, which is less than the average value of 19,560 for the 150-200 fm (modified) zone. However, the documentation for the Habitat Weighted Cumulative Fishing Effort ~~layer does not specify whether~~indicates that shrimp trawl and NMFS trawl surveys are ~~accounted for~~ not included in the fishing effort component of the impact metric. As noted above, the rationale presented by NMFS is partly based on the fact that these activities occur only in depths less than 150 fathoms.

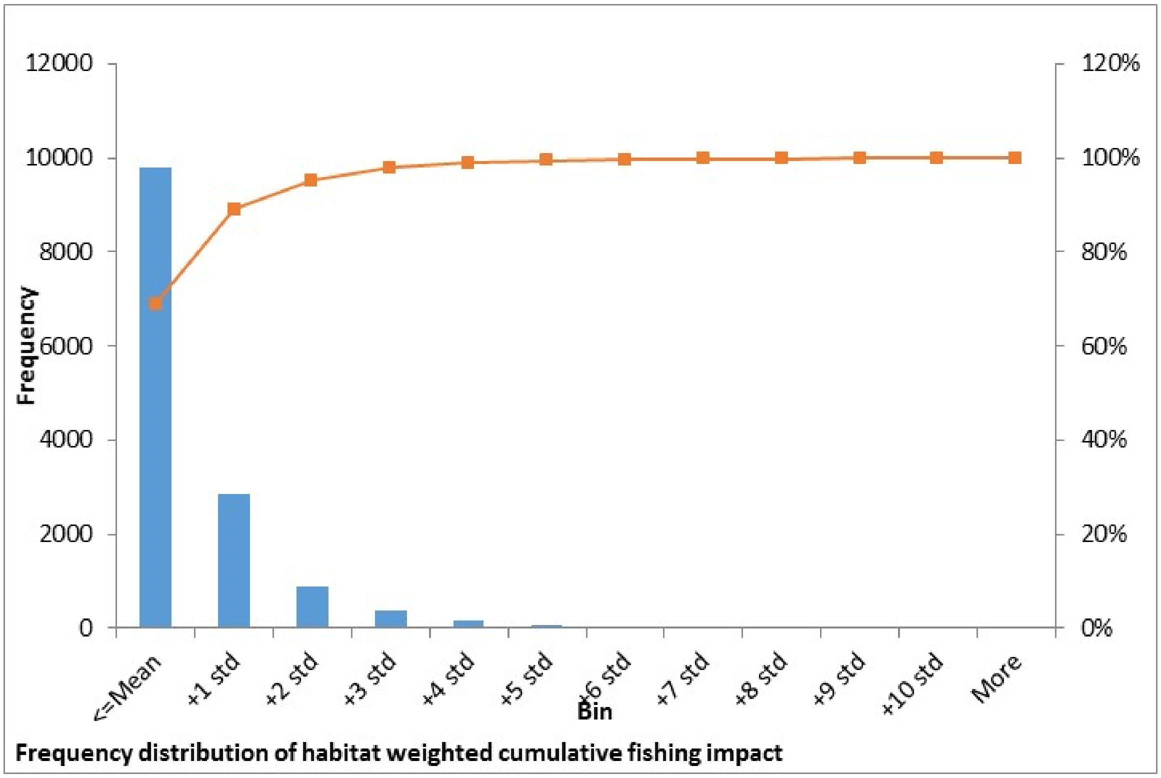

Figure 4-34. Frequency distribution of habitat weighted cumulative fishing effort index values between 40°10’ N lat. and 45°46’ N lat. (columns) and cumulative percent of the total count (line).

Table 4-159. Summary statistics for area adjusted habit-weighted cumulative fishing effort layer by RCA depth zone between 40°10' N lat. and 45°46' N lat.

	Shoreward of 75 fm	75-100 fm	100-150 fm	150-200 fm (modified)	Seaward of 200 fm (modified)	Possible "cut-outs"
Summed Impact	178,404,764	171,415,525	84,795,897	102,546,519	803,699,491	17,334,798
Area Adjusted Values						
Clipped cells as pct. of all cells	11.90%	71.11%	77.34%	84.82%	8.61%	100.00%
Summed Impact	161,707,248	99,427,056	37,724,588	29,433,399	770,505,634	2,630,034
Area (sq. km.)	15,210	6,064	2,401	1,505	22,065	35
Average Impact*	10,632	16,395	15,711	19,560	34,920	74,132
Max	879,880	599,027	552,697	390,344	2,745,001	947,876
Mean	39,928	40,682	35,027	35,462	134,048	38,116
Standard Deviation (SD)	78,973	60,389	50,655	42,916	184,490	122,257
Values > 5 x SD (% total)	13%	6%	7%	6%	7%	36%
count of values > 5x SD	38	16	8	6	45	1
Summed Impacts <= 5x SD	141,333,998	93,030,347	35,141,495	27,748,068	717,537,772	1,682,158
Average impact <= 5x SD	9,292	15,341	14,635	18,440	32,520	47,414

* Summed impact divided by area (sq. km.) of polygon

To examine the socioeconomic importance of these areas, trawl RCA trawl logbook data from a period before the RCA was implemented, 1998-2001, was analyzed to evaluate the economic benefits derived from fishing in the different trawl RCA zones.[5] Set positions were obtained from the PacFIN logbook subsystem (lbk_tow table) along with set time, up time, and hail weight. Tow duration was computed by subtracting up time from set time, accounting for instances where the up time was on the following day from the set time. The tow set position was used to create a point feature layer in ArcGIS and a spatial join was performed on the polygon layer for the RCA zones.[6] This allowed RCA zone names assigned in the polygon layer attribute table to be added to each record in the logbook point layer attribute table. The spatial join rule used was to assign attributes to the point layer record falling within a polygon in the RCA zone layer.

Table 4-160 shows three metrics derived from the GIS analysis to evaluate the economic importance of the RCA zones. These are the number of tows, the total duration of all tows made, and the total of the hail weights for all the tows. The metric values have been normalized to account for the varying sizes of different zones (the ~~adjusted impact~~socioeconomic metric divided by the area ~~in square kilometers~~ of the zone in square kilometers). The number of tows where a null value appears for the hail weight is shown as a percent of all tows. These null values are assumed to represent omitted data. The data are presented for six areas: the depth zones comprising the configurations of the trawl RCA (75-100 fm, 100-150 fm, 150-

[5] PacFIN gear IDs were used for to exclude sets using midwater gear. The logbook database covers the Federal groundfish bottom trawl fishery so activity in the state-managed shrimp trawl fishery is not included. As discussed in Section 3.2, groundfish fishery landings declined precipitously between 1997 and 1998 and remained relatively low in the years afterward. In order to have a more consistent data set 1998 was chosen as the cutoff for the time series.

[6] Since only set positions were used, this analysis does not account for tow tracks that crossed from one zone into another somewhere along the length of the tow track. Since a lot of the fishing effort occurred near the 150 fm isobath some amount of the metric quantity ascribed to one zone may have occurred in the other.

200 fm), the adjacent shoreward and seaward areas, and the presumed petrale cutout areas. Figure 4-35 presents data for the trawl RCA zones graphically for easier interpretation.

Excluding the presumed petrale cutout areas, in the period before RCA implementation (1998-2001) the 100-150 fm zone shows the highest area normalized metric values, suggesting that it was the most important area economically, followed by 150-200 fm (modified) zone.[7] This indicates that this area generated socioeconomic benefits that may be sufficient to demonstrate that keeping this area closed is impracticable as defined in Federal regulations at 50 CFR 600.815(2)(ii) and (iii). This definition of practicability asks Councils to consider "the nature and extent of adverse effect[s]" and the "long and short-term costs and benefits" of mitigation measures. Analysis using the Habitat Weighted Cumulative Fishing Effort layer suggests that the 150-200 fm (modified) zone has experienced impacts greater than the 100-150 fm zone, ~~that~~ which would be remain closed under the Council's proposal, an indication that the~~is~~ 150-200 fm (modified) zone ~~area~~ does not have special conservation value, while substantial socioeconomic benefits could be realized if the 150-200 fm (modified) were accessible to the trawl fishery.

Another factor identified in the Final Rule discussed above (and in Section 3.3.3.2) is the potential for areas within the 150-200 fm (modified) zone to be closed specifically to mitigate the adverse effects of fishing. This could occur as part of the Council's ongoing review of EFH designation and mitigation measures in the Groundfish FMP. Information was not obtained from proponents in time to compare locations using GIS and determine their importance with respect to the RCA configuration. The Council would have to consider whether the future benefits in terms of impact mitigation accruing from any closures outweigh the ongoing socioeconomic costs of keeping the 150-200 fm zone closed if ~~it is~~is the closures are unnecessary with respect to the stated objective of reducing catch of overfished species.

Table 4-160. No of tows, total tow duration, and total hail weight summed by depth zone, per sq. km. for areas between 40°10' N lat. and 45°46' N lat. 1998-2001. Tows made with midwater gear excluded. (PacFIN lbk_tow, 6/9/14)

Depth Zone	No. of tows	Tow Duration	Hail Weight	Hail Wt Null Values (%)
<75 fm	0.28	0.79	273	0%
75-100 fm	1.90	6.20	2,579	2%
100-150 fm	2.57	10.10	4,027	1%
150-200 fm (m)	2.09	9.97	3,441	1%
"Cut outs"	4.57	16.42	7,930	1%
>200 fm (m)	0.35	2.33	672	1%

[7] The presumed petrale cutout areas represent a special case. First, without more investigation it cannot be confirmed that these areas, where the 200 fm (modified) line crosses the 150 fm line are intential cutouts or errors in designating waypoints for the two lines. Nonetheless, the metrics suggest that a lot of fishing effort is concentrated in these areas, which would make sense if they are important fishing grounds. Overall, they demonstrate the point made above that impacts are not spatially uniform, so privileging the ancillary conservation benefits of the RCAs may not be a practicable approach to mitigating adverse impacts.

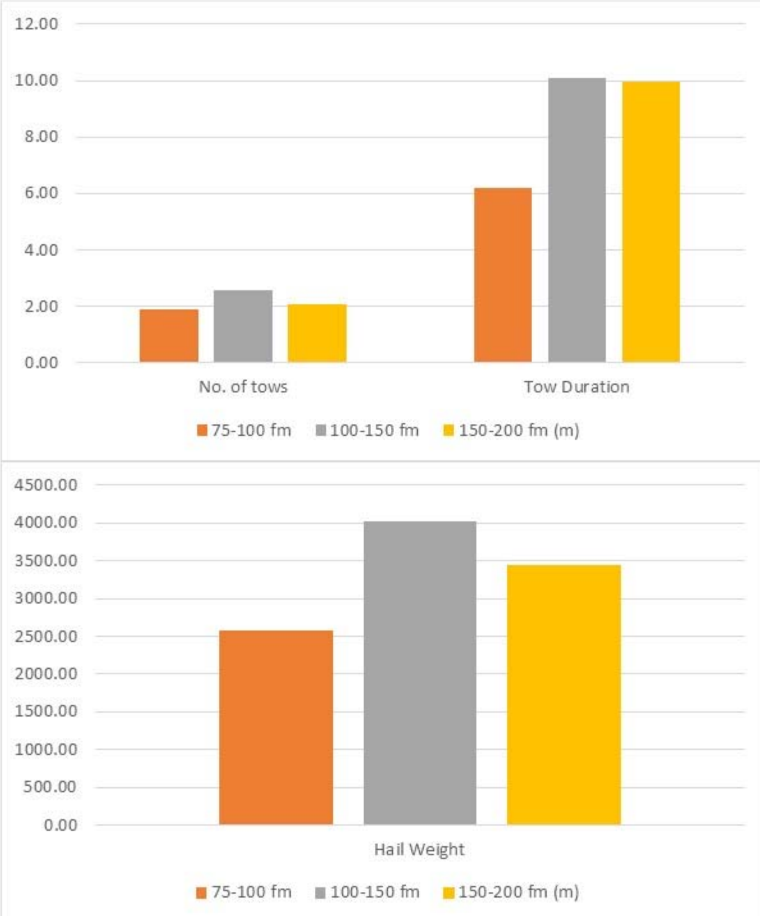

Figure 4-35. Graphical representation of logbook economic metrics for areas of the RCA between 40°10' N lat. and 45°46' N lat., 1998-2001.

4.4.3 Summary of the Impact of the Alternatives on Essential Fish Habitat

4.4.3.1 The No Action Alternative

Under No Action the harvest specifications and management measures in place in 2014 would continue in effect, although inseason action could be taken to adjust routine management measures. As noted above, the characterization of the environmental baseline in Section 3.3 is the best available summary of the impact in the future, because there are no models or methodology available to estimate the amount and spatial distribution of fishing effort, and thus effects on EFH, resulting from the proposed action. Using information about the environmental baseline, the following possible effects are noted:

- Based on historical trends, fishing effort in the bottom trawl portion of the shoreside IFQ fishery is not likely to increase. Bottom trawl effort fell substantially with the implementation of IFQ management (see Figure 3-22). Bottom trawl gear has greater adverse impacts to groundfish EFH compared to other gear types.
- A portion of the shoreside IFQ fishery is using fixed gear to catch their IFQ. Fixed gear has less adverse impact on groundfish EFH compared to bottom trawl. Hard substrate (rocky habitat) is more accessible to fixed gear but recovery times are shorter for fixed gear even in comparison to bottom trawl gear for soft substrate, which is generally rated to recover faster from the adverse impacts of fishing.

- In 2014 NMFS partially implemented a Council recommendation to reduce the size of the trawl RCA between 40°10' N lat. and 48°10' N lat. The environmental baseline now includes the trawl activity in these open areas for the remainder of 2014. Under No Action, trawl fishing would continue to be permitted in these areas.

4.4.3.2 The Preferred Alternative

As discussed in Section 4.4.1, a correlation between the size of target species ACLs and bottom trawl fishing effort estimated from logbook data could not be identified. At some level of magnitude, it is reasonable to conclude that fishing opportunity, dictated overall by ACLs and mediated by sector allocations and related management measures, affects fishing effort. A crude way of representing the difference between Alternative 1 and No Action is the difference between the sum of all the ACLs under each alternative. The sum of Alternative 1 ACLs for 2015 (not including Pacific whiting) is 44,736 mt greater than No Action, a 53 percent increase. Put another way, out of the 38 stocks for which ACLs are established and a comparison can be made with No Action, 25 show an increase from No Action.[8] However, 25,000 mt of this difference in the ACL is represented by the increase in the Dover sole ACL; as discussed in Section 4.3.2.6, there is not enough historical evidence to demonstrate that this increase would be accompanied by a comparable increase in catch. The sum of the non-whiting ACLs for 2015, 129,060 mt, is larger than summed values for any year during the baseline period when the largest value was 119,371 mt. (It is important to bear in mind that the stock definitions for which individual ACLs are set have changed over time. Thus these sums are not exactly comparable, but at this gross scale the changes in the recent past have probably not by themselves substantially affected fishery behavior.) While no conclusion can be made about how ACLs and resulting fishing opportunity may affect the distribution of fishing effort, it is reasonable to conclude that fishing effort is more likely to increase than to decrease.

Under the Preferred Alternative, the Council reiterates its previous recommendation on changing the trawl RCA boundary. Because of NMFS action in 2014, the effect of this recommendation would be to open the area from 150 fm to 200 fm between 40°10' N lat. and 45°46' N lat. This would have adverse impacts to EFH that had fully recovered from the past effects of bottom trawl in this area.

4.4.3.3 Alternative 1

Under No Action there are 10 stocks where the ACL is set equal to the ABC and a P* value less than 0.45 is used. Under Alternative 1 the P* value used is 0.45 in all cases, indicating a policy change from No Action (however, six of these stocks have ACLs set for geographic subdivisions of a coastwide value so effectively the P* policy choice only comes into play in seven cases). Otherwise, ACLs are expected to increase in cases where spawning stock abundance is increasing. The sum of the 2015 ACLs under Alternative 1 is 106,733 mt; the main difference from the Preferred Alternative is that the No Action ACL of 25,000 mt for Dover sole would apply under Alternative 1 rather than the Preferred alternative ACL of 50,000 mt.

The Council recommendation to change the trawl RCA boundary from 150 fm to 200 fm between 40°10' N lat. and 45°46' N lat. would apply under this alternative. There is no information demonstrating that a substantial change in fishing effort is likely under this alternative. Management measures with mitigating effects on the adverse impacts of fishing are the same as No Action, except for the proposed change in the seaward boundary of the trawl RCA described above, which may increase adverse impacts from fishing on EFH, to the extent that recovered EFH is subject to bottom trawl. Except for this change, it is reasonable

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[8] Because spiny dogfish is removed from the Other Fish complex, which has further changes through the designation of EC species, only 38 out of 40 ACLs for the 2015-2016 biennium can be compared.

to conclude that the impacts of Alternative 1 would not be discernibly different from the effects under No Action.

4.4.3.4 Alternative 2

Under No Action there are 25 stocks where the ACL is set equal to the ABC based on a P* value. Under Alternative 2 the P* value used is 0.25 in all cases, indicating a policy change from No Action (however, six of these stocks, have ACLs set for geographic subdivisions of a coastwide value so effectively the P* policy choice comes into play in 22 cases). The sum of the 2015 ACLs under Alternative 2 is 82,512 mt, which is 1,814 mt less than the sum of No Action ACLs. At a gross level, this suggests that fishing opportunity, fishing effort, and resulting adverse impacts on EFH is not likely to increase compared to No Action.

The Council recommendation to change the trawl RCA boundary from 150 fm to 200 fm between 40°10' N lat. and 45°46' N lat. would apply under this alternative. There is no information demonstrating that a substantial change in fishing effort is likely under this alternative. Management measures with mitigating effects on the adverse impacts of fishing are the same as No Action, except for the proposed change in the seaward boundary of the trawl RCA described above, which may increase adverse impacts from fishing on EFH, to the extent that recovered EFH is subject to bottom trawl. Except for this change, it is reasonable to conclude that the impacts of Alternative 2 would not be discernibly different from the effects under No Action.

4 Impacts of the Alternatives

4.8 Biological Impacts of Alternative Long Term Biennial Harvest Specifications on Groundfish Stocks

This section evaluates the predicted biological impacts of alternative long term harvest specifications on a select list of groundfish stocks. The focus of this section are on those overfished stocks currently managed under rebuilding plans, the economically most important target stocks that are the backbone of the current fishery, and those stocks and stock complexes that were historically important targets of the west coast groundfish fishery. This evaluation notes the projected depletion trends under the range of scenarios modeled. The results of this analysis are presented by taxon and, for rockfish, further stratified by depth strata (i.e., nearshore, shelf, and slope).

The long term analysis in this EIS used projections of spawning stock depletion, spawning stock biomass, and total biomass of key assessed groundfish stocks through 2024 under a wide range of catch streams or harvest control rules, as well as across the states of nature that captured the key axes of uncertainty in stock assessments. An important caveat in the analysis is that the base case state of nature in these projections is the most probable. The Terms of Reference for stock assessments directs the states of nature modeled in assessment decision tables be developed as stochastically as possible with the base case state of nature being the median or most probable case (i.e., 50% likelihood) and the low and high states of nature bracketing the base case having half the probability (i.e., 25% likelihood) as the base case. In all cases, the highest catch stream modeled is the harvest control rule of ACL = ABC under a P* of 0.45; the highest catch streams are from the high state of nature models under this harvest control rule. The lowest catch streams, depending on the stock, are modeled using either the harvest control rule ACL = ABC under a P* of 0.25, the 2014 ACL scenario, or under the “recent year average catch” scenario. The lowest catch streams are from the low state of nature models under one of these harvest control rule scenarios.

The states of nature developed in groundfish stock assessments can best be thought of as bracketing the key axes of uncertainty that affect stock productivity. Stock assessments vary by how many of the key population dynamics parameters are estimated. The more parameters that are estimated, the more the true uncertainty in the assessment is characterized. However, no assessments attempt to estimate all parameters that describe stock dynamics. For example, those assessments that are done in Stock Synthesis (the assessment platform used for the majority of current groundfish stock assessments) will often try to estimate steepness of the stock-recruitment function (h) or the instantaneous rate of natural mortality (M), but seldom both parameters. Both h and M are measures of relative stock productivity (high h and high M are indicators of strong stock productivity) and their estimates are confounded (that is, assumptions or priors used to estimate one of these parameters will affect the estimate of the other). Therefore, when one of these parameters is freely estimated, the other is usually assumed and fixed in the assessment. In this case, the fixed parameter is usually what is varied to determine the states of nature in the assessment. The high state of nature is therefore indicative of an “optimistic” assumption that affects high stock productivity and the low state of nature indicates a more “pessimistic” lower productivity assumption.

It is important to note that all biomass projections are deterministic in that future recruitment and total removals (i.e., total catch), as well as the fixed parameters in the assessment, are assumed. Decision tables in assessments that show variable future catch streams by state of nature also explore the implications of using a catch stream that is projected to be sustainable for the base case model (i.e., future biomass is projected to remain above B_{MSY}) for the other states of nature to address the question, “what is predicted to happen if the alternative state of nature is the actual one for the stock?”. However, the purpose of this analysis is to probe a broader range of biomasses and catches for select groundfish stocks to better posit how these outcomes affect the stocks and the fishery. The highest and lowest biomasses and catches in this analysis are highly unlikely and any case where all these stocks are in equilibrium at these high or low biomasses is implausible.

Since the main objective of this long term impact analysis is to specifically discuss impacts at the extremes of plausibility (i.e., analyzing the highest and lowest catch streams using the high and low states of nature models), this analysis does not map directly to the 2015-2016 alternatives analyzed in this EIS. However, when linking this long term impact analysis with the 2015-2016 alternatives analyzed in this EIS, the base case model is always assumed since that is the most probable assessment model. In all cases, Alternative 1 is the ACL = ABC using a P* of 0.45 and Alternative 2 is the ACL = ABC using a P* of 0.25 (in both cases the appropriate precautionary reduction to the ACL, either the 40-10 or the 25-5 rule, is made when the stock is projected to be below the B_{MSY} target). The No Action Alternative is the 2014 ACL and the Preferred Alternative varies by stock.

4.8.1 Long Term Impacts of Assessed Flatfish Species

Of all the assessed flatfish species, only the projections for rex sole were not available in time for this analysis.

The proxy biomass reference points that direct management of assessed flatfish species are a target biomass (B_{MSY}) depletion ratio of 0.25 (depletions at or above this threshold indicate a healthy stock) and a Minimum Stock Size Threshold (MSST) of 0.125 (depletions below this threshold indicate an overfished stock). Depletions between the B_{MSY} threshold and the MSST indicate stocks in the precautionary zone. The default ACL harvest control rule for flatfish in the precautionary zone is to implement the “25-5” rule which is a reduction in the ACL from the ABC (see {PFMC, 2014 #563} for more details).

Most of the flatfish species are not caught at levels commensurate with high attainment of ACLs, with the exception of petrale sole, which is an important trawl target. Therefore, the high catch streams for these species under even the base case models are unlikely. Flatfish species managed in the FMP are mostly trawl-dominant (i.e., on average, 90% or more of the catch occurs in the trawl fishery), with the exception of Pacific sanddabs and starry flounder, which are a significant species in trawl and recreational fisheries. Given the dominance of flatfish as a trawl species, catch monitoring uncertainty is low. Therefore, there is very low risk of depleting flatfish stocks through overfishing.

4.8.1.1 Arrowtooth Flounder

The modeled catch scenarios for arrowtooth flounder range from 3,088 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 37,915 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-1). Projected arrowtooth depletions under all states of nature are sustainable assuming the respective states of nature, except maintaining the 2014 ACL under the low state of nature is projected to drive depletion just below B_{MSY} by the end of the projection period (Figure 4-1, Figure 4-2, and Figure 4-3). All the 2015-2016 alternatives are sustainable under the base case model (Figure 4-1).

Table 4-1. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for arrowtooth flounder.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	5,758
	ABC Removals (P* = 0.25; Alt. 2)	6,364
	ABC Removals (P* = 0.4; Pref. Alt.)	7,125
	ABC Removals (P* = 0.45; Alt. 1)	7,307
	Recent Year Average Total Catch Removals	3,088
High	2014 ACL	5,758
	ABC Removals (P* = 0.25)	33,968
	ABC Removals (P* = 0.4)	37,184
	ABC Removals (P* = 0.45)	37,915
	Recent Year Average Total Catch Removals	3,088
Low	2014 ACL	5,758
	ABC Removals (P* = 0.25)	4,001
	ABC Removals (P* = 0.4)	4,624
	ABC Removals (P* = 0.45)	4,789
	Recent Year Average Total Catch Removals	3,088

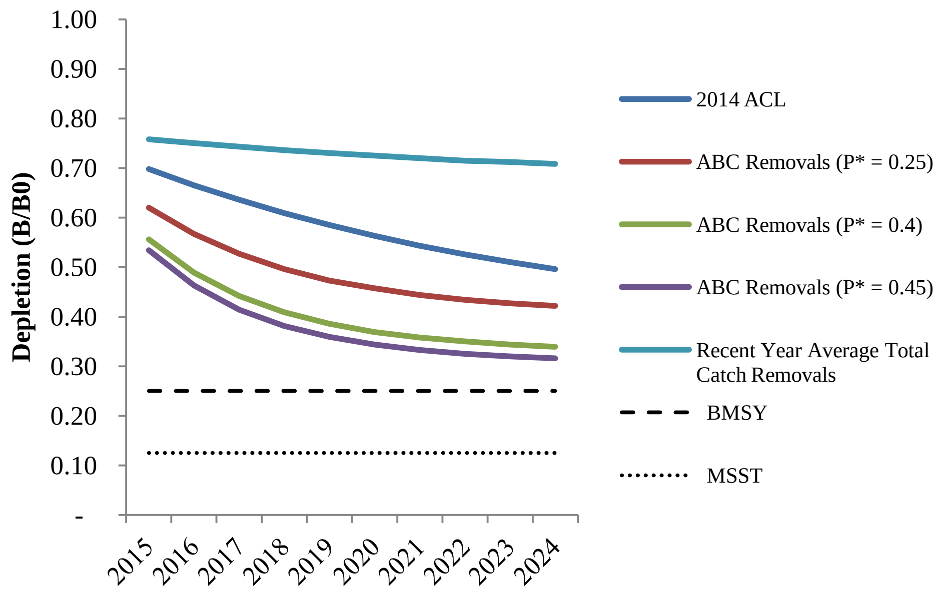


Figure 4-1. Projected depletion under alternative catch streams under the base case state of nature model for arrowtooth flounder.

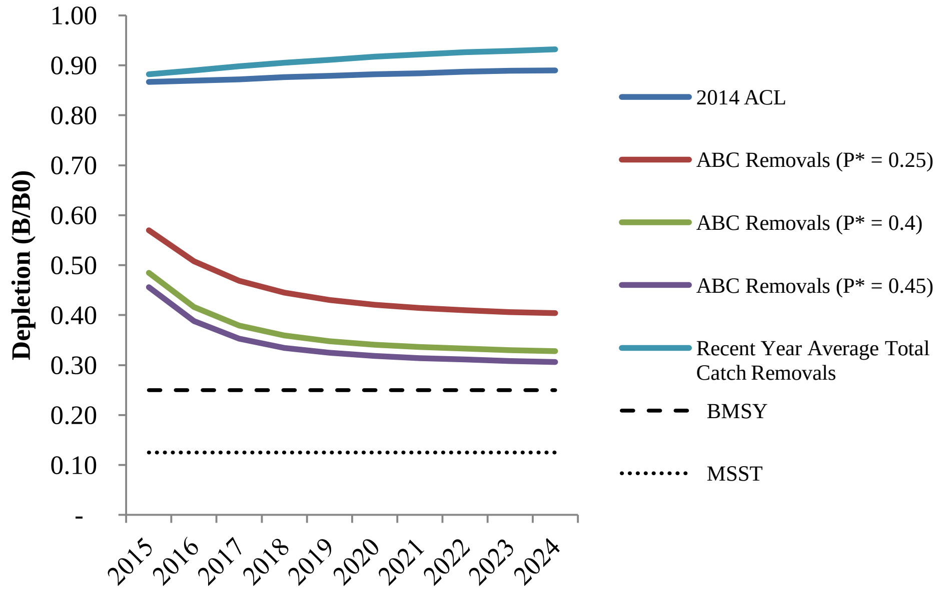


Figure 4-2. Projected depletion under alternative catch streams under the high state of nature model for arrowtooth flounder.

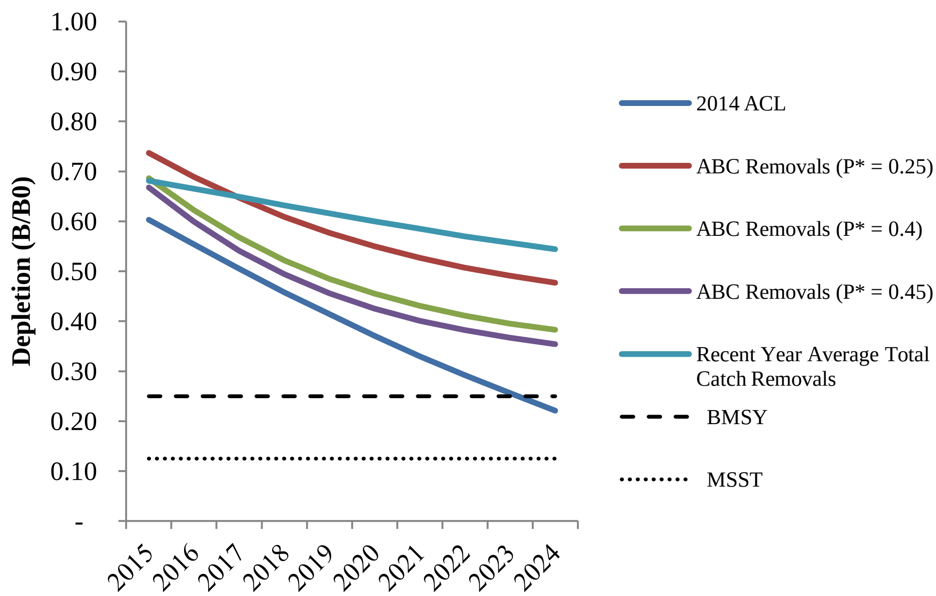


Figure 4-3. Projected depletion under alternative catch streams under the low state of nature model for arrowtooth flounder.

4.8.1.2 Dover Sole

The modeled catch scenarios for Dover sole range from 7,551 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 91,249 mt based on the ACL = ABC with a

P* of 0.45 catch scenario under the high state of nature (Table 4-2). Projected Dover sole depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-4, Figure 4-5, and Figure 4-6). While the preferred Dover sole alternative of a 50,000 mt constant catch has not been projected or modeled in this long term analysis, the total removals and biomass trajectory assuming full attainment of the ACL in the next ten years is very similar to the Alternative 2 scenario (ABC Removals using a P* of 0.25) under the base case model in Figure 4-4.

Table 4-2. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for Dover sole.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	25,000
	ABC Removals (P* = 0.25; Alt. 2)	50,630
	ABC Removals (P* = 0.45; Alt. 1)	56,611
	Recent Year Average Total Catch Removals	7,551
High	2014 ACL	25,000
	ABC Removals (P* = 0.25)	81,641
	ABC Removals (P* = 0.45)	91,249
	Recent Year Average Total Catch Removals	7,551
Low	2014 ACL	25,000
	ABC Removals (P* = 0.25)	34,880
	ABC Removals (P* = 0.45)	39,069
	Recent Year Average Total Catch Removals	7,551

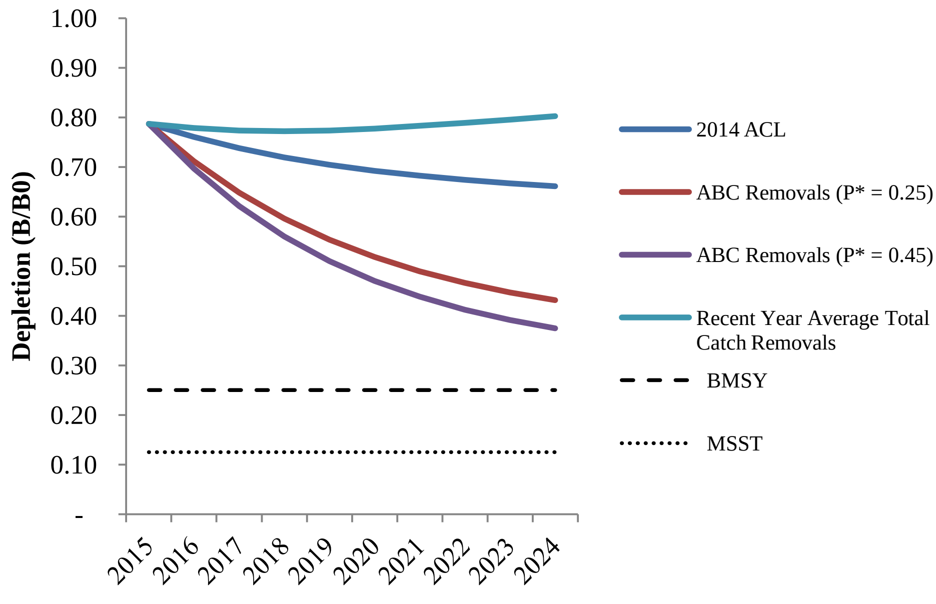


Figure 4-4. Projected depletion under alternative catch streams under the base case state of nature model for Dover sole.

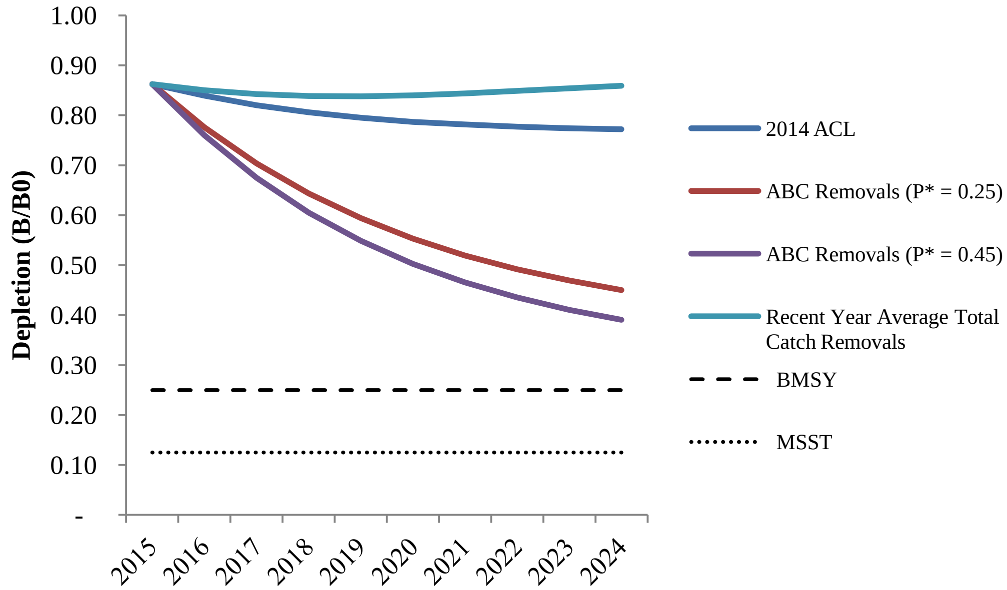


Figure 4-5. Projected depletion under alternative catch streams under the high state of nature model for Dover sole.

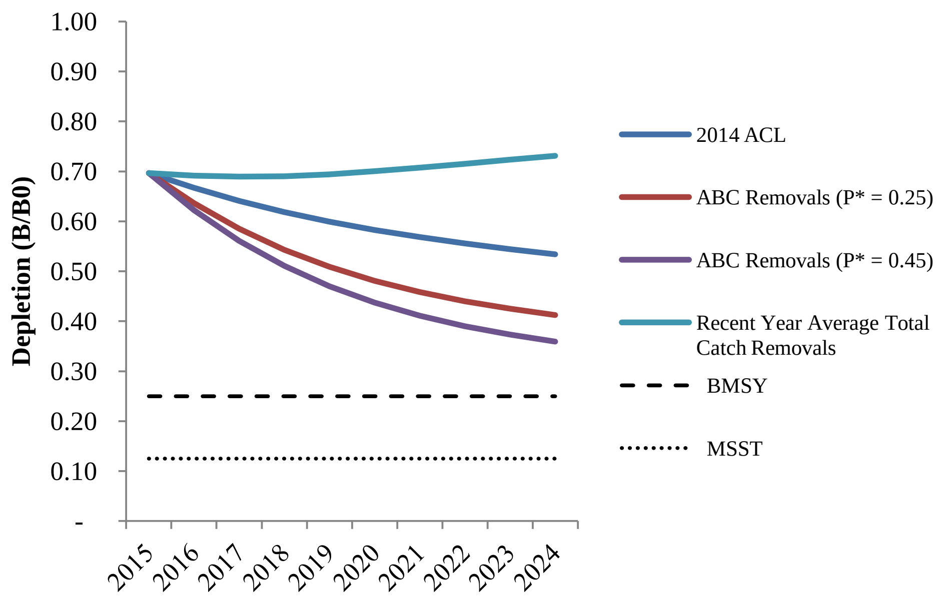


Figure 4-6. Projected depletion under alternative catch streams under the low state of nature model for Dover sole.

4.8.1.3 English Sole

The modeled catch scenarios for English sole range from 207 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 7,461 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-3). Projected English sole depletions under all catch scenarios and states of nature are predicted to be sustainable, except maintaining the 2014 ACL is predicted to drive the stock down below the B_{MSY} target into the precautionary zone under the base case and low state of nature models (Figure 4-7, Figure 4-8, and Figure 4-9).

Table 4-3. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for English sole.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	5,645
	ABC Removals (P* = 0.25; Alt. 2)	4,423
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	5,479
	Recent Year Average Total Catch Removals	207
High	2014 ACL	5,645
	ABC Removals (P* = 0.25)	6,011
	ABC Removals (P* = 0.45)	7,461
	Recent Year Average Total Catch Removals	207
Low	2014 ACL	5,645
	ABC Removals (P* = 0.25)	3,585
	ABC Removals (P* = 0.45)	4,447
	Recent Year Average Total Catch Removals	207

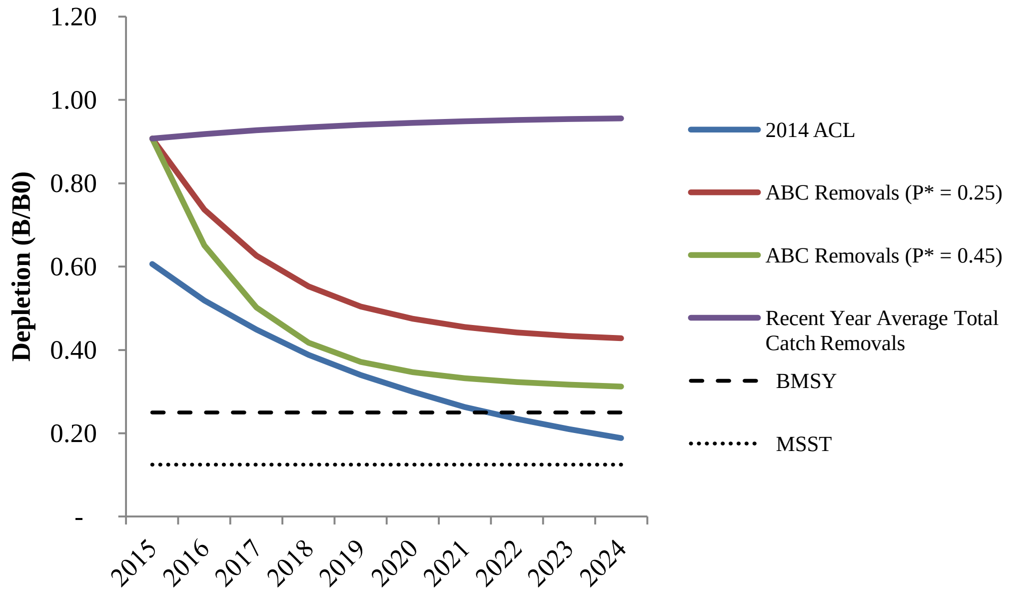


Figure 4-7. Projected depletion under alternative catch streams under the base case state of nature model for English sole.

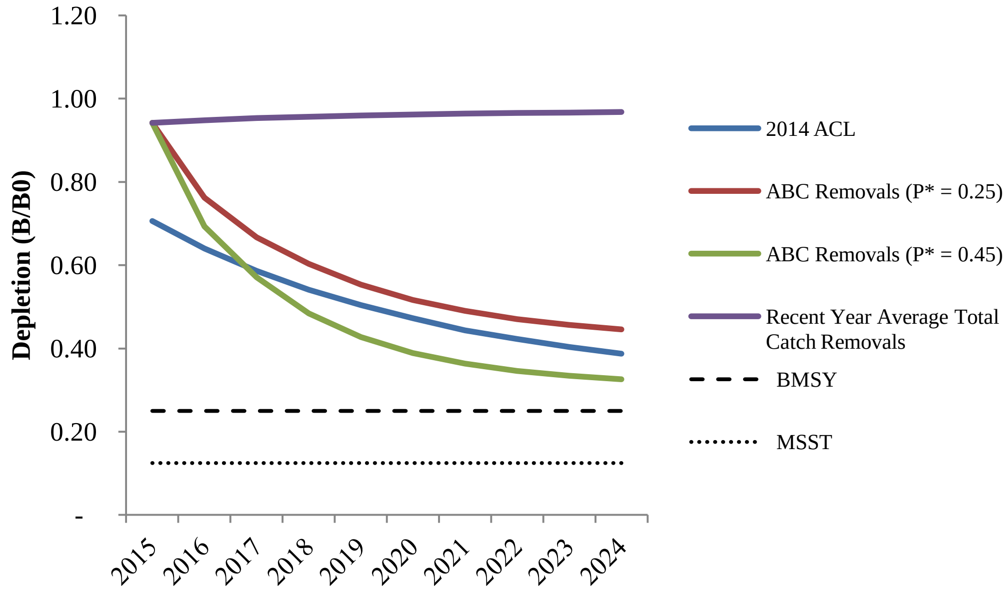


Figure 4-8. Projected depletion under alternative catch streams under the high state of nature model for English sole.

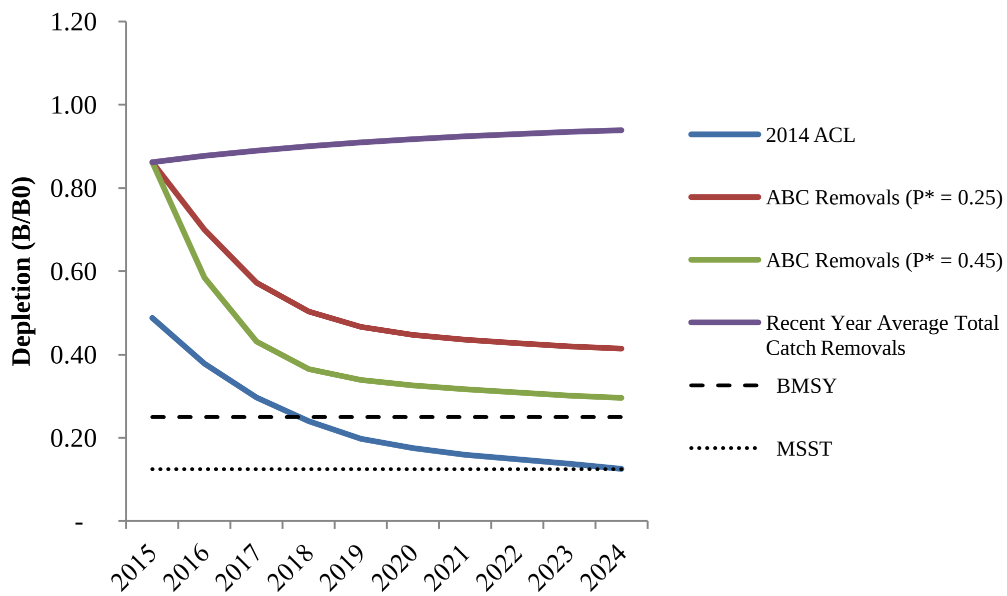


Figure 4-9. Projected depletion under alternative catch streams under the low state of nature model for English sole.

4.8.1.4 Petrale Sole

The modeled catch scenarios for petrale sole range from 939 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 3,170 mt based on the ACL = ABC with a P* of 0.45

catch scenario under the high state of nature (Table 4-4). Projected petrale sole depletions under all states of nature are sustainable assuming the respective states of nature, except the stock is estimated to be less than the target B_{MSY} depletion level in the beginning of the projection period under the base case and low state of nature models (Figure 4-10, Figure 4-11, and Figure 4-12).

Table 4-4. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for petrale sole.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.) ABC Removals (P* = 0.25; Alt. 2) ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.) Recent Year Average Total Catch Removals	2,652 2,522 2,771 939
High	2014 ACL ABC Removals (P* = 0.25) ABC Removals (P* = 0.45) Recent Year Average Total Catch Removals	2,652 2,919 3,170 939
Low	2014 ACL ABC Removals (P* = 0.25) ABC Removals (P* = 0.45) Recent Year Average Total Catch Removals	2,652 2,191 2,439 939

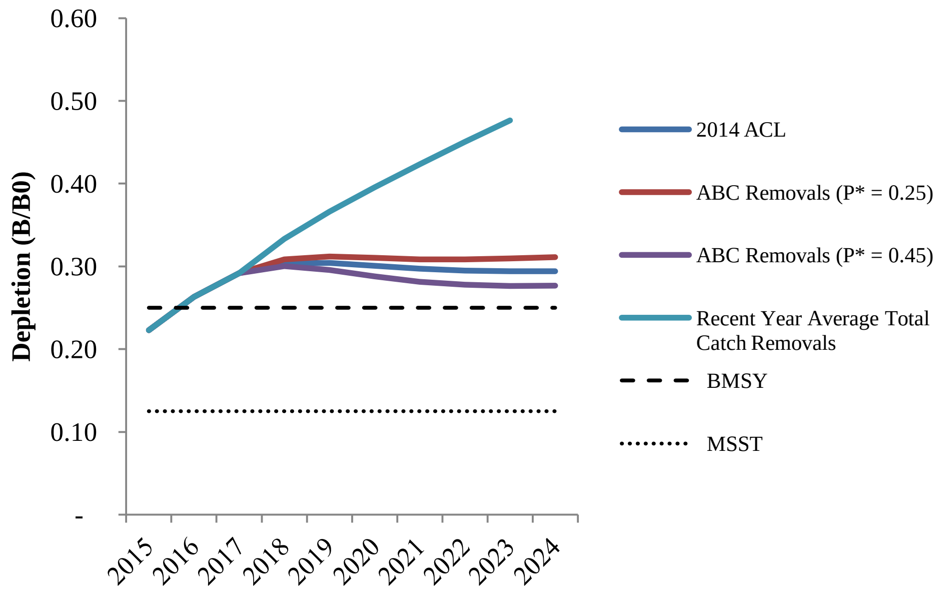


Figure 4-10. Projected depletion under alternative catch streams under the base case state of nature model for petrale sole.

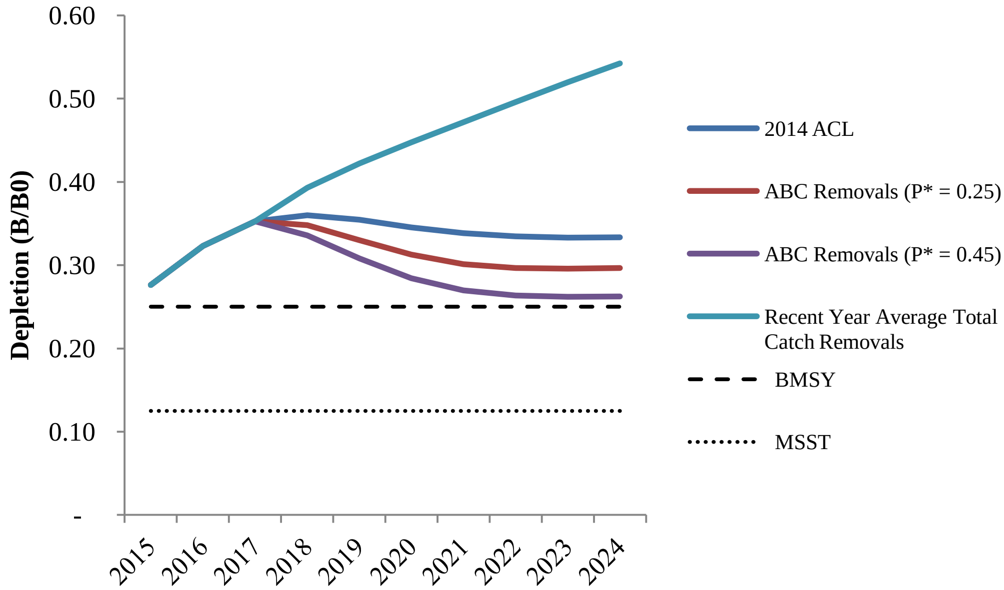


Figure 4-11. Projected depletion under alternative catch streams under the high state of nature model for petrale sole.

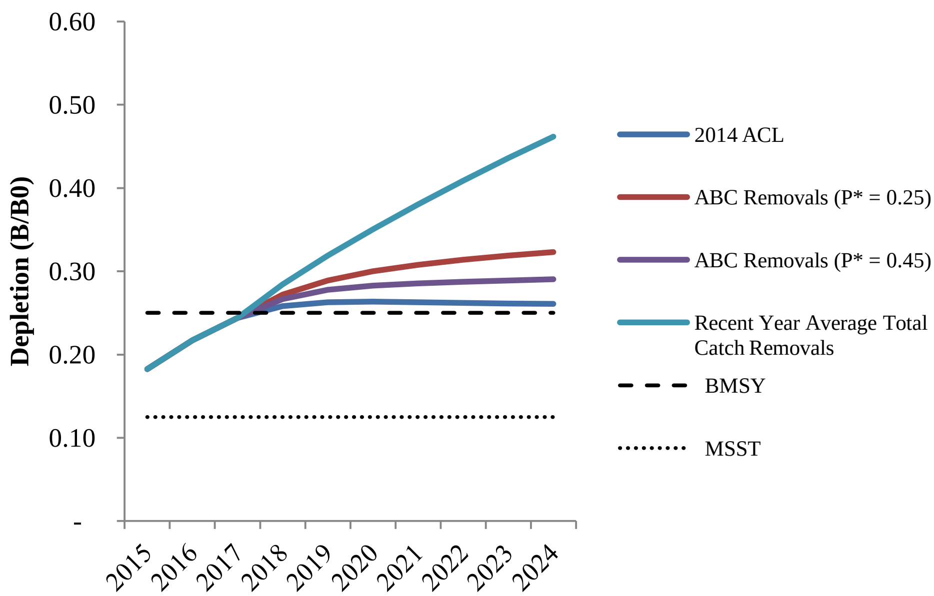


Figure 4-12. Projected depletion under alternative catch streams under the low state of nature model for petrale sole.

4.8.2 Long Term Impacts of Assessed Nearshore Rockfish Species

Of the assessed nearshore rockfish species, long term projections were not provided in time for brown, China, and copper rockfish nor for California scorpionfish. Nearshore rockfish are dominant in the non-trawl fisheries (both commercial and recreational) and therefore have a higher catch monitoring uncertainty than trawl-dominant species. The assessments are also generally more uncertain since there are no fishery-independent indices of abundance (i.e., no nearshore surveys) informing abundance trends. Most nearshore rockfish assessments rely on fishery CPUE indices and the fisheries compositional data (i.e., age and length data from sampled fisheries) to inform stock status and dynamics. Therefore, there is considerably more uncertainty in the long term projections for nearshore rockfish than for the other species analyzed in this EIS.

4.8.2.1 Black Rockfish in California and Oregon

The modeled catch scenarios for southern black rockfish off California and Oregon range from 554 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 2,032 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-5). Projected southern black rockfish depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-13, Figure 4-14, and Figure 4-15). Note the default harvest control rule of 1,000 mt/year cannot be accommodated under the low state of nature due to a lack of exploitable biomass at that level of harvest (Table 4-5 and Figure 4-15).

Table 4-5. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for black rockfish in California and Oregon.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	1,044
	ABC Removals (P* = 0.45; Alt. 1)	1,220
	ACL Removals (1,000 mt constant catch; No Action Alt.; Pref. Alt.)	1,000
	Recent Year Average Total Catch Removals	554
High	ABC Removals (P* = 0.25)	1,739
	ABC Removals (P* = 0.45)	2,032
	ACL Removals (1,000 mt constant catch)	1,000
	Recent Year Average Total Catch Removals	554
Low	ABC Removals (P* = 0.25)	715
	ABC Removals (P* = 0.45)	836
	Recent Year Average Total Catch Removals	554

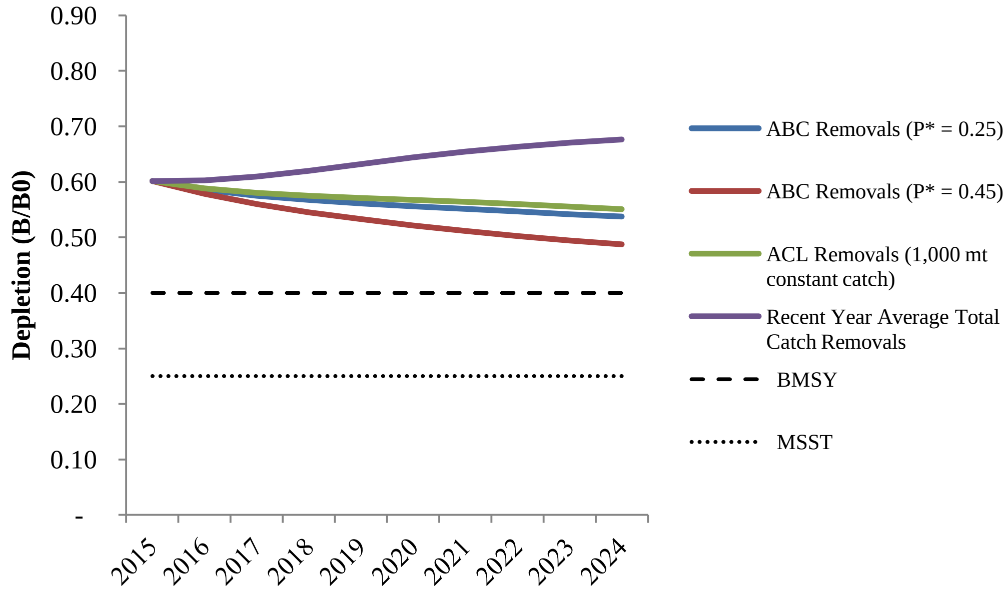


Figure 4-13. Projected depletion under alternative catch streams under the base case state of nature model for black rockfish in California and Oregon.

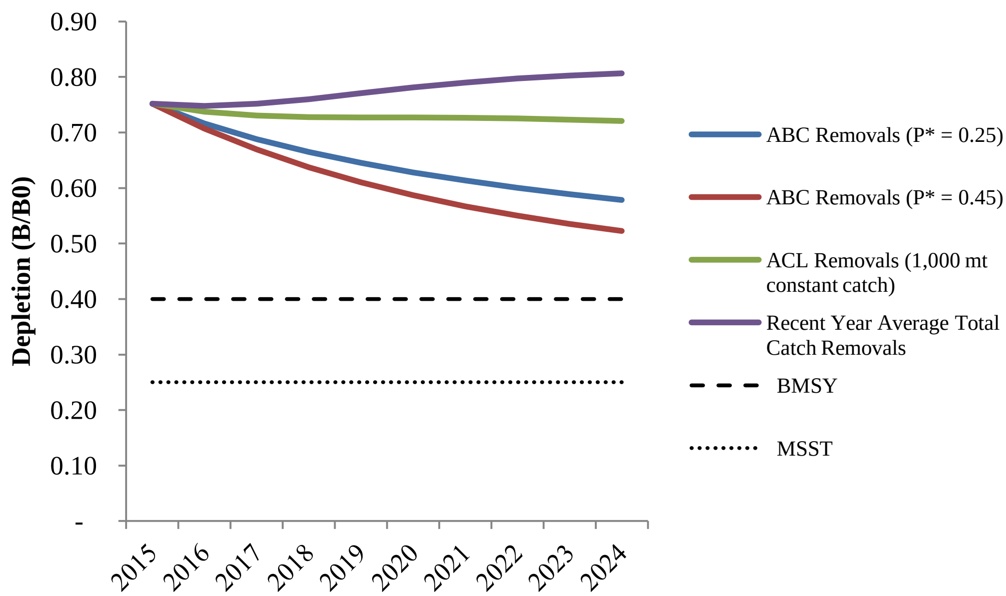


Figure 4-14. Projected depletion under alternative catch streams under the high state of nature model for black rockfish in California and Oregon.

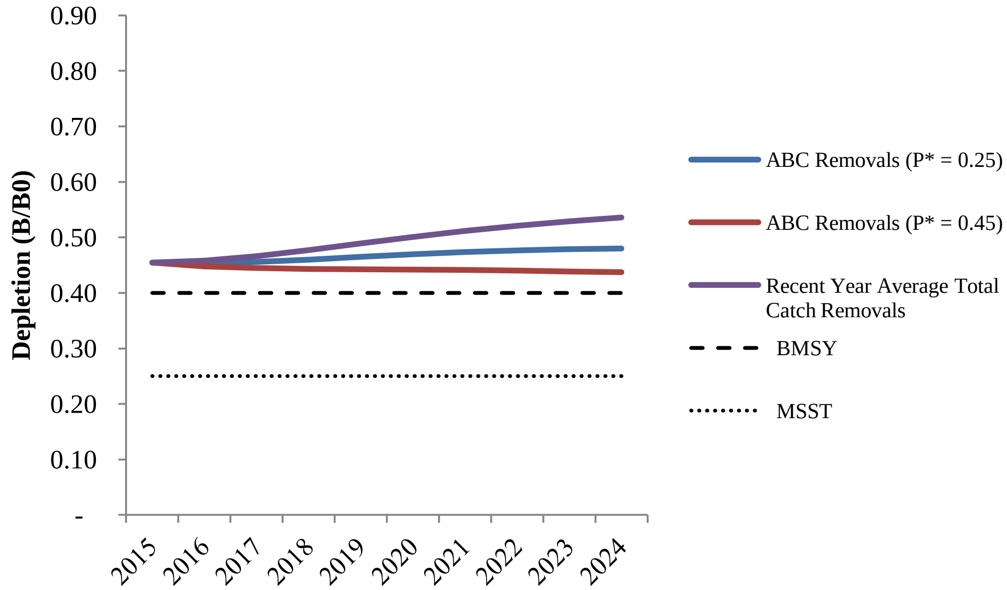


Figure 4-15. Projected depletion under alternative catch streams under the low state of nature model for black rockfish in California and Oregon.

4.8.2.2 Black Rockfish in Washington

The modeled catch scenarios for northern black rockfish off Washington range from 134 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 592 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-6). Projected northern black rockfish depletions under the base case and high states of nature are sustainable assuming the respective states of nature (Figure 4-16 and Figure 4-17). All of these catch scenarios are under the B_{MSY} target under the low state of nature (Figure 4-18). The stock is estimated to be currently overfished under the low state of nature but projected to increase in abundance under all the catch scenarios except the constant catch of the 2014 ACL, which drives the stock to a lower abundance during the projection period (Figure 4-18).

Table 4-6. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for black rockfish in Washington.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	409
	ABC Removals (P* = 0.25; Alt. 2)	325
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	381
	ACL Removals (40-10 rule)	395
	Recent Year Average Total Catch Removals	219
High	2014 ACL	409
	ABC Removals (P* = 0.25)	488
	ABC Removals (P* = 0.45)	572
	ACL Removals (40-10 rule)	592
	Recent Year Average Total Catch Removals	219
Low	2014 ACL	409
	ABC Removals (P* = 0.25)	134
	ABC Removals (P* = 0.45)	155
	ACL Removals (40-10 rule)	160
	Recent Year Average Total Catch Removals	219

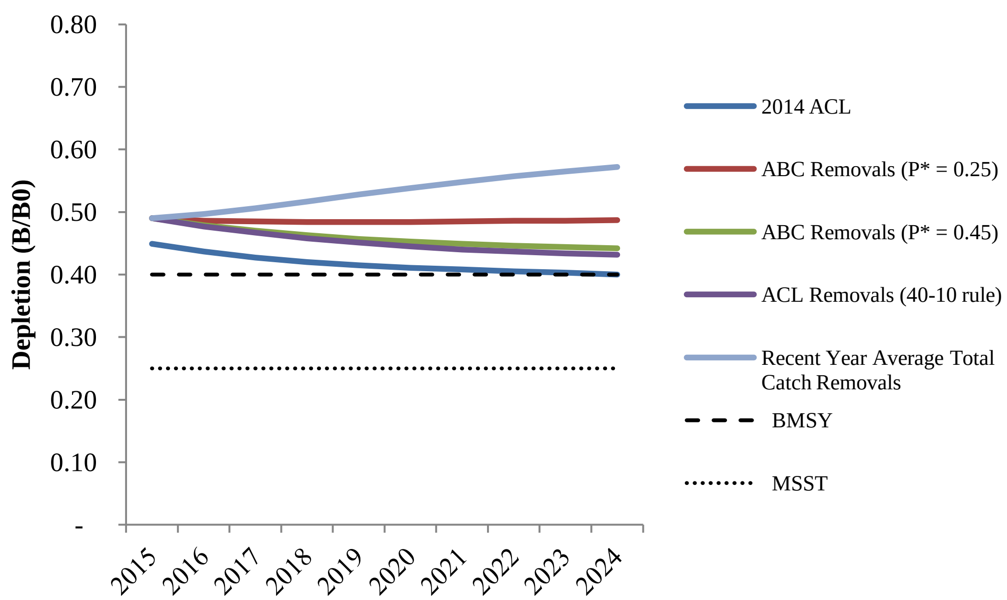


Figure 4-16. Projected depletion under alternative catch streams under the base case state of nature model for black rockfish in Washington.

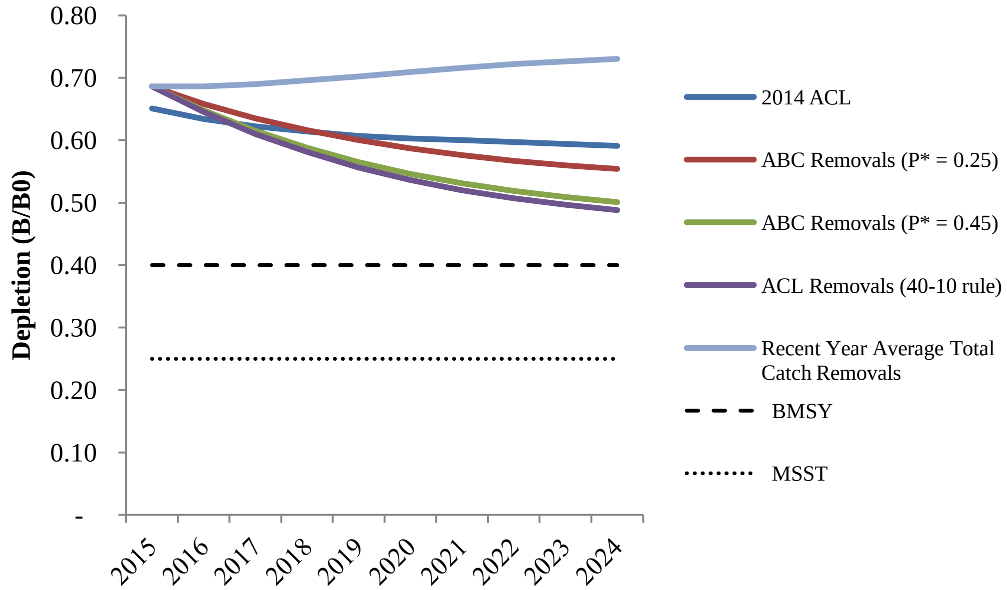


Figure 4-17. Projected depletion under alternative catch streams under the high state of nature model for black rockfish in Washington.

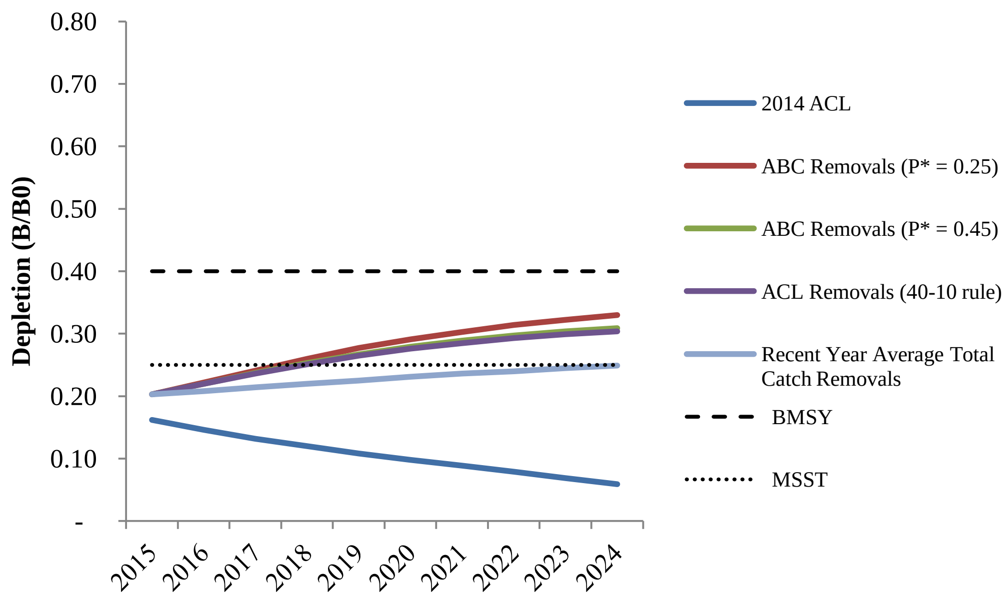


Figure 4-18. Projected depletion under alternative catch streams under the low state of nature model for black rockfish in Washington.

4.8.2.3 Gopher Rockfish South of 40º10’ N lat.

The average annual catch of gopher rockfish in 2015-2024 varies between 77 mt (the ABC removals using a P* of 0.25 for the low state of nature) to 229 mt (the 2014 ACL) (Table 4-7). The 2014 gopher

ACL contribution projected forward is not predicted to be sustainable under any of the states of nature and is predicted to drive the stock to an overfished condition under the base case and low state of nature models (Figure 4-19, Figure 4-20, and Figure 4-21). However, all the other catch scenarios are predicted to be sustainable under all the states of nature. The most likely projection is the recent year average total catch removals under the base case since access to gopher rockfish will likely be constrained by limits imposed on the entire Southern Nearshore Rockfish complex.

Table 4-7. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for gopher rockfish south of 40º10’ N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	229
	ABC Removals (P* = 0.25; Alt. 2)	139
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	156
	Recent Year Average Total Catch Removals	81
High	2014 ACL	229
	ABC Removals (P* = 0.25)	170
	ABC Removals (P* = 0.45)	191
	Recent Year Average Total Catch Removals	81
Low	2014 ACL	229
	ABC Removals (P* = 0.25)	77
	ABC Removals (P* = 0.45)	86
	Recent Year Average Total Catch Removals	81

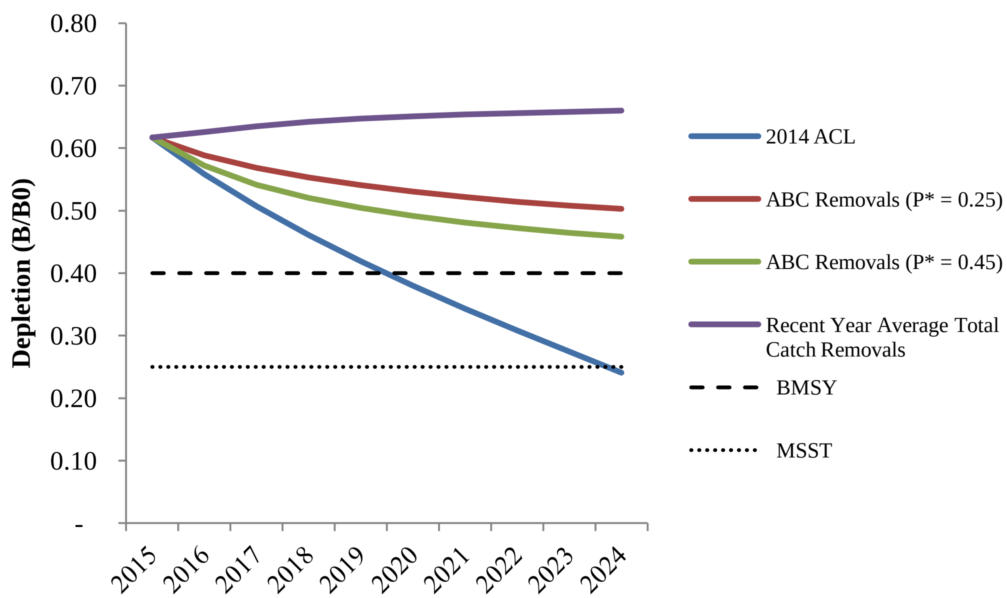


Figure 4-19. Projected depletion under alternative catch streams under the base case state of nature model for gopher rockfish south of 40º10’ N lat.

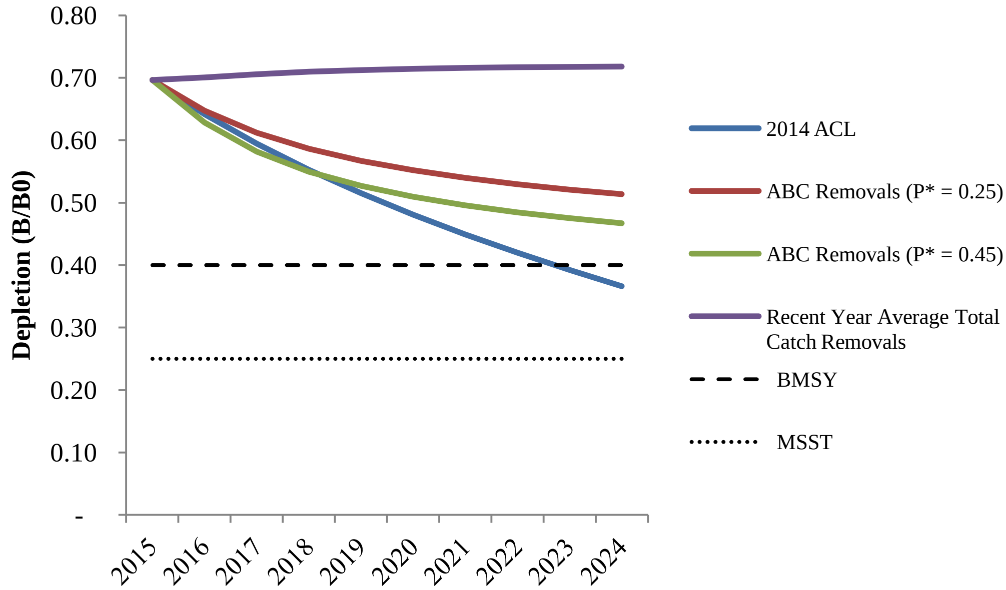


Figure 4-20. Projected depletion under alternative catch streams under the high state of nature model for gopher rockfish south of 40º10' N lat.

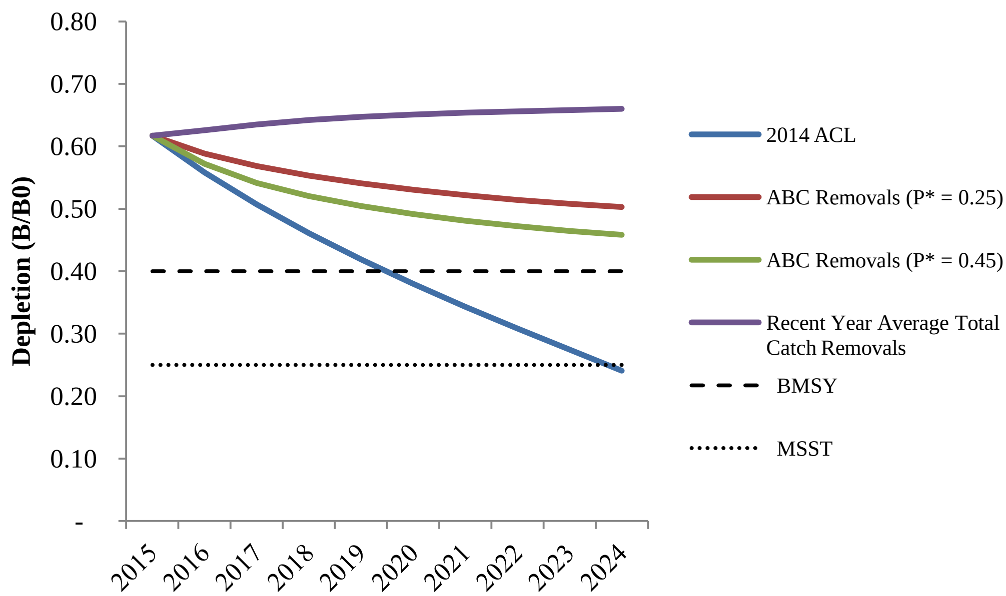


Figure 4-21. Projected depletion under alternative catch streams under the low state of nature model for gopher rockfish south of 40º10' N lat.

4.8.3 Long Term Impacts of Assessed Shelf Rockfish Species

Of the assessed shelf rockfish species, only the greenspotted rockfish projections were not provided in time for this analysis. Shelf rockfish are caught by both the trawl and fixed gear sectors, although there is some variation between species on their relative selectivities to different gears. For instance, greenstriped rockfish, while not targeted in any fishery, tend to be more readily caught in trawl gears than fixed gears. Catch monitoring precision therefore varies by species based on their relative gear selectivity with more certain catch estimation for those species dominant to the trawl fishery given the 100% observer coverage for those fleets. Current overfishing risks are low for shelf rockfish in general and have been since implementation of RCAs over ten years ago.

4.8.3.1 Bocaccio South of 40º10’ N lat.

The modeled catch scenarios for bocaccio south of 40º10’ N lat. range from 150 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,431 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-8). Projected bocaccio depletions under the base case and high states of nature are sustainable assuming the respective states of nature (Figure 4-22 and Figure 4-23). All of these catch scenarios are in the precautionary zone under the B_{MSY} target at the beginning of the projection period under the low state of nature (Figure 4-24). The stock is estimated to undergo rebuilding under the low state of nature with all catch scenarios. All catch scenarios under the low state of nature except the ABC removals (under both P*s of 0.45 and 0.25) are predicted to be over the B_{MSY} target by the end of the projection period (Figure 4-24).

Table 4-8. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for bocaccio south of 40º10’ N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	338
	ABC Removals (P* = 0.25; Alt. 2)	1,127
	ABC Removals (P* = 0.45; Alt. 1)	1,314
	Recent Year Average Total Catch Removals	150
	ACL Removals (SPR = 77.7%; Pref. Alt.)	563
High	2014 ACL	338
	ABC Removals (P* = 0.25)	1,225
	ABC Removals (P* = 0.45)	1,431
	Recent Year Average Total Catch Removals	150
	ACL Removals (SPR = 77.7%)	609
Low	2014 ACL	338
	ABC Removals (P* = 0.25)	729
	ABC Removals (P* = 0.45)	839
	Recent Year Average Total Catch Removals	150
	ACL Removals (SPR = 77.7%)	383

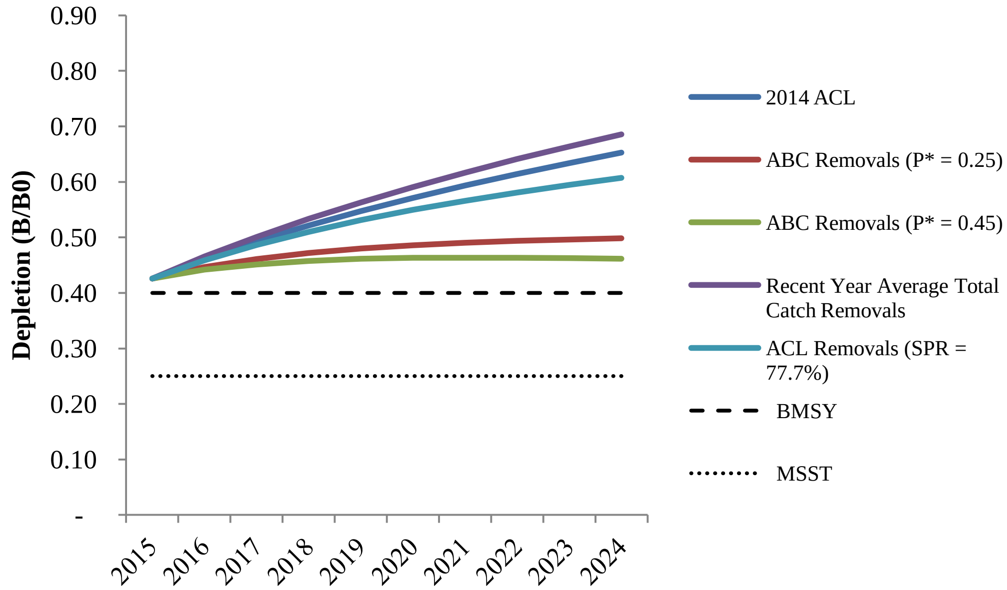


Figure 4-22. Projected depletion under alternative catch streams under the base case state of nature model for bocaccio south of 40º10’ N lat.

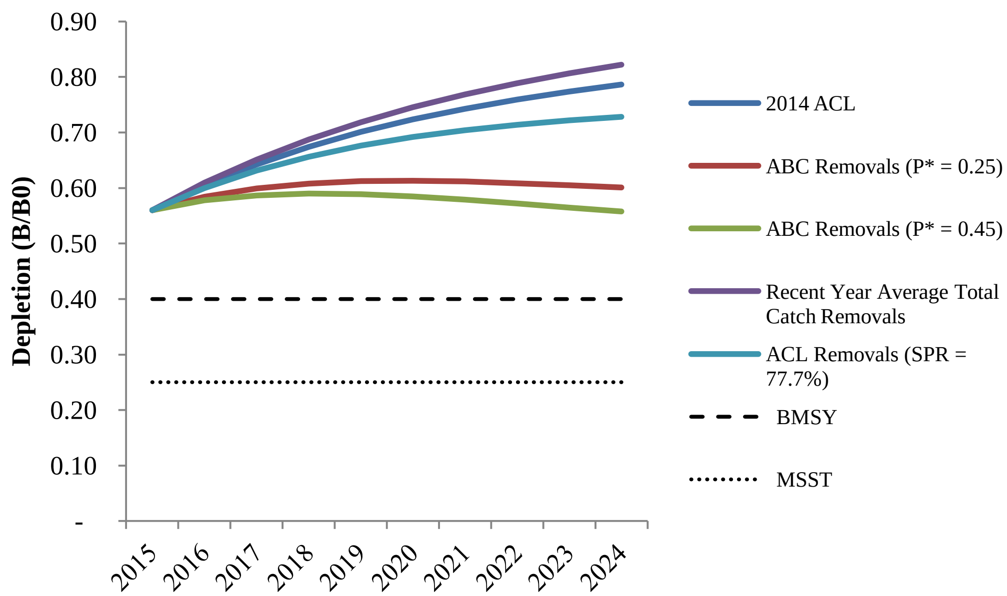


Figure 4-23. Projected depletion under alternative catch streams under the high state of nature model for bocaccio south of 40º10’ N lat.

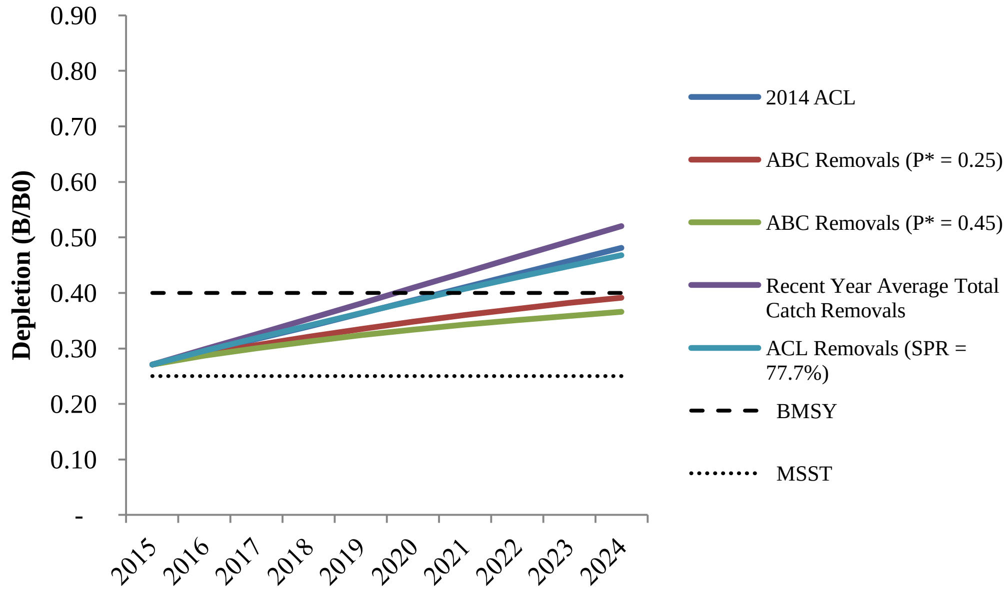


Figure 4-24. Projected depletion under alternative catch streams under the low state of nature model for bocaccio south of 40º10' N lat.

4.8.3.2 Canary Rockfish

The modeled catch scenarios for canary rockfish range from 47 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,337 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-9). Projected canary rockfish depletions for all catch scenarios under the base case state of nature are shown to be in the precautionary zone and are predicted to rebuild but not by the end of the projection period (Figure 4-25). Projected canary depletions for all catch scenarios under the high state of nature are sustainable (Figure 4-26). Projected canary depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-27).

Table 4-9. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for canary rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	119
	ABC Removals (P* = 0.25; Alt. 2)	556
	ABC Removals (P* = 0.45; Alt. 1)	652
	ACL Removals (SPR = 88.7%; Pref. Alt.)	145
	Recent Year Average Total Catch Removals	47
High	2014 ACL	119
	ABC Removals (P* = 0.25)	1,130
	ABC Removals (P* = 0.45)	1,337
	ACL Removals (SPR = 88.7%)	248
	Recent Year Average Total Catch Removals	47
Low	2014 ACL	119
	ACL Removals (SPR = 88.7%)	38
	Recent Year Average Total Catch Removals	47

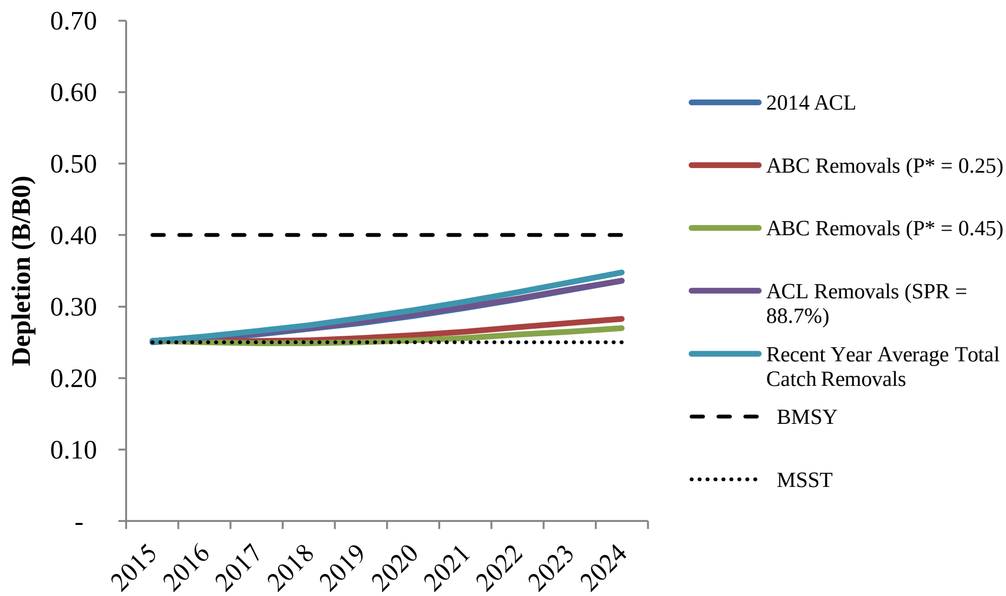


Figure 4-25. Projected depletion under alternative catch streams under the base case state of nature model for canary rockfish.

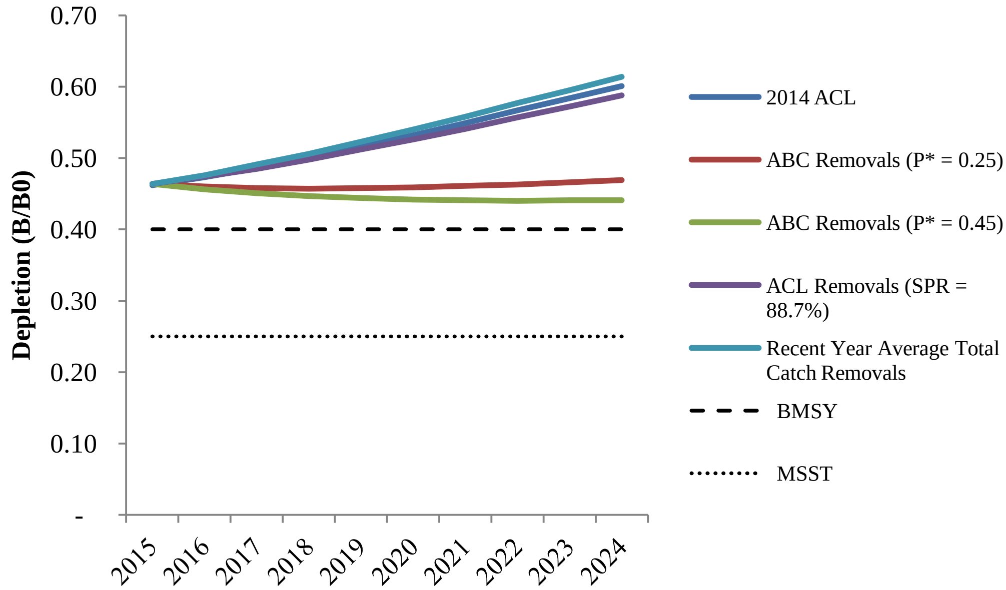


Figure 4-26. Projected depletion under alternative catch streams under the high state of nature model for canary rockfish.

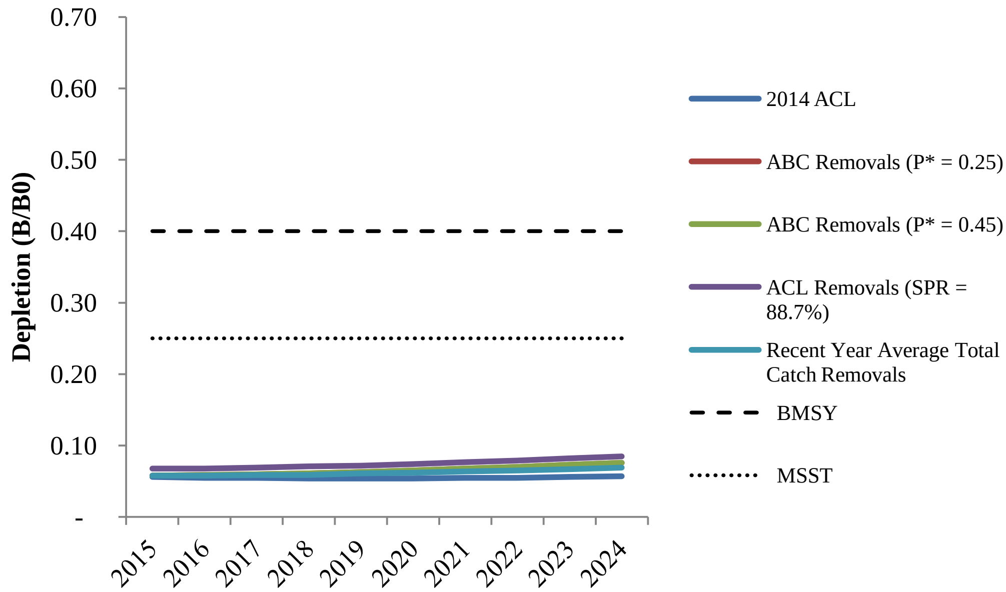


Figure 4-27. Projected depletion under alternative catch streams under the low state of nature model for canary rockfish.

4.8.3.3 Chilipepper Rockfish

The modeled catch scenarios for chilipepper range from 330 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 2,252 mt based on the ACL = ABC with a P* of 0.45

catch scenario under the high state of nature (Table 4-10). Projected chilipepper depletions under all states of nature are sustainable during the projection period assuming the respective states of nature except for the ABC removals at a P* of 0.45 under the low state of nature, which causes the stock to drop below the B_{MSY} threshold into the precautionary zone (Figure 4-28, Figure 4-29, and Figure 4-30).

Table 4-10. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for chilipepper rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	1,618
	ABC Removals (P* = 0.25; Alt. 2)	1,922
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	2,216
	Recent Year Average Total Catch Removals	330
High	2014 ACL	1,618
	ABC Removals (P* = 0.25)	1,950
	ABC Removals (P* = 0.45)	2,252
	Recent Year Average Total Catch Removals	330
Low	2014 ACL	1,618
	ABC Removals (P* = 0.25)	1,532
	ABC Removals (P* = 0.45)	1,747
	Recent Year Average Total Catch Removals	330

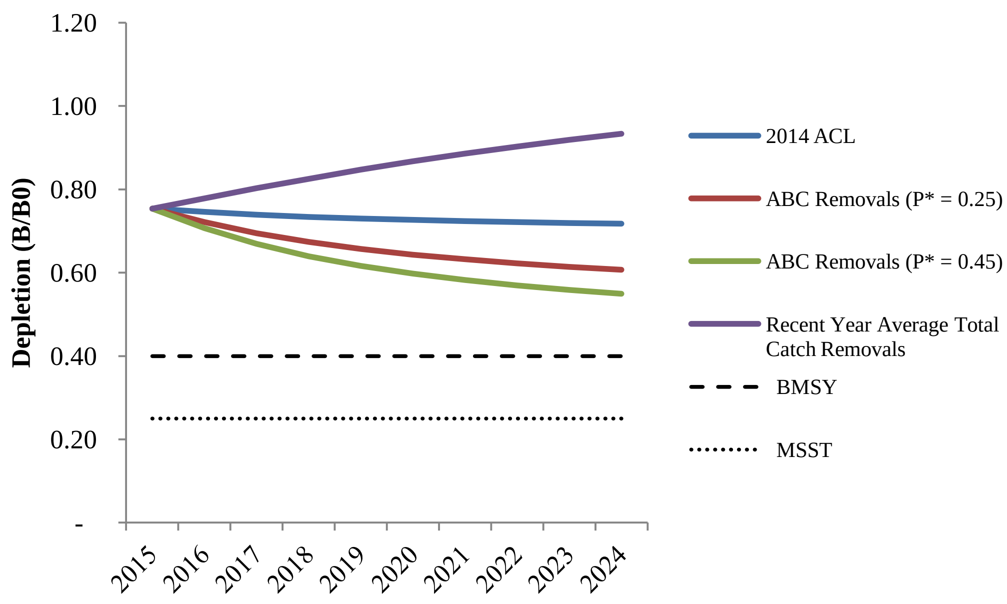


Figure 4-28. Projected depletion under alternative catch streams under the base case state of nature model for chilipepper rockfish.

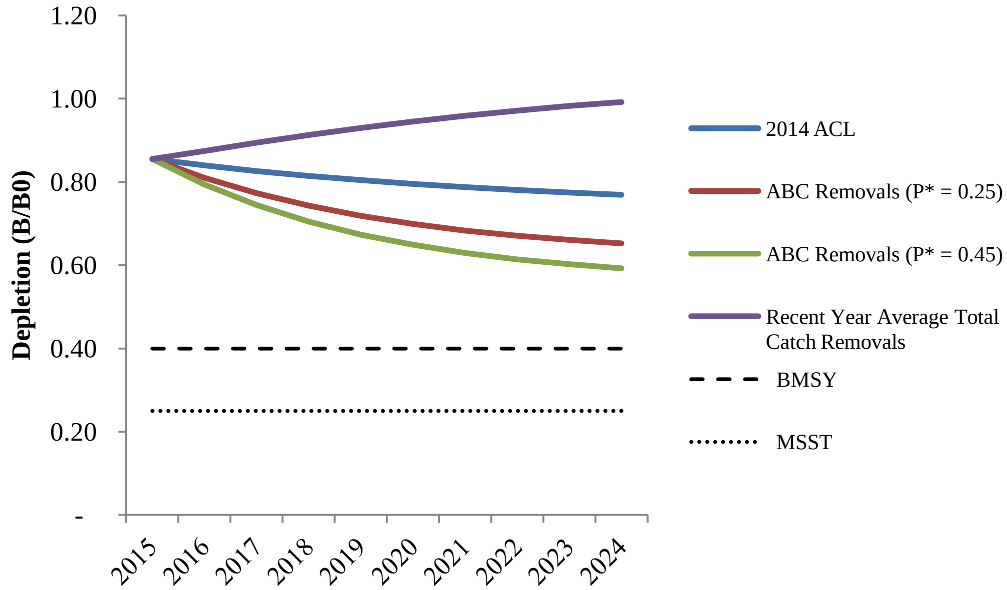


Figure 4-29. Projected depletion under alternative catch streams under the high state of nature model for chilipepper rockfish.

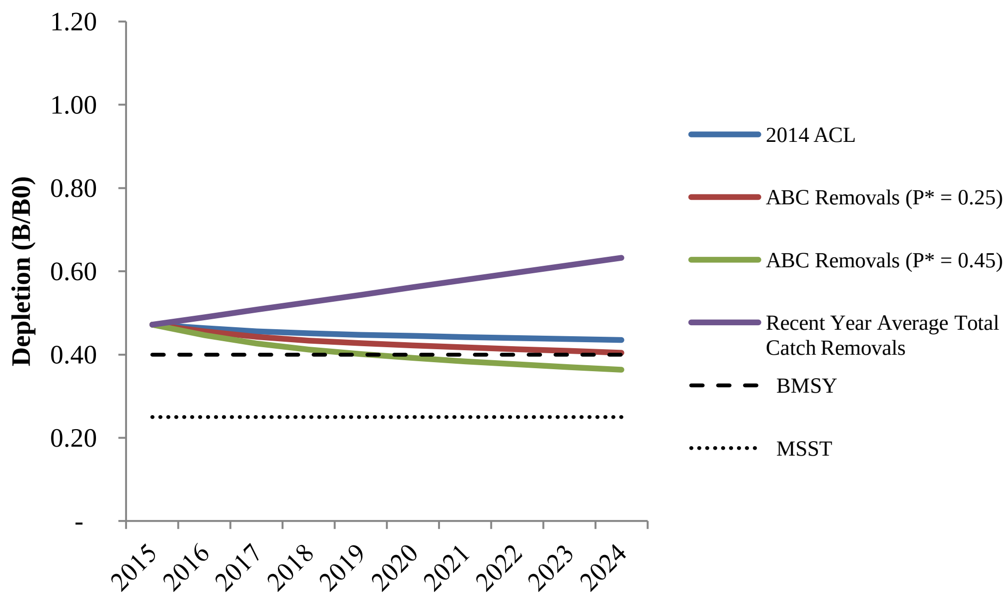


Figure 4-30. Projected depletion under alternative catch streams under the low state of nature model for chilipepper rockfish.

4.8.3.4 Cowcod

While the management unit for the cowcod stock managed under the rebuilding plan is for the population south of 40º10’ N lat., the long term projections analyzed in this section are only for the assessed population south of Pt. Conception at 34º27' N lat. The range of average annual cowcod catch contributions in 2015-2024 from the Southern California Bight across the catch scenarios analyzed and states of nature modeled in the 2013 assessment is 1-93 mt (Table 4-11). The stock is projected to rebuild under the base case scenario for all catch scenarios except the highest one (ACL = ABC using a P* of 0.45), where the biomass trends to a slightly lower depletion (Figure 4-31). All the ABC removal scenarios are predicted to keep the stock in the precautionary zone, while the lower catch scenarios (i.e., 2014 ACL, ACL removal using an SPR rate of 82.7% (or equivalent exploitation fraction[1]), and recent year average total catch removals) are predicted to rebuild the stock within the next ten years. The stock is estimated to be healthy with all catch scenarios being sustainable under the high state of nature (Figure 4-32). In contrast, the estimated depletion under the low state of nature is below the MSST with a slightly increasing trend under all catch scenarios (Figure 4-33). None of the catch scenarios under the low state of nature are predicted to rebuild the stock within ten years, although the lower catch streams up to the ABC removals using a P* of 0.25 are predicted to increase biomass above the MSST within ten years.

Table 4-11. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for cowcod south of 34º27' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2
	ABC Removals (P* = 0.25; Alt. 2)	35
	ABC Removals (P* = 0.4)	46
	ABC Removals (P* = 0.45; Alt. 1)	49
	ACL Removals (SPR = 82.7% in Conception area; Pref. Alt.)	9
	Recent Year Average Total Catch Removals	1
High	2014 ACL	2
	ABC Removals (P* = 0.25)	68
	ABC Removals (P* = 0.4)	86
	ABC Removals (P* = 0.45)	93
	ACL Removals (SPR = 82.7% in Conception area)	12
	Recent Year Average Total Catch Removals	1
Low	2014 ACL	2
	ABC Removals (P* = 0.25)	15
	ABC Removals (P* = 0.4)	21
	ABC Removals (P* = 0.45)	22
	ACL Removals (SPR = 82.7% in Conception area)	6
	Recent Year Average Total Catch Removals	1

[1] The 2013 cowcod assessment was conducted in an XDB-SRA platform which does not accommodate SPR harvest rates. Therefore, the 2013 cowcod rebuilding analysis calculated an equivalent exploitation fraction of allowable harvest/age 11+ biomass to the status quo SPR harvest rate of 82.7% (E = 0.007) to project impacts.

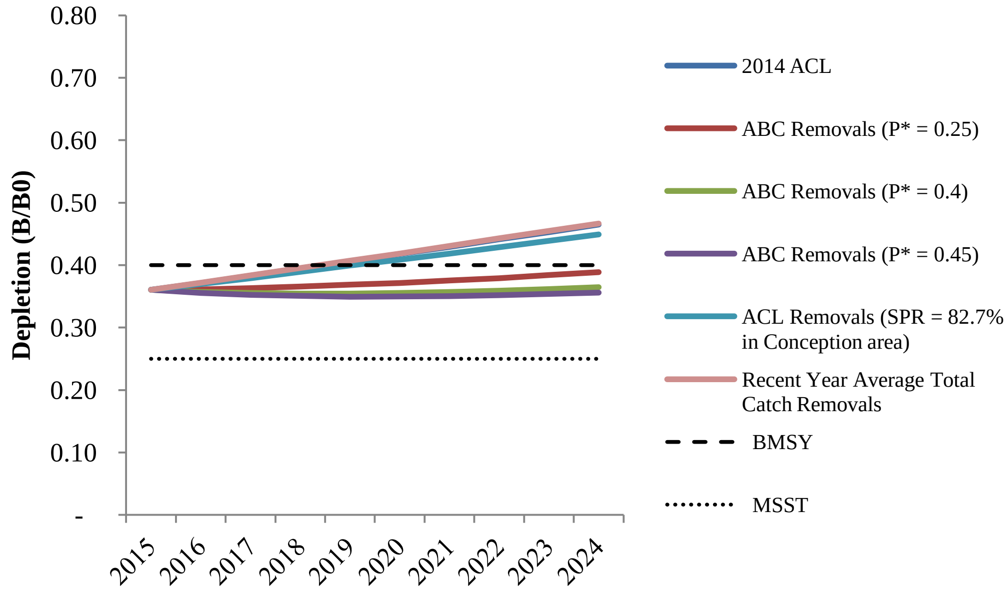


Figure 4-31. Projected depletion under alternative catch streams under the base case state of nature model for cowcod south of 34º27' N lat.

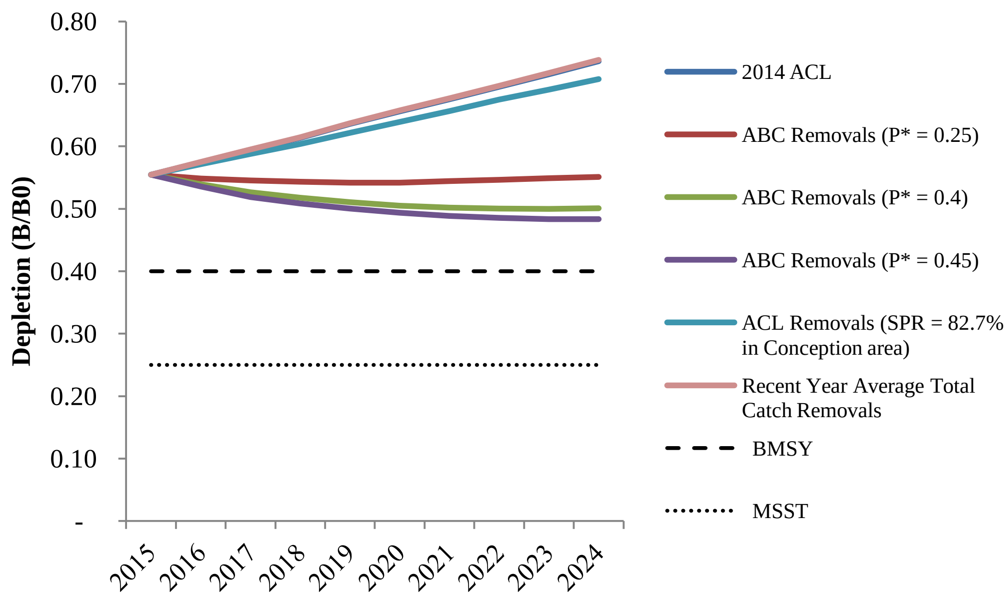


Figure 4-32. Projected depletion under alternative catch streams under the high state of nature model for cowcod south of 34º27' N lat.

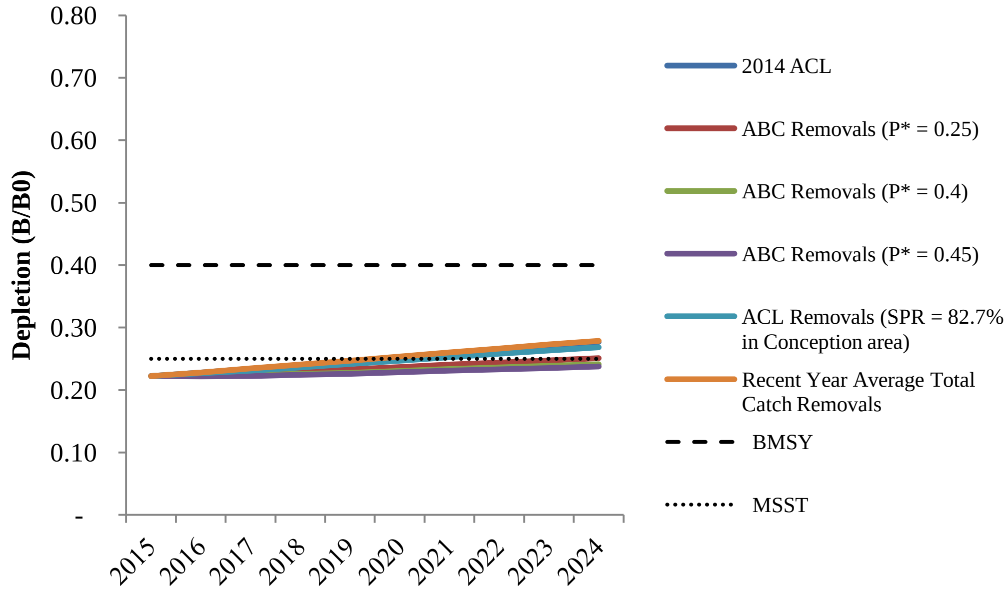


Figure 4-33. Projected depletion under alternative catch streams under the low state of nature model for cowcod south of 34º27' N lat.

4.8.3.5 Greenstriped Rockfish

The modeled catch scenarios for greenstriped rockfish range from 21 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 10,211 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-12). Projected greenstriped depletions under all catch scenarios and states of nature are predicted to be sustainable (Figure 4-34, Figure 4-35, and Figure 4-36). The most likely trajectory for greenstriped is the recent year average total catch scenario under the base case model since greenstriped are not targeted and do not tend to aggregate, which might otherwise cause sporadically high catches.

Table 4-12. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for greenstriped rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	857
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	1,201
	Recent Year Average Total Catch Removals	21
High	ABC Removals (P* = 0.25)	7,365
	ABC Removals (P* = 0.45)	10,211
	Recent Year Average Total Catch Removals	21
Low	ABC Removals (P* = 0.25)	156
	ABC Removals (P* = 0.45)	221
	Recent Year Average Total Catch Removals	21

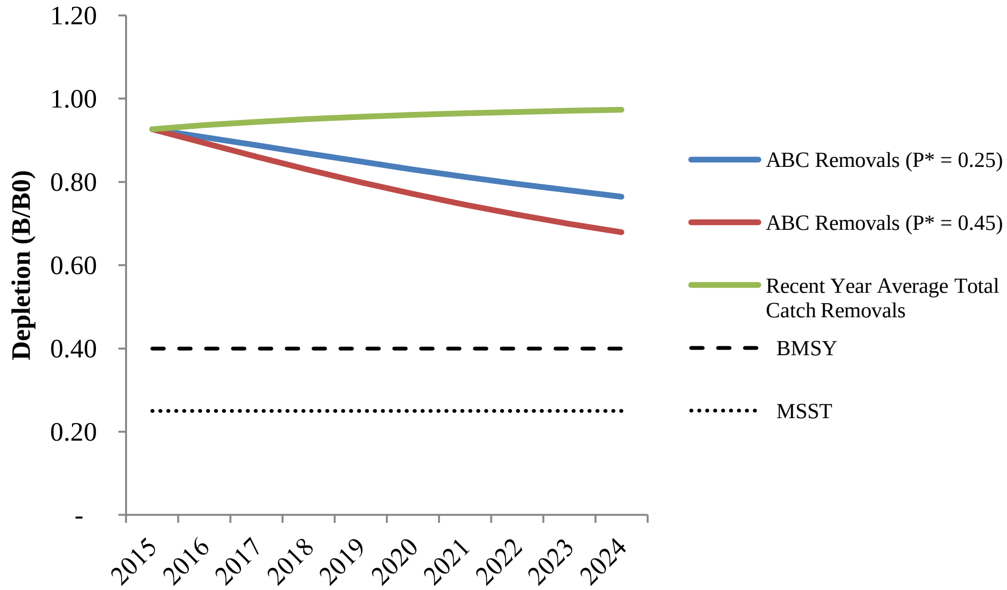


Figure 4-34. Projected depletion under alternative catch streams under the base case state of nature model for greenstriped rockfish.

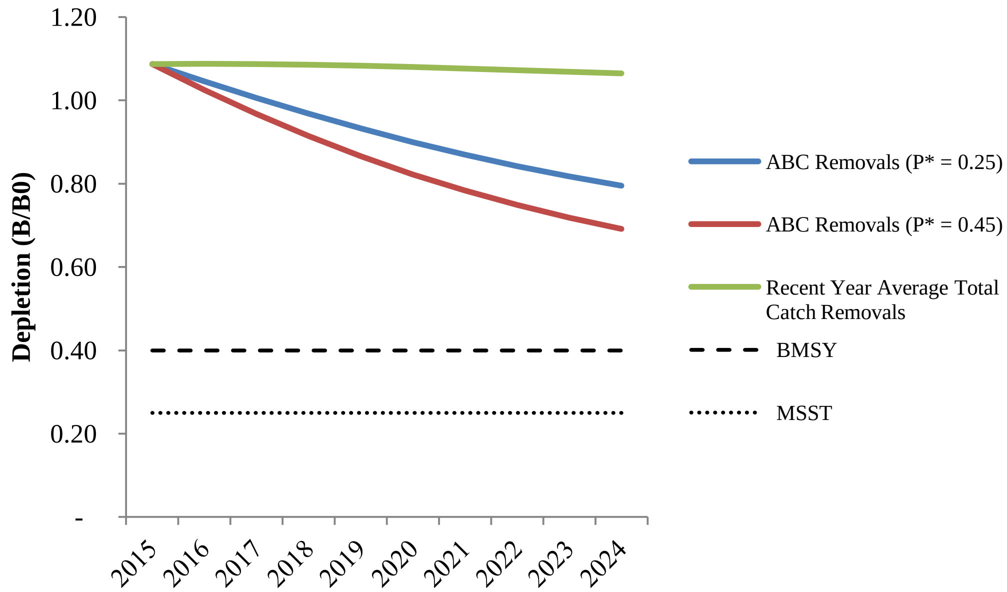


Figure 4-35. Projected depletion under alternative catch streams under the high state of nature model for greenstriped rockfish.

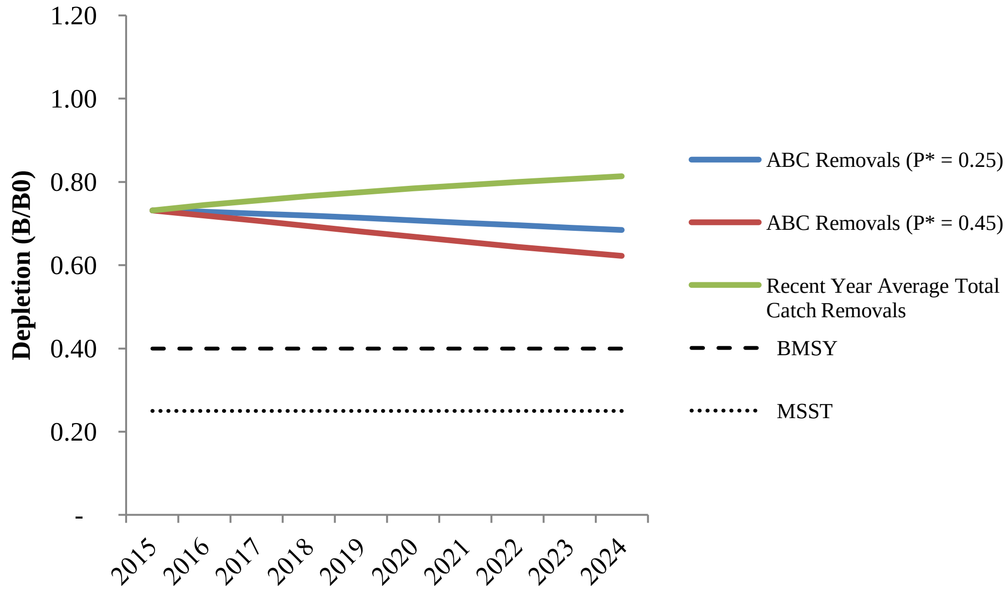


Figure 4-36. Projected depletion under alternative catch streams under the low state of nature model for greenstriped rockfish.

4.8.3.6 Widow Rockfish

The modeled catch scenarios for widow rockfish range from 247 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 4,648 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-13). Projected widow depletions under the base case and high states of nature are sustainable during the projection period assuming the respective states of nature (Figure 4-37 and Figure 4-38). Projected widow depletions under the low state of nature keeps the stock in the precautionary zone during the projection period (Figure 4-39). All the catch scenarios except the 3,000 mt constant catch scenario under the low state of nature predict some stock rebuilding. The 3,000 mt constant catch scenario under the low state of nature is predicted to reach an asymptote at the MSST during the projection period (Figure 4-39).

Table 4-13. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for widow rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	3,709
	ABC Removals (P* = 0.45; Alt. 1)	4,402
	Recent Year Average Total Catch Removals	247
	ACL Removals (1,500 mt constant catch; No Action Alt.)	1,500
	ACL Removals (3,000 mt constant catch)	3,000
High	ABC Removals (P* = 0.25)	3,915
	ABC Removals (P* = 0.45)	4,648
	Recent Year Average Total Catch Removals	247
	ACL Removals (1,500 mt constant catch)	1,500
	ACL Removals (3,000 mt constant catch)	3,000
Low	ABC Removals (P* = 0.25)	2,131
	ABC Removals (P* = 0.45)	2,493
	Recent Year Average Total Catch Removals	247
	ACL Removals (1,500 mt constant catch)	1,500
	ACL Removals (3,000 mt constant catch)	3,000

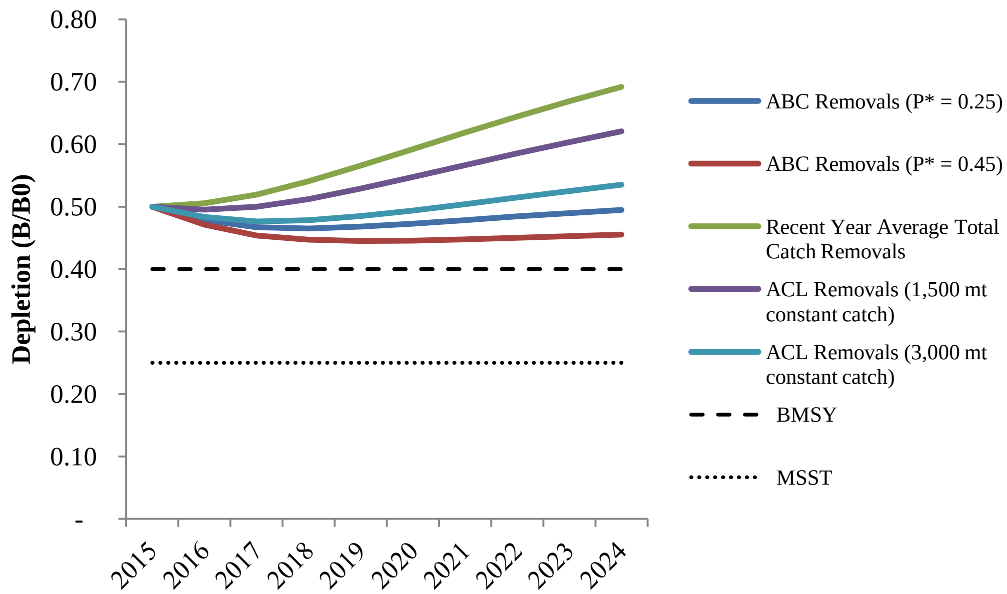


Figure 4-37. Projected depletion under alternative catch streams under the base case state of nature model for widow rockfish.

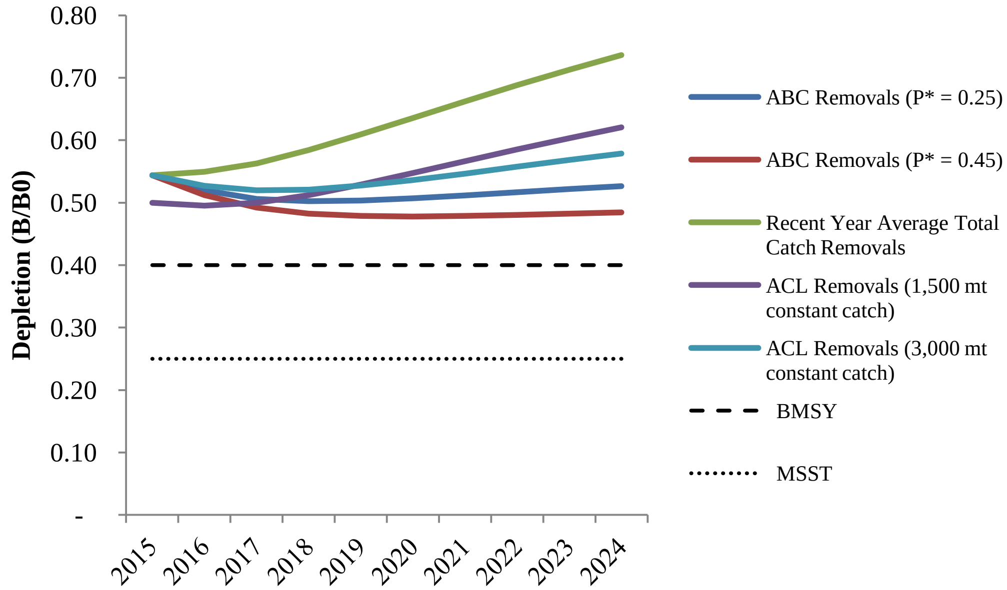


Figure 4-38. Projected depletion under alternative catch streams under the high state of nature model for widow rockfish.

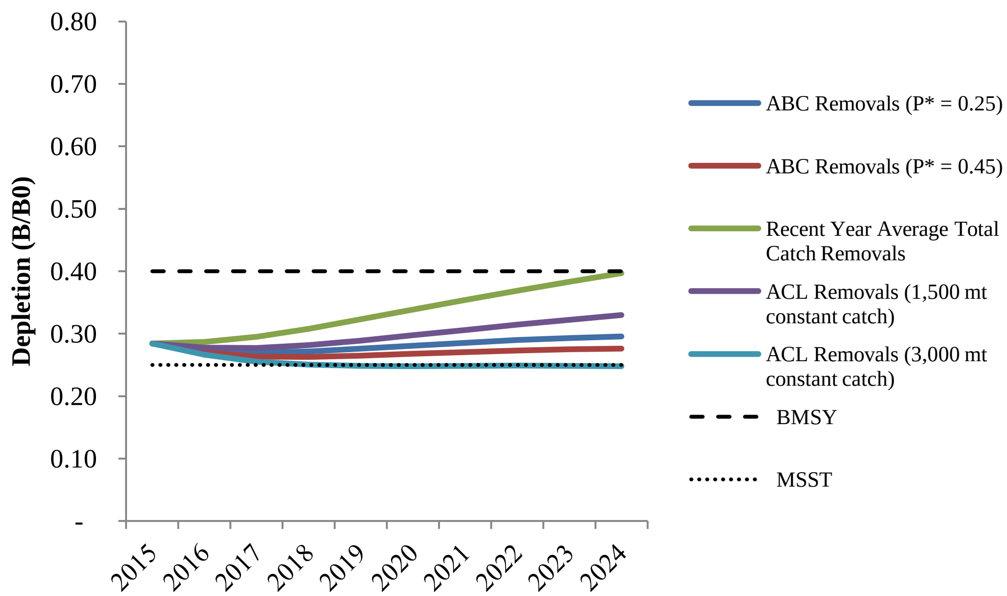


Figure 4-39. Projected depletion under alternative catch streams under the low state of nature model for widow rockfish.

4.8.3.7 Yelloweye Rockfish

The modeled catch scenarios for yelloweye rockfish range from 10 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 76 mt based on the ACL = ABC with a

P* of 0.45 catch scenario under the high state of nature (Table 4-14). Projected yelloweye rockfish depletions for all catch scenarios under the base case state of nature are predicted to undergo rebuilding and increase in abundance from below the MSST into the precautionary zone during the projection period (Figure 4-40). Projected yelloweye depletions for all catch scenarios under the high state of nature are predicted to keep the stock in the precautionary zone during the projection period (Figure 4-41). Projected yelloweye depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-42).

Table 4-14. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for yelloweye rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	18
	ABC Removals (P* = 0.25; Alt. 2)	29
	ABC Removals (P* = 0.45; Alt. 1)	41
	ACL Removals (SPR = 76%; Pref. Alt.)	19
	Recent Year Average Total Catch Removals	10
High	2014 ACL	18
	ABC Removals (P* = 0.25)	54
	ABC Removals (P* = 0.45)	76
	ACL Removals (SPR = 76%)	33
	Recent Year Average Total Catch Removals	10
Low	2014 ACL	18
	ABC Removals (P* = 0.25)	17
	ABC Removals (P* = 0.45)	24
	ACL Removals (SPR = 76%)	12
	Recent Year Average Total Catch Removals	10

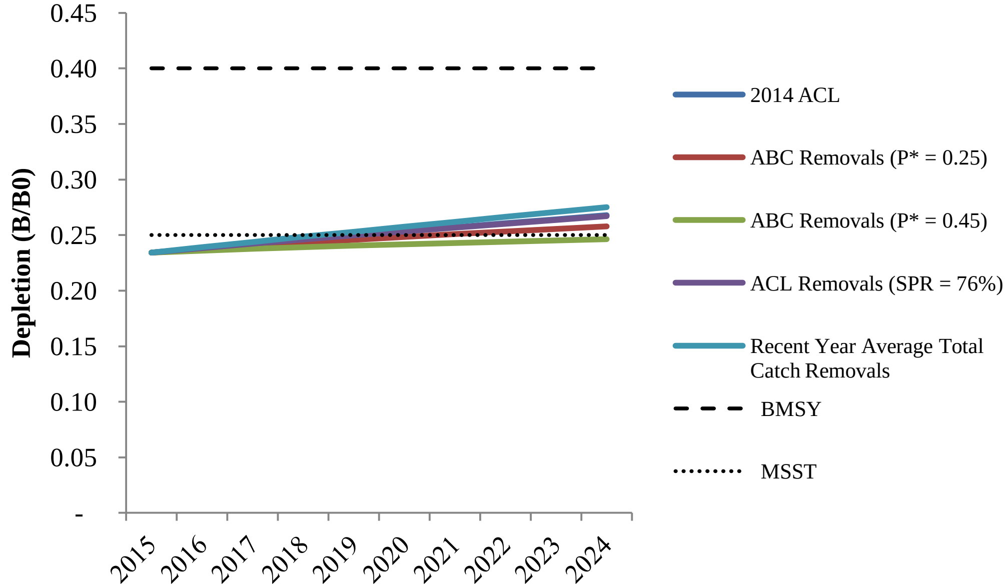


Figure 4-40. Projected depletion under alternative catch streams under the base case state of nature model for yelloweye rockfish.

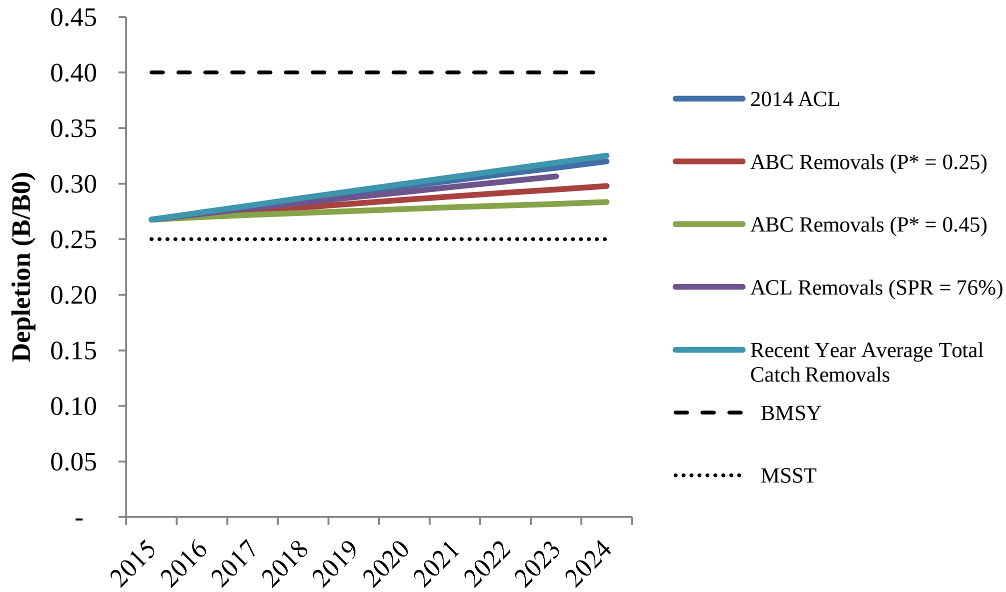


Figure 4-41. Projected depletion under alternative catch streams under the high state of nature model for yelloweye rockfish.

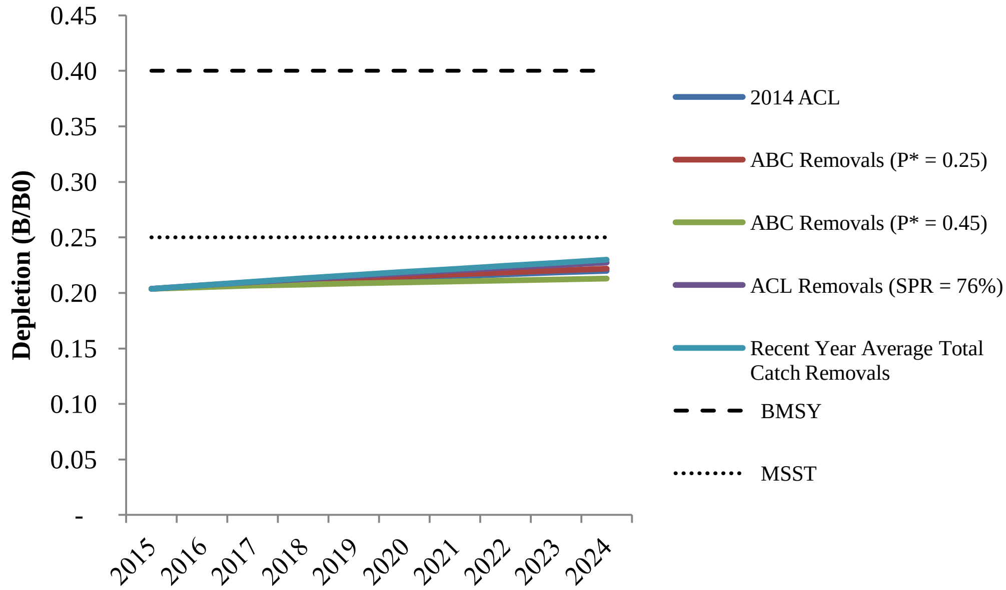


Figure 4-42. Projected depletion under alternative catch streams under the low state of nature model for yelloweye rockfish.

4.8.3.8 Yellowtail Rockfish North of 40º10' N lat.

The modeled catch scenarios for yellowtail rockfish north of 40º10' N lat. range from 1,551 mt per year based on the recent year average catches to an annual average catch in 2015-2024 of 9,805 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-15). Projected yellowtail rockfish depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-43, Figure 4-44, and Figure 4-45).

Table 4-15. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for yellowtail rockfish north of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	4,382
	ABC Removals (P* = 0.25; Alt. 2)	3,251
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	5,603
	Recent Year Average Total Catch Removals	1,551
High	2014 ACL	4,382
	ABC Removals (P* = 0.25)	5,745
	ABC Removals (P* = 0.45)	9,805
	Recent Year Average Total Catch Removals	1,551
Low	2014 ACL	4,382
	ABC Removals (P* = 0.25)	2,050
	ABC Removals (P* = 0.45)	3,571
	Recent Year Average Total Catch Removals	1,551

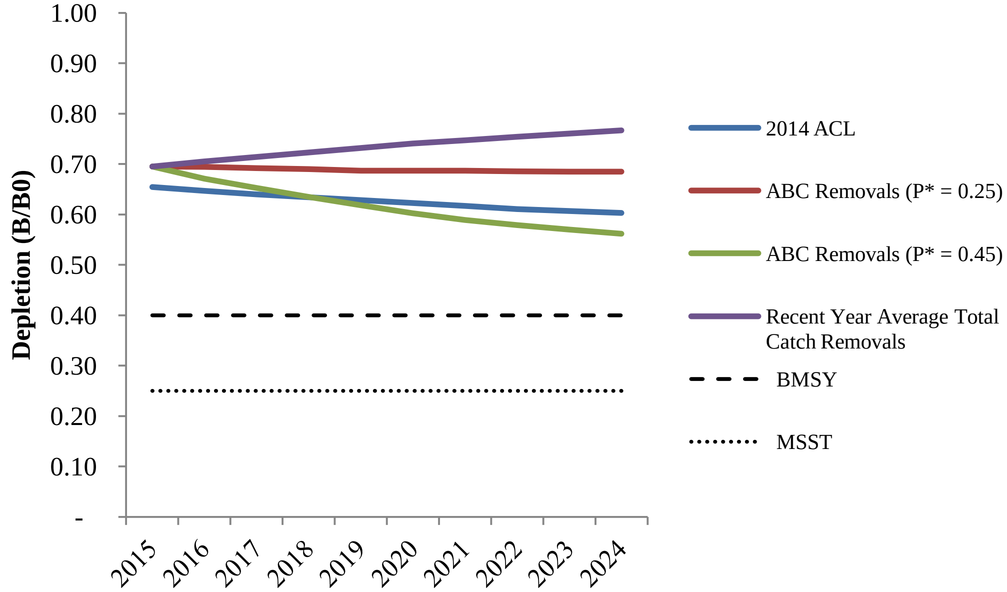


Figure 4-43. Projected depletion under alternative catch streams under the base case state of nature model for yellowtail rockfish north of 40º10' N lat.

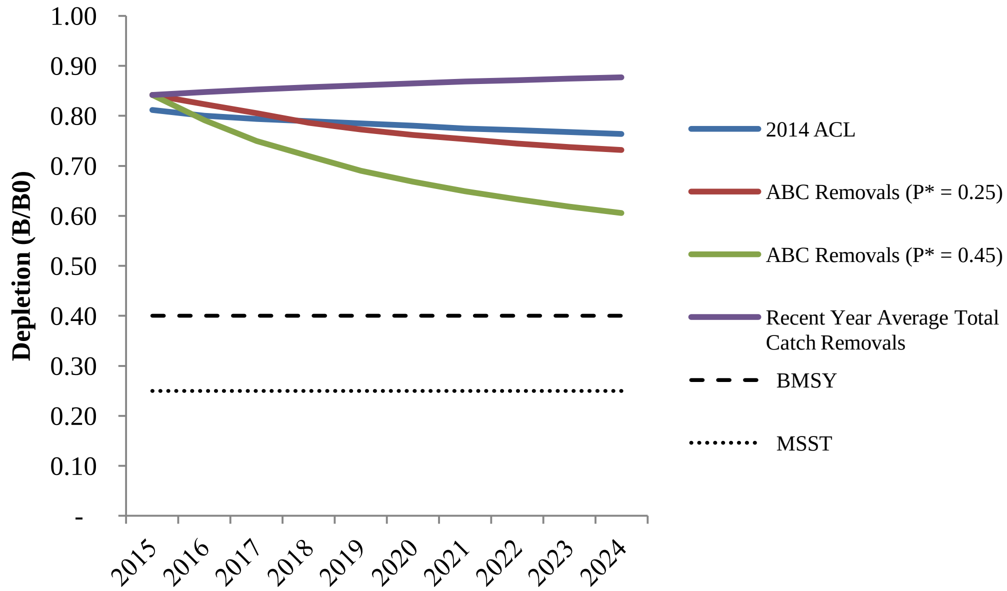


Figure 4-44. Projected depletion under alternative catch streams under the high state of nature model for yellowtail rockfish north of 40º10' N lat.

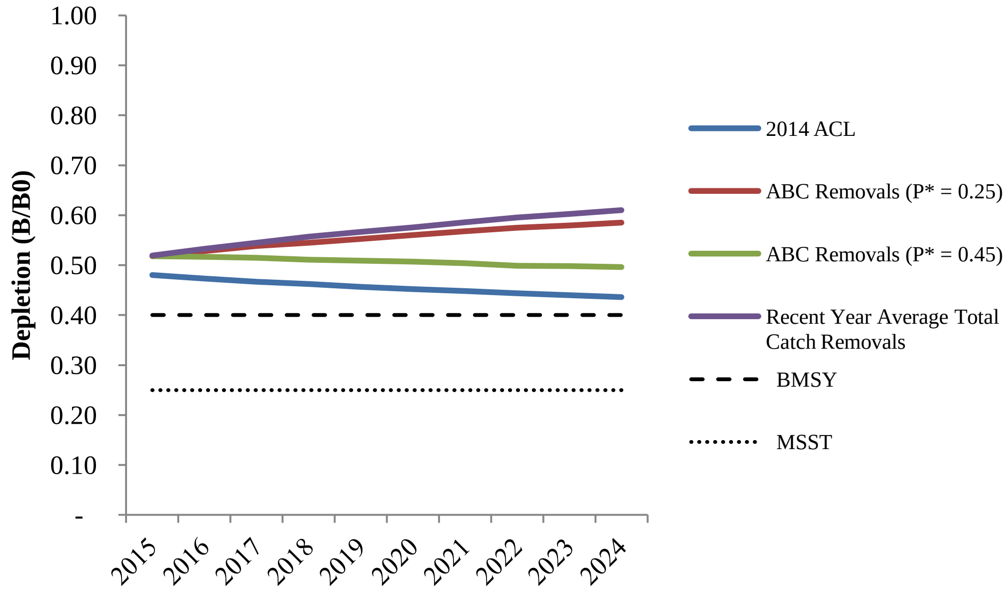


Figure 4-45. Projected depletion under alternative catch streams under the low state of nature model for yellowtail rockfish north of 40º10' N lat.

4.8.4 Long Term Impacts of Assessed Slope Rockfish Species

4.8.4.1 Aurora Rockfish

The modeled catch scenarios for aurora rockfish range from 34 mt per year based on the 2014 ACL contribution (based on a data-poor OFL that preceded the OFL estimated from the 2013 assessment and a 16.6% ABC deduction from the OFL based on the stock then being categorized as a cat. 3 stock under a P* of 0.45) to an annual average catch in 2015-2024 of 144 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-16). Projected aurora rockfish depletions under all states of nature are sustainable assuming the respective states of nature (Figure 4-46, Figure 4-47, and Figure 4-48).

Table 4-16. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for aurora rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL contribution (No Action Alt.)	34
	ABC Removals (P* = 0.25; Alt. 2)	72
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	87
	Recent Year Average Total Catch Removals	46
High	2014 ACL contribution	34
	ABC Removals (P* = 0.25)	118
	ABC Removals (P* = 0.45)	144
	Recent Year Average Total Catch Removals	46
Low	2014 ACL contribution	34
	ABC Removals (P* = 0.25)	46
	ABC Removals (P* = 0.45)	55
	Recent Year Average Total Catch Removals	46

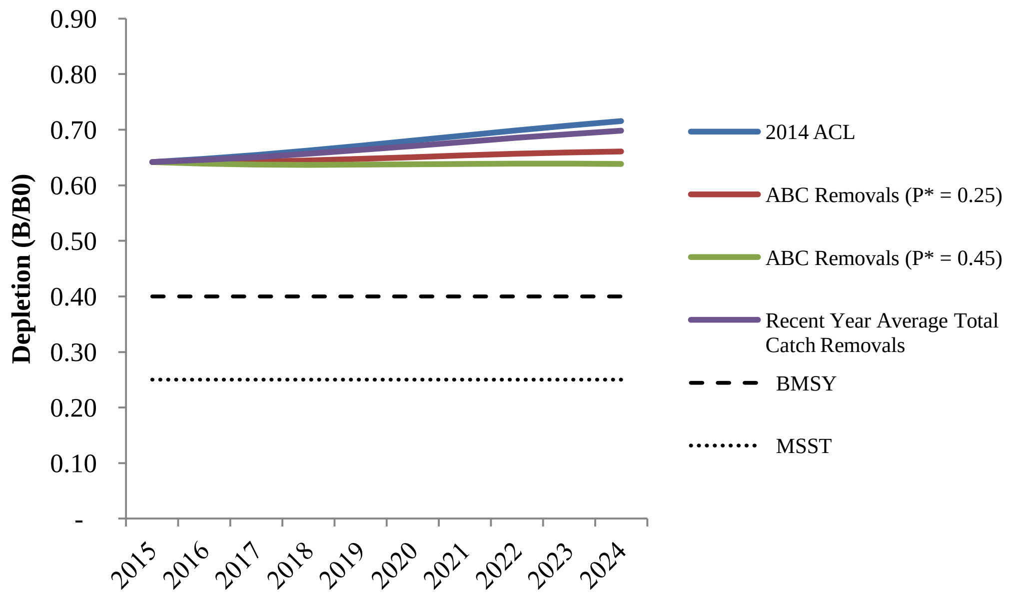


Figure 4-46. Projected depletion under alternative catch streams under the base case state of nature model for aurora rockfish.

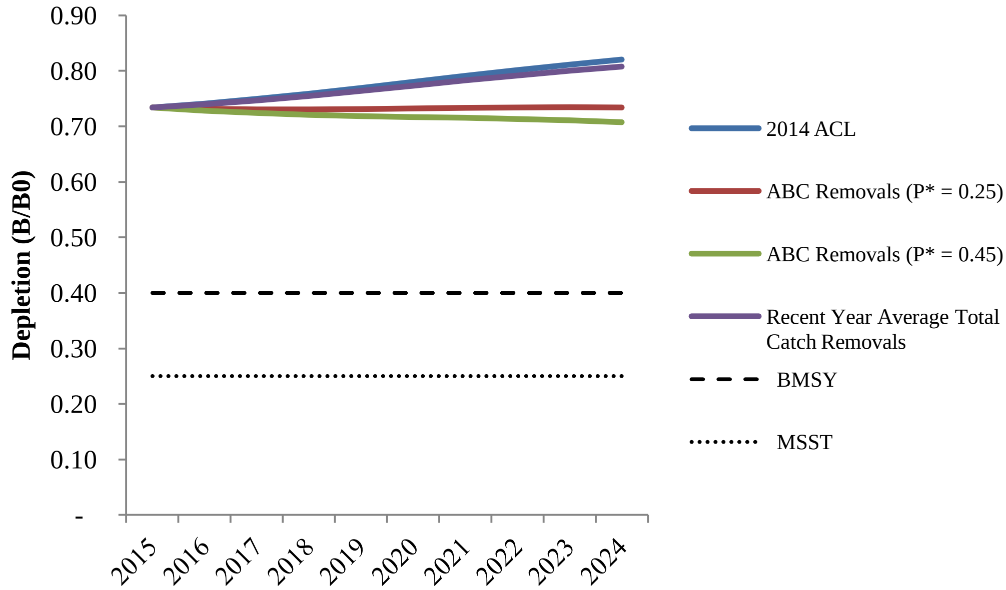


Figure 4-47. Projected depletion under alternative catch streams under the high state of nature model for aurora rockfish.

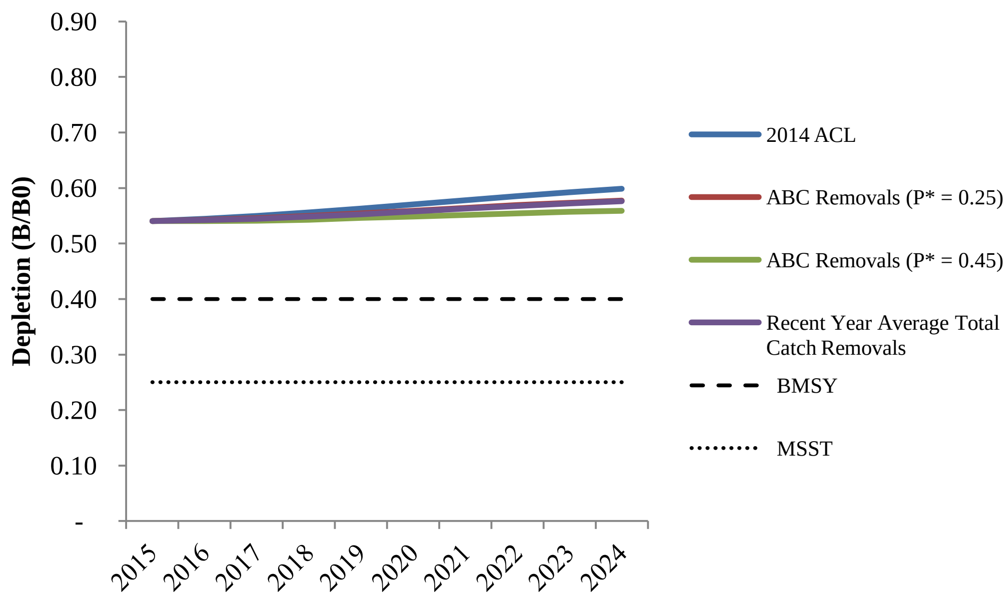


Figure 4-48. Projected depletion under alternative catch streams under the low state of nature model for aurora rockfish.

4.8.4.2 Blackgill Rockfish South of 40º10' N lat.

The modeled catch scenarios for blackgill rockfish south of 40º10' N lat. range from an annual average catch of 55 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 224 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-17). Projected blackgill rockfish depletions under the base case state of nature for all catch scenarios keep the stock within the precautionary zone during the projection period except for the ABC removals under a P* of 0.25, where the depletion is projected to rebuild to the B_{MSY} threshold by the end of the projection period (Figure 4-49). Projected blackgill rockfish depletions under the high state of nature are sustainable for all catch scenarios (Figure 4-50). Projected blackgill rockfish depletions under the low state of nature for all catch scenarios are predicted to rebuild from below the MSST into the precautionary zone during the projection period (Figure 4-51).

Table 4-17. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for blackgill rockfish south of 40°10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL contribution (No Action Alt.	110
	ABC Removals (P* = 0.25; Alt. 2)	93
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	131
	Recent Year Average Total Catch Removals	173
High	2014 ACL contribution	110
	ABC Removals (P* = 0.25)	159
	ABC Removals (P* = 0.45)	224
	Recent Year Average Total Catch Removals	173
Low	2014 ACL contribution	110
	ABC Removals (P* = 0.25)	55
	ABC Removals (P* = 0.45)	78
	Recent Year Average Total Catch Removals	173

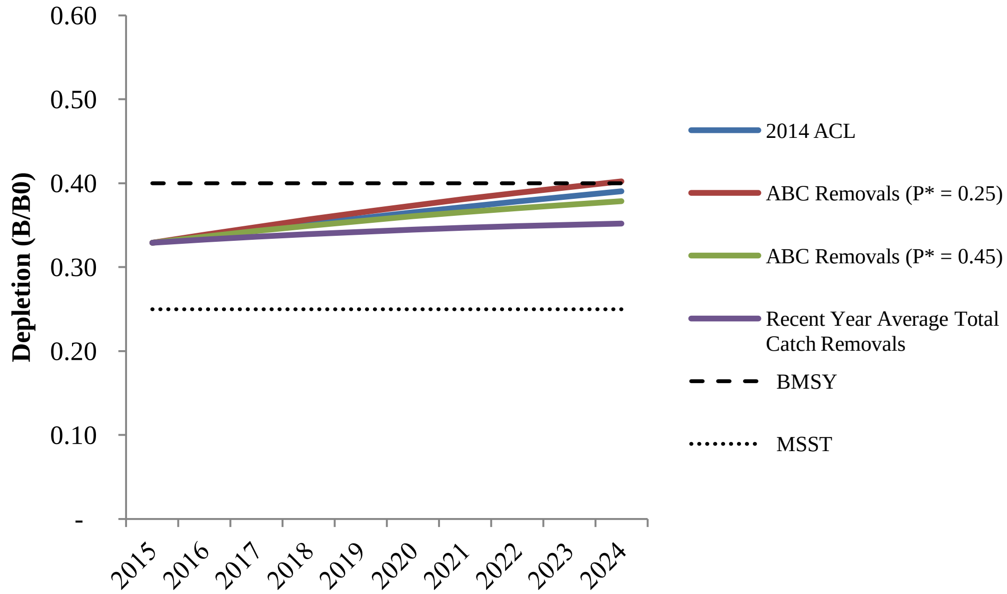


Figure 4-49. Projected depletion under alternative catch streams under the base case state of nature model for blackgill rockfish south of 40º10' N lat.

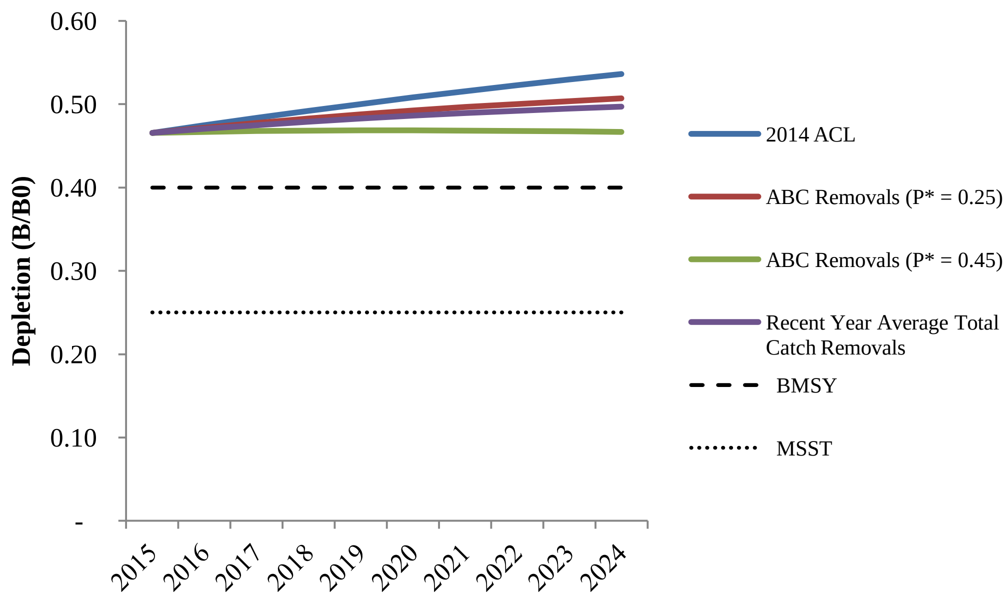


Figure 4-50. Projected depletion under alternative catch streams under the high state of nature model for blackgill rockfish south of 40º10' N lat.

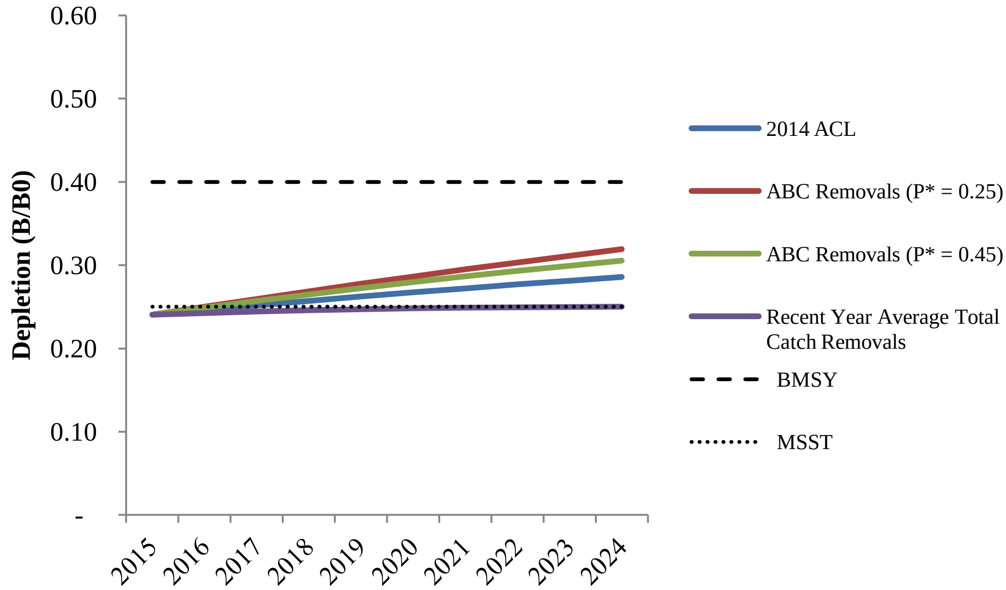


Figure 4-51. Projected depletion under alternative catch streams under the low state of nature model for blackgill rockfish south of 40º10' N lat.

4.8.4.3 Darkblotched Rockfish

The modeled catch scenarios for darkblotched rockfish range from an annual average catch of 108 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 2,003 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-18). Projected darkblotched rockfish depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-52 and Figure 4-53). Projected darkblotched rockfish depletions under the low state of nature for all catch scenarios are predicted to rebuild from below the MSST into the precautionary zone during the projection period (Figure 4-54).

Table 4-18. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for darkblotched rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	330
	ABC Removals (P* = 0.25; Alt. 2)	484
	ABC Removals (P* = 0.45; Alt. 1)	575
	ACL Removals (SPR = 64.9%; Pref. Alt.)	349
	Recent Year Average Total Catch Removals	108
High	2014 ACL	330
	ABC Removals (P* = 0.25)	1,702
	ABC Removals (P* = 0.45)	2,003
	ACL Removals (SPR = 64.9%)	1,253
	Recent Year Average Total Catch Removals	108
Low	2014 ACL	330
	ABC Removals (P* = 0.25)	168
	ABC Removals (P* = 0.45)	200
	ACL Removals (SPR = 64.9%)	121
	Recent Year Average Total Catch Removals	108

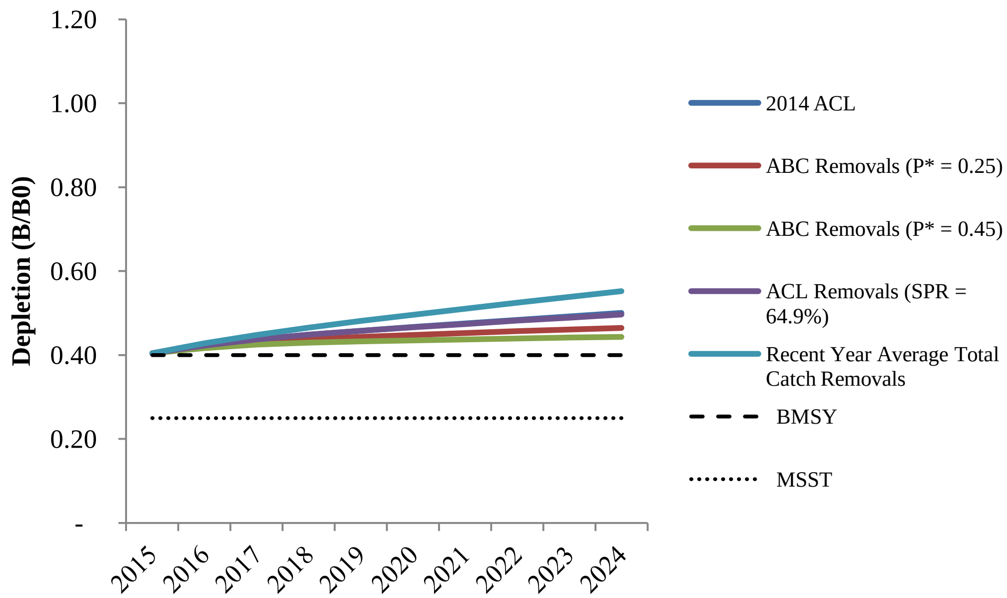


Figure 4-52. Projected depletion under alternative catch streams under the base case state of nature model for darkblotched rockfish.

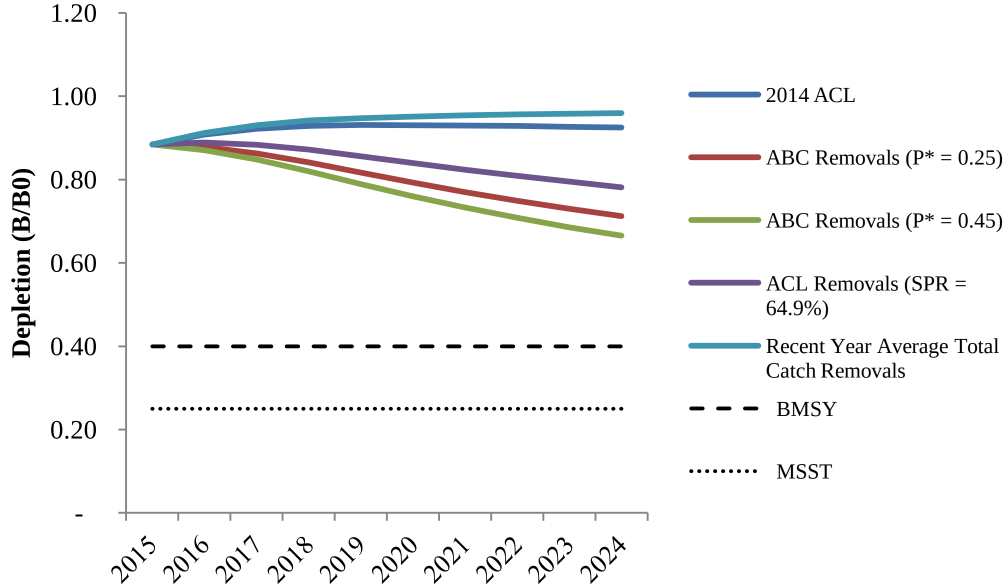


Figure 4-53. Projected depletion under alternative catch streams under the high state of nature model for darkblotched rockfish.

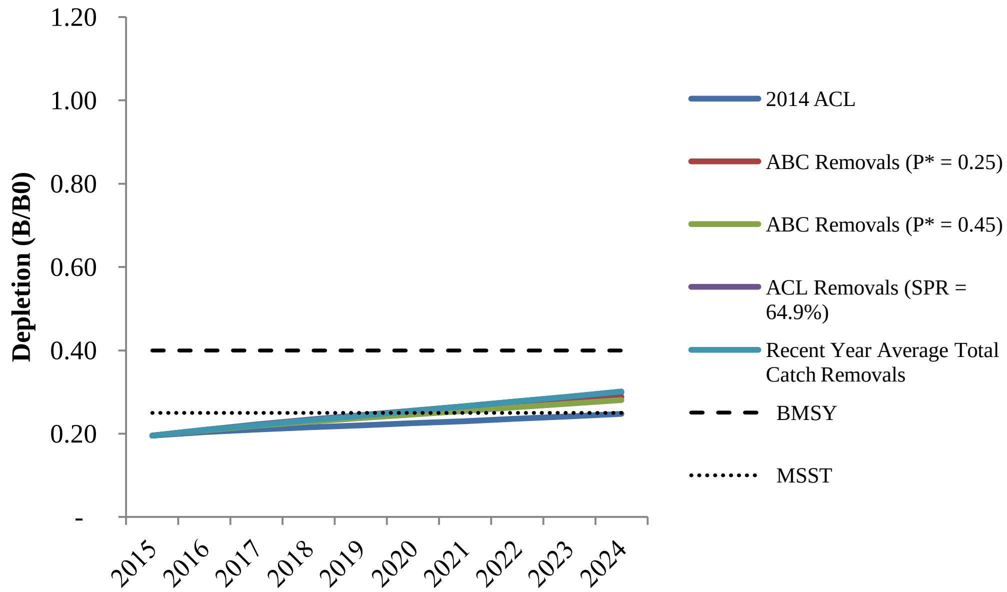


Figure 4-54. Projected depletion under alternative catch streams under the low state of nature model for darkblotched rockfish.

4.8.4.4 Longspine Thornyheads

The modeled catch scenarios for longspine thornyheads range from an annual average catch of 942 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 6,620 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-19). Projected longspine thornyhead depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-55, Figure 4-56, and Figure 4-57).

Table 4-19. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for longspine thornyheads.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2,305
	ABC Removals (P* = 0.25; Alt. 2)	2,683
	ABC Removals (P* = 0.4; Pref. Alt.)	3,395
	ABC Removals (P* = 0.45; Alt. 1)	3,631
	Recent Year Average Total Catch Removals	942
High	2014 ACL	2,305
	ABC Removals (P* = 0.25)	4,904
	ABC Removals (P* = 0.4)	6,192
	ABC Removals (P* = 0.45)	6,620
	Recent Year Average Total Catch Removals	942
Low	2014 ACL	2,305
	ABC Removals (P* = 0.25)	1,732
	ABC Removals (P* = 0.4)	2,195
	ABC Removals (P* = 0.45)	2,349
	Recent Year Average Total Catch Removals	942

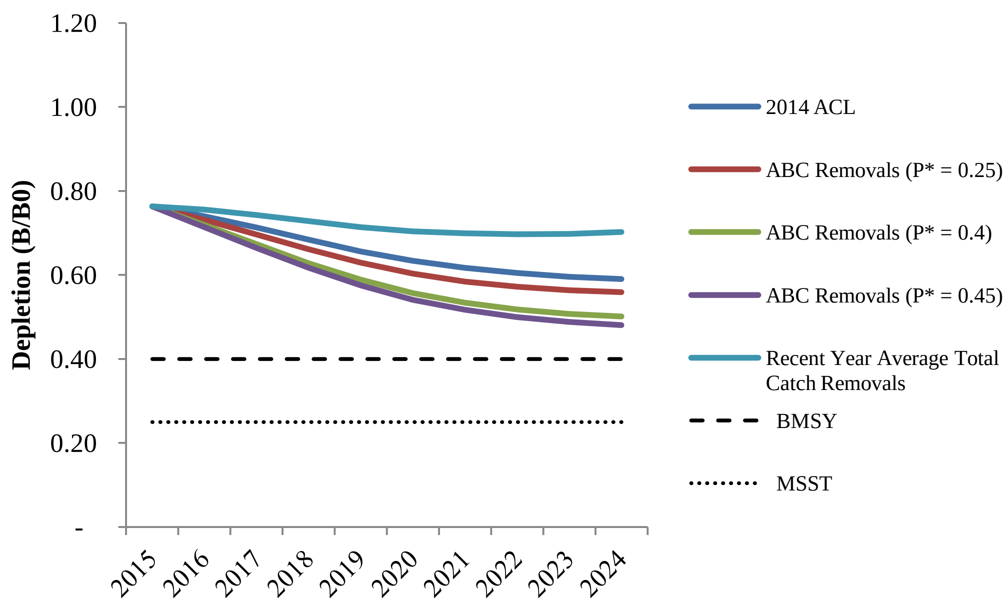


Figure 4-55. Projected depletion under alternative catch streams under the base case state of nature model for longspine thornyheads.

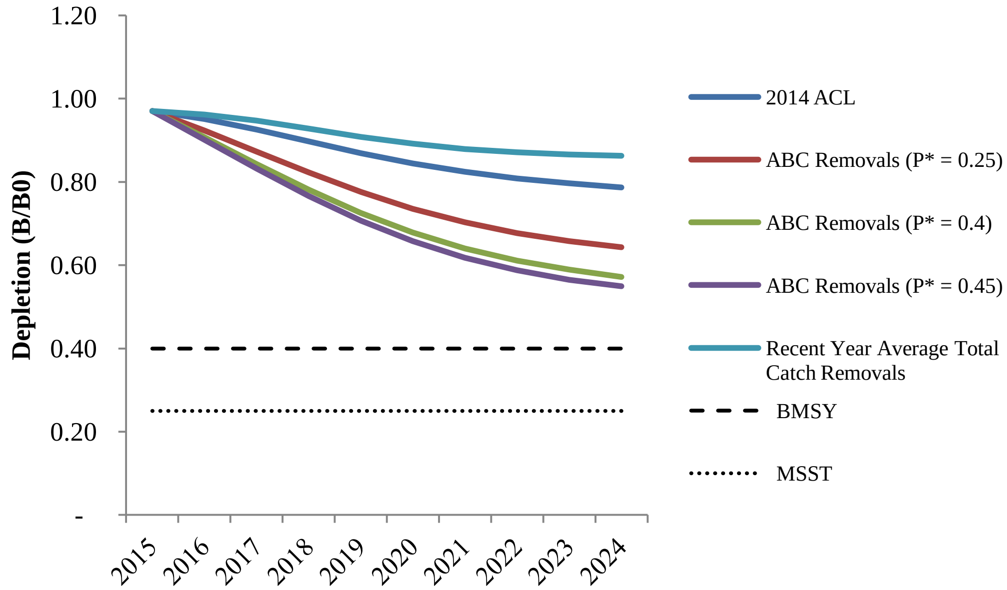


Figure 4-56. Projected depletion under alternative catch streams under the high state of nature model for longspine thornyheads.

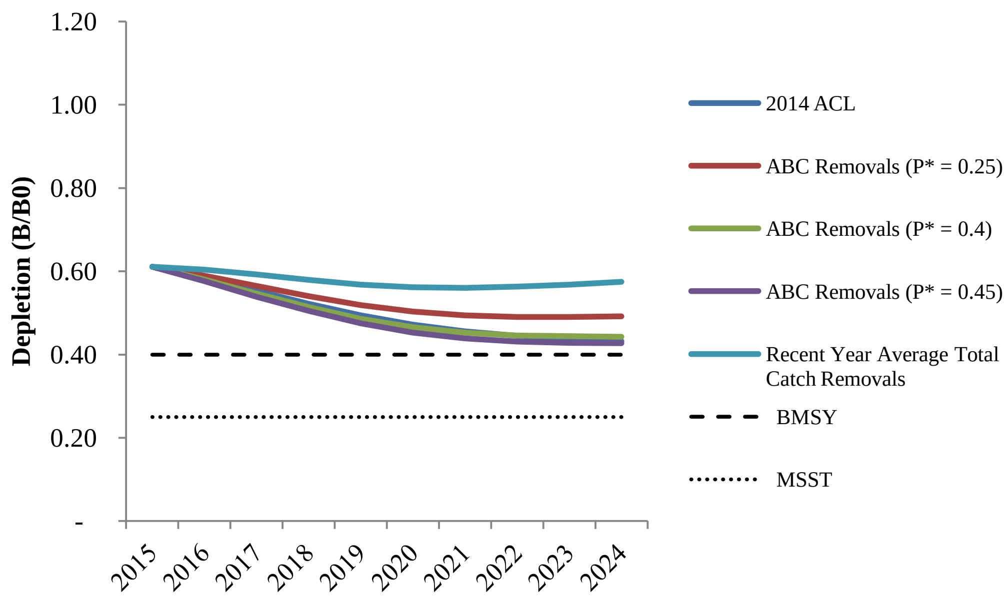


Figure 4-57. Projected depletion under alternative catch streams under the low state of nature model for longspine thornyheads.

4.8.4.5 Pacific Ocean Perch

The modeled catch scenarios for Pacific ocean perch range from 59 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,805 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-20). Projected POP depletions for all catch scenarios except the ABC removals (both the P* of 0.25 and 0.45 scenarios) under the base case state of nature are predicted to undergo rebuilding and increase in abundance from below the MSST into the precautionary zone during the projection period; the ABC removal scenarios keep the stock below the MSST during the projection period (Figure 4-58). Projected POP depletions for all catch scenarios under the high state of nature are predicted to be sustainable during the projection period (Figure 4-59). Projected POP depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-60).

Table 4-20. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for Pacific ocean perch.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	153
	ABC Removals (P* = 0.25; Alt. 2)	560
	ABC Removals (P* = 0.45; Alt. 1)	662
	ACL Removals (SPR = 86.4%; Pref. Alt.)	180
	Recent Year Average Total Catch Removals	59
High	2014 ACL	153
	ABC Removals (P* = 0.25)	1,517
	ABC Removals (P* = 0.45)	1,805
	ACL Removals (SPR = 86.4%)	371
	Recent Year Average Total Catch Removals	59
Low	2014 ACL	153
	ABC Removals (P* = 0.25)	189
	ABC Removals (P* = 0.45)	224
	ACL Removals (SPR = 86.4%)	110
	Recent Year Average Total Catch Removals	59

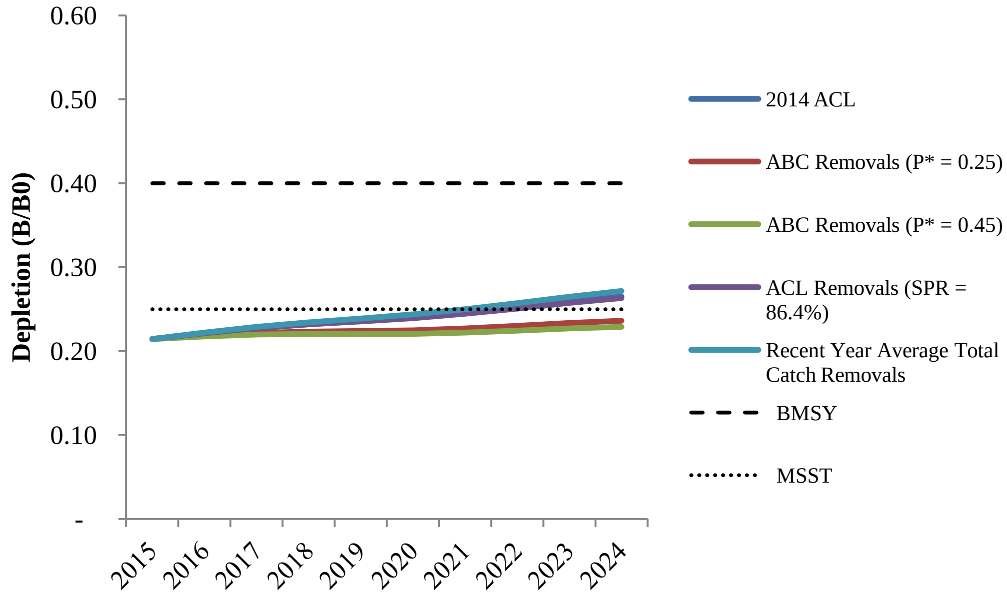


Figure 4-58. Projected depletion under alternative catch streams under the base case state of nature model for Pacific ocean perch.

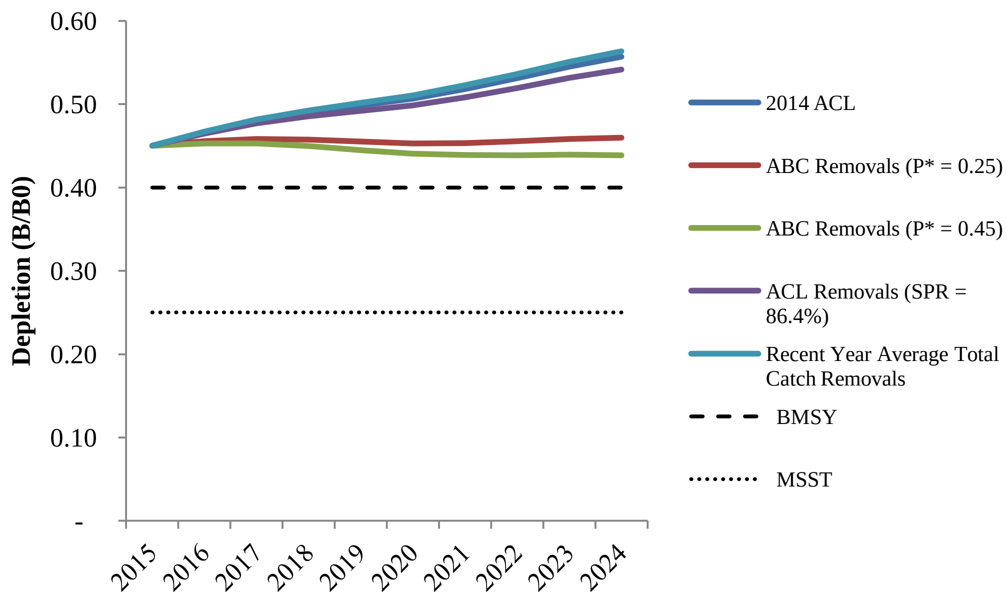


Figure 4-59. Projected depletion under alternative catch streams under the high state of nature model for Pacific ocean perch.

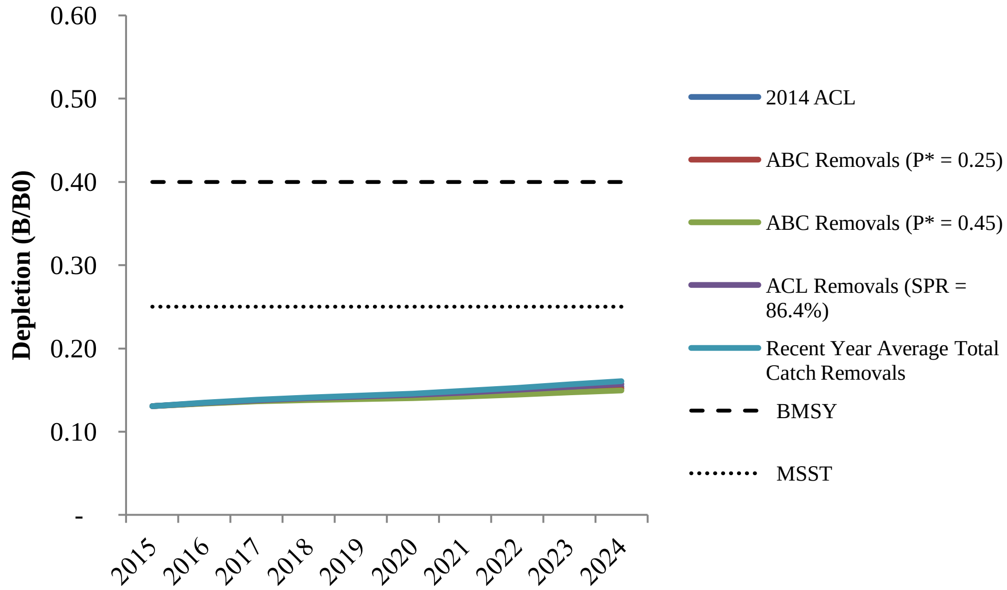


Figure 4-60. Projected depletion under alternative catch streams under the low state of nature model for Pacific ocean perch.

4.8.4.6 Rougheye/Blackspotted Rockfish

The modeled catch scenarios for rougheye/blackspotted rockfish range from an annual average catch of 60 mt per year based on the 2014 ACL contribution (based on a data-poor OFL that preceded the OFL estimated from the 2013 assessment and a 16.6% ABC deduction from the OFL based on the stock then being categorized as a cat. 3 stock under a P* of 0.45) to an annual average catch in 2015-2024 of 319 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-21). Projected rougheye/blackspotted rockfish depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-61 and Figure 4-62). Projected rougheye/blackspotted rockfish depletions under the low state of nature for all catch scenarios are predicted to rebuild from the precautionary zone to above the B_{MSY} threshold during the projection period (Figure 4-63).

Table 4-21. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for rougheye/blackspotted rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL Contribution (No Action Alt.)	60
	ABC Removals (P* = 0.25; Alt. 2)	141
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	202
	Recent Year Average Total Catch Removals	189
High	2014 ACL Contribution	60
	ABC Removals (P* = 0.25)	224
	ABC Removals (P* = 0.45)	319
	Recent Year Average Total Catch Removals	189
Low	2014 ACL Contribution	60
	ABC Removals (P* = 0.25)	91
	ABC Removals (P* = 0.45)	130
	Recent Year Average Total Catch Removals	189

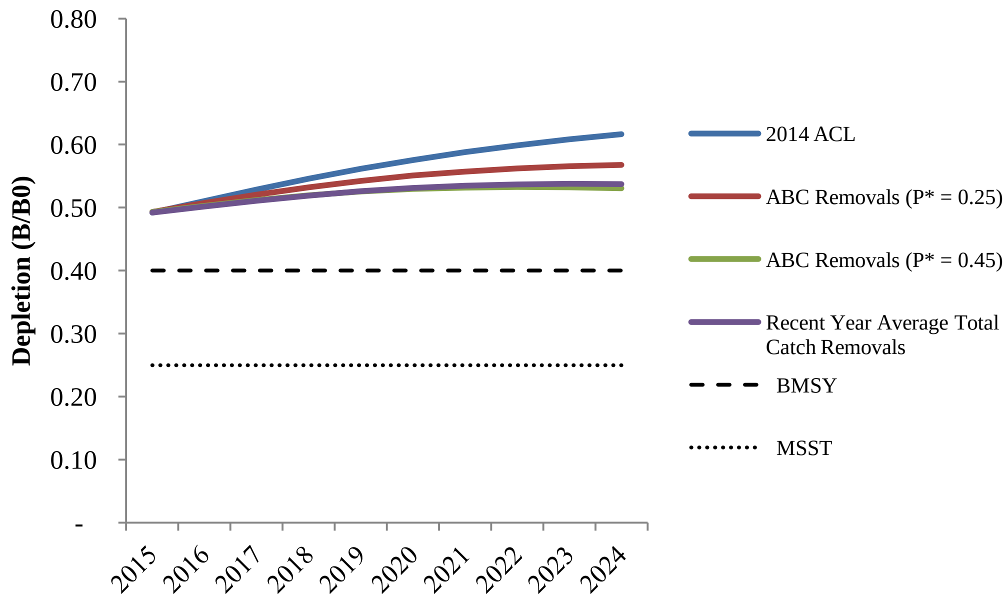


Figure 4-61. Projected depletion under alternative catch streams under the base case state of nature model for rougheye/blackspotted rockfish.

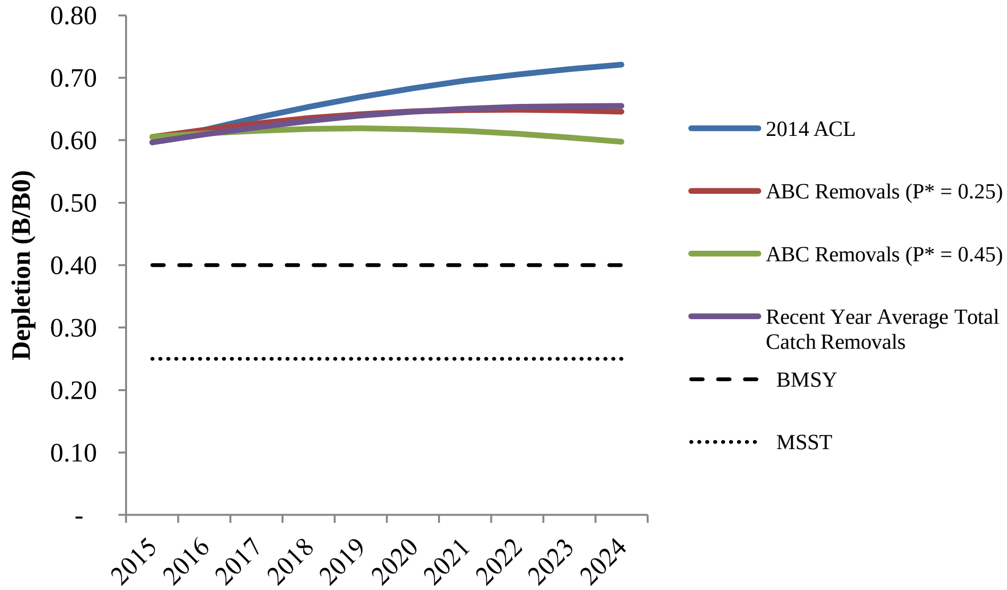


Figure 4-62. Projected depletion under alternative catch streams under the high state of nature model for rougheye/blackspotted rockfish.

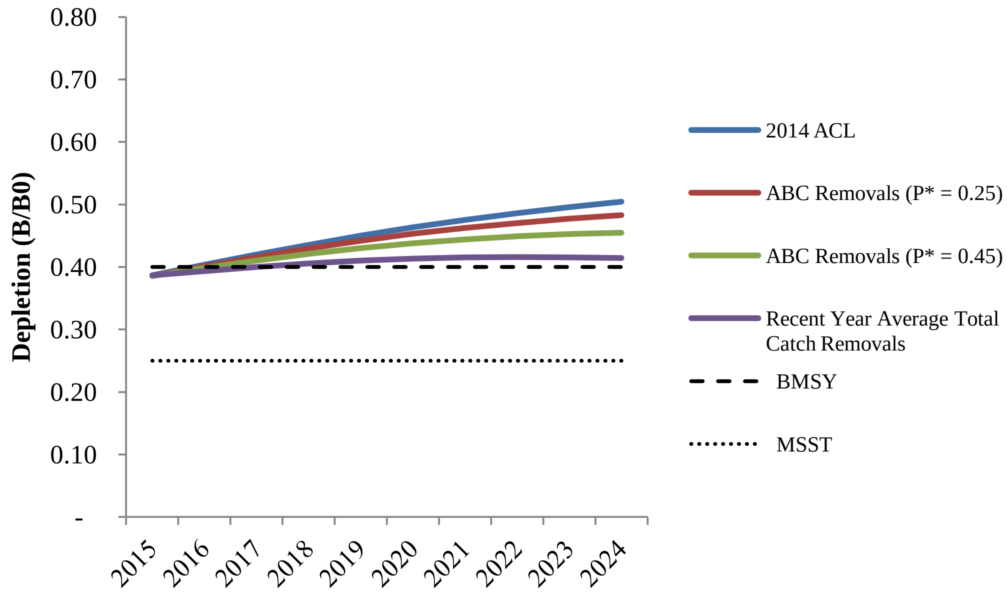


Figure 4-63. Projected depletion under alternative catch streams under the low state of nature model for rougheye/blackspotted rockfish.

4.8.4.7 Shortspine Thornyheads

The modeled catch scenarios for shortspine thornyheads range from an annual average catch of 754 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 8,011 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-22). Projected shortspine thornyhead depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-64, Figure 4-65, and Figure 4-66).

Table 4-22. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for shortspine thornyheads.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	1,918
	ABC Removals (P* = 0.25; Alt. 2)	1,928
	ABC Removals (P* = 0.4; Pref. Alt.)	2,566
	ABC Removals (P* = 0.45; Alt. 1)	2,794
	Recent Year Average Total Catch Removals	953
High	2014 ACL	1,918
	ABC Removals (P* = 0.25)	5,527
	ABC Removals (P* = 0.4)	7,356
	ABC Removals (P* = 0.45)	8,011
	Recent Year Average Total Catch Removals	953
Low	2014 ACL	1,918
	ABC Removals (P* = 0.25)	754
	ABC Removals (P* = 0.4)	1,003
	ABC Removals (P* = 0.45)	1,093
	Recent Year Average Total Catch Removals	953

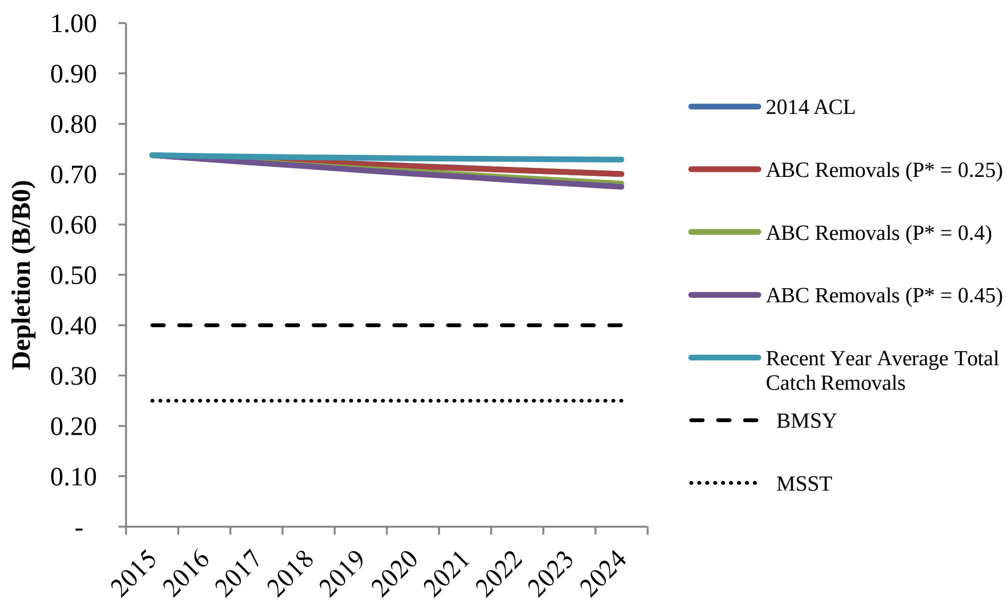


Figure 4-64. Projected depletion under alternative catch streams under the base case state of nature model for shortspine thornyheads.

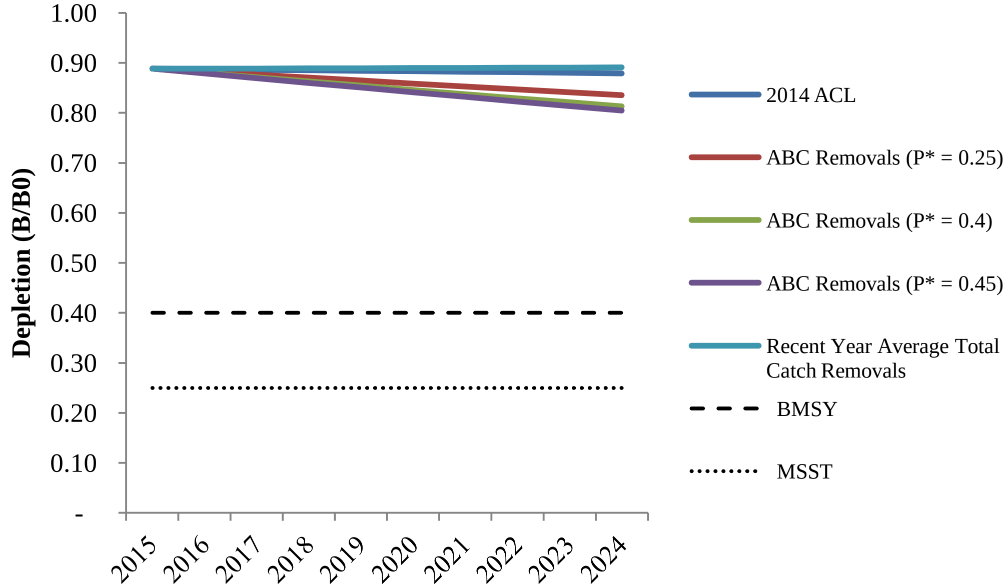


Figure 4-65. Projected depletion under alternative catch streams under the high state of nature model for shortspine thornyheads.

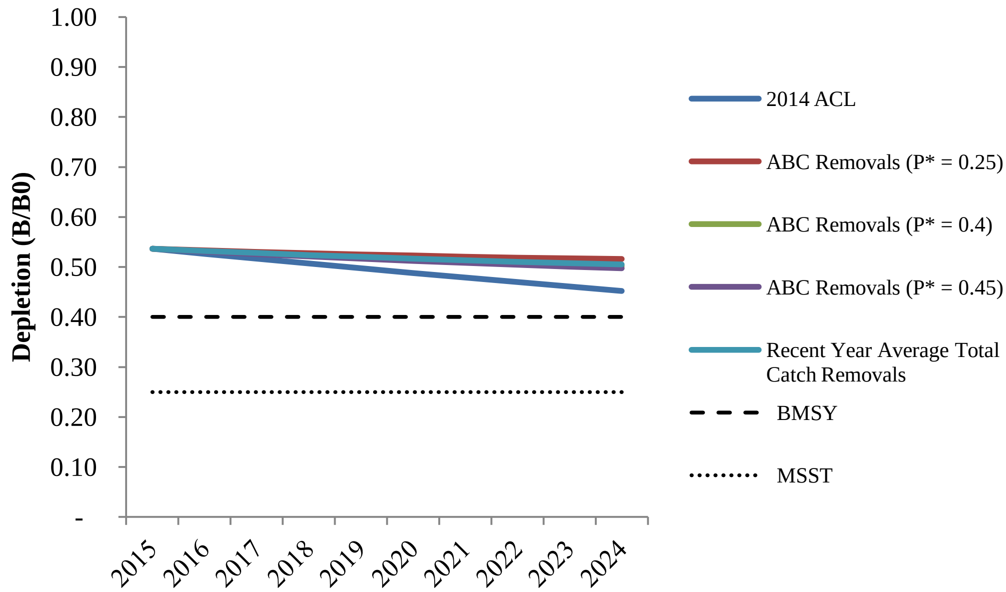


Figure 4-66. Projected depletion under alternative catch streams under the low state of nature model for shortspine thornyheads.

4.8.4.8 Splitnose Rockfish

The modeled catch scenarios for splitnose rockfish range from an annual average catch of 70 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 3,036 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-23). Projected splitnose rockfish depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-67, Figure 4-68, and Figure 4-69).

Table 4-23. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for splitnose rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	2,440
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	2,908
	Recent Year Average Total Catch Removals	70
High	ABC Removals (P* = 0.25)	2,549
	ABC Removals (P* = 0.45)	3,036
	Recent Year Average Total Catch Removals	70
Low	ABC Removals (P* = 0.25)	2,028
	ABC Removals (P* = 0.45)	2,417
	Recent Year Average Total Catch Removals	70

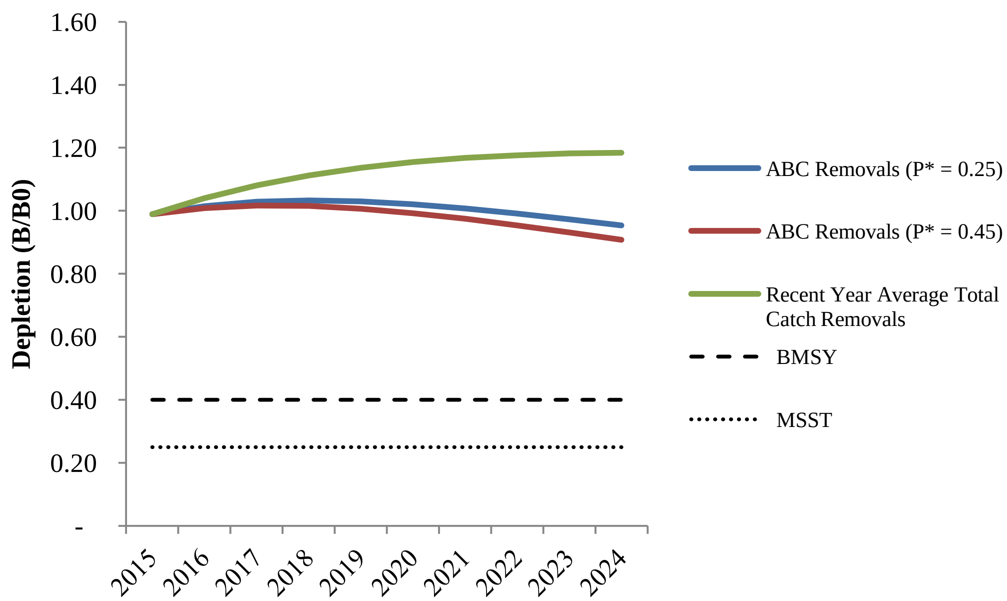


Figure 4-67. Projected depletion under alternative catch streams under the base case state of nature model for splitnose rockfish.

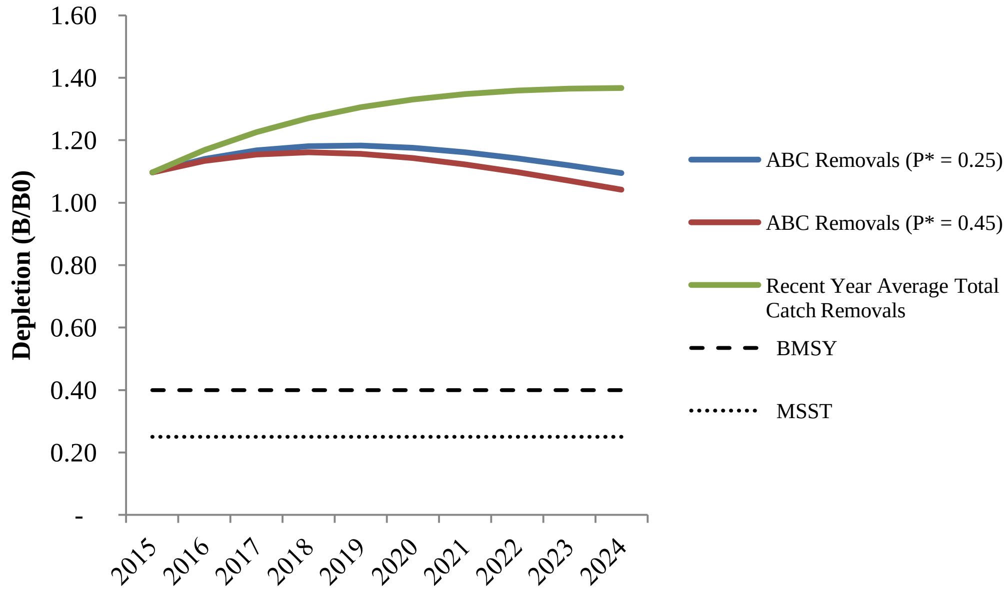


Figure 4-68. Projected depletion under alternative catch streams under the high state of nature model for splitnose rockfish.

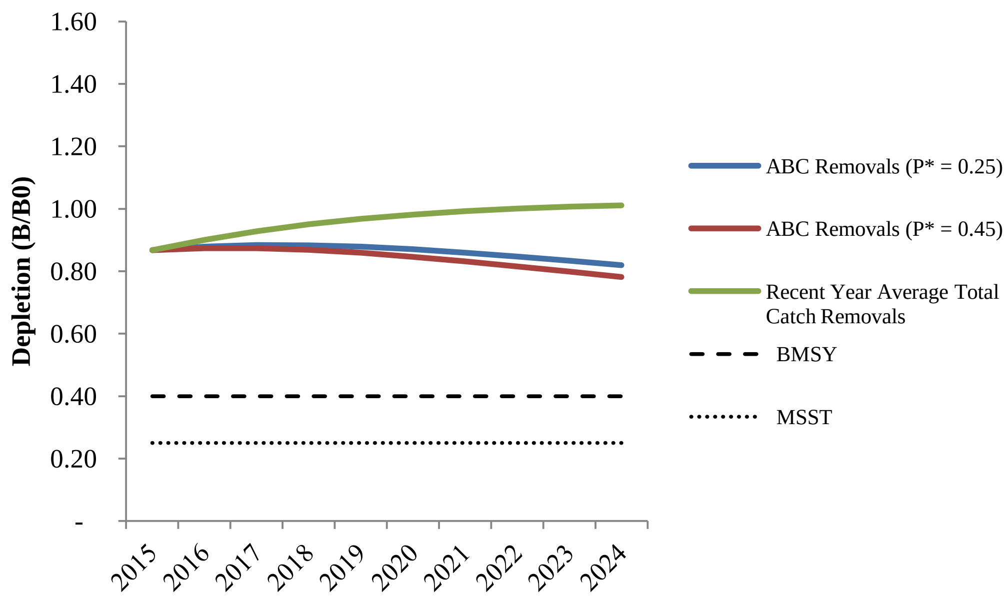


Figure 4-69. Projected depletion under alternative catch streams under the low state of nature model for splitnose rockfish.

4.8.4.9 Sharpchin Rockfish

The modeled catch scenarios for sharpchin rockfish range from an annual average catch of 7 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 636 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-24). Projected sharpchin rockfish depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-70, Figure 4-71, and Figure 4-72).

Table 4-24. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for sharpchin rockfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL Contribution (No Action Alt.)	179
	ABC Removals (P* = 0.25; Alt. 2)	223
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	340
	Recent Year Average Total Catch Removals	7
High	2014 ACL Contribution	179
	ABC Removals (P* = 0.25)	422
	ABC Removals (P* = 0.45)	636
	Recent Year Average Total Catch Removals	7
Low	2014 ACL Contribution	179
	ABC Removals (P* = 0.25)	121
	ABC Removals (P* = 0.45)	187
	Recent Year Average Total Catch Removals	7

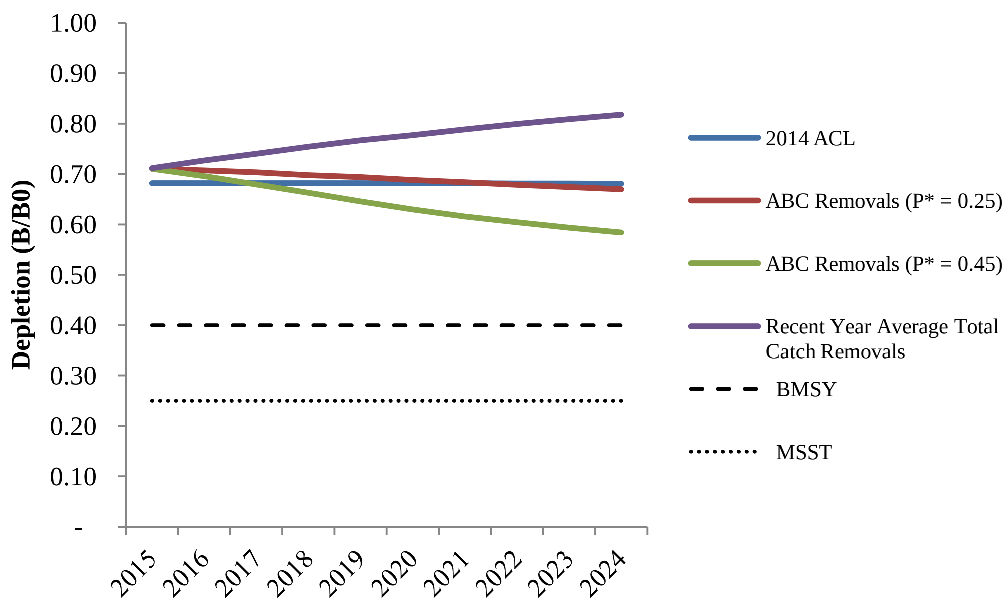


Figure 4-70. Projected depletion under alternative catch streams under the base case state of nature model for sharpchin rockfish.

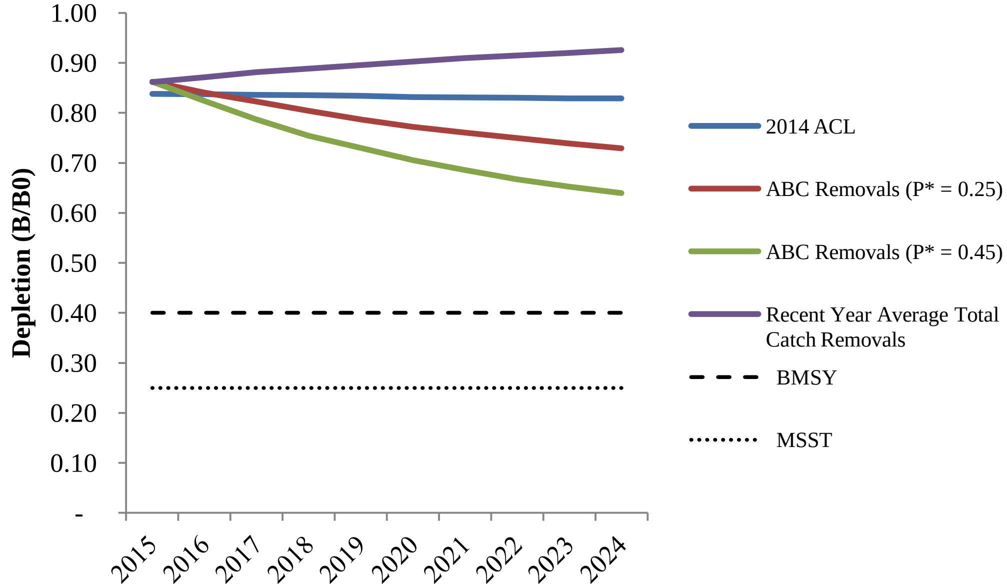


Figure 4-71. Projected depletion under alternative catch streams under the high state of nature model for sharpchin rockfish.

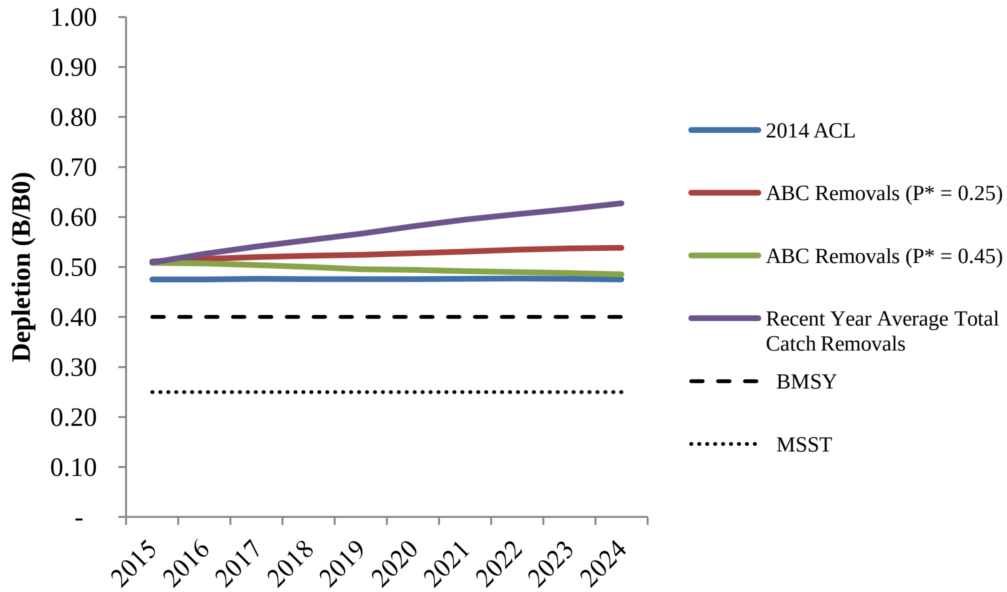


Figure 4-72. Projected depletion under alternative catch streams under the low state of nature model for sharpchin rockfish.

4.8.5 Long Term Impacts of Assessed Roundfish Species

Of the assessed roundfish species, only cabezon in California is missing from this analysis.

4.8.5.1 Cabezon in Oregon

The modeled catch scenarios for cabezon in Oregon range from 24 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 88 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-25). Projected Oregon cabezon depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-73 and Figure 4-74). Projected Oregon cabezon depletions under the low state of nature for the ABC removals with a P* of 0.25 catch scenario is predicted to rebuild from below the MSST to above the B_{MSY} threshold during the projection period (Figure 4-75). The ABC removals with a P* of 0.45 under the low state of nature is predicted to rebuild the stock from below the MSST but keeps the stock in the precautionary zone during the projection period (Figure 4-75). The 2014 ACL and recent year average catch scenarios are predicted to drive the stock to lower levels of depletion below the MSST under the low state of nature (Figure 4-75).

Table 4-25. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for cabezon in Oregon.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	47
	ABC Removals (P* = 0.25; Alt. 2)	43
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	49
	Recent Year Average Total Catch Removals	45
High	2014 ACL	47
	ABC Removals (P* = 0.25)	77
	ABC Removals (P* = 0.45)	88
	Recent Year Average Total Catch Removals	45
Low	2014 ACL	47
	ABC Removals (P* = 0.25)	24
	ABC Removals (P* = 0.45)	27
	Recent Year Average Total Catch Removals	45

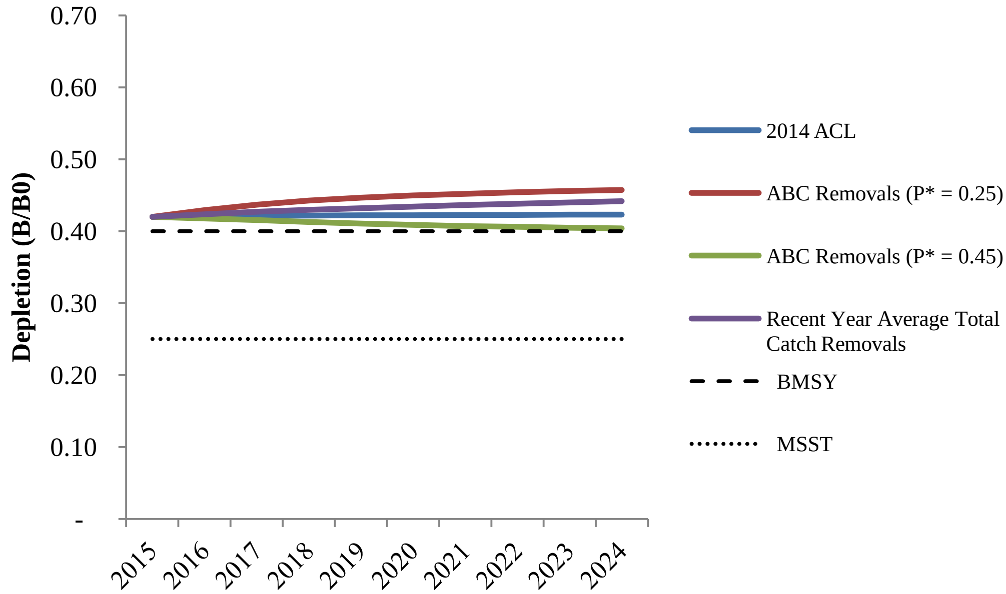


Figure 4-73. Projected depletion under alternative catch streams under the base case state of nature model for cabezon in Oregon.

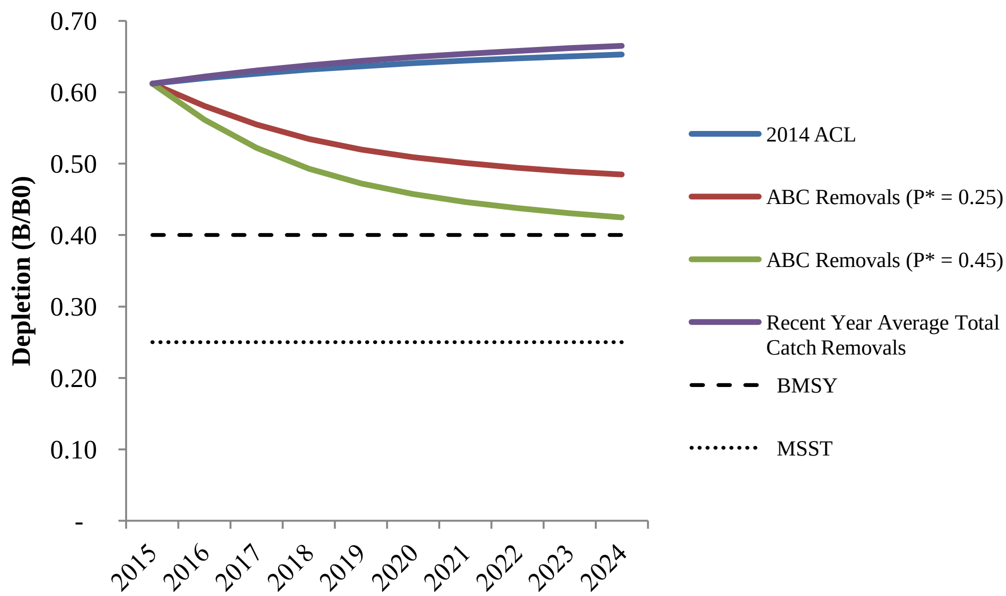


Figure 4-74. Projected depletion under alternative catch streams under the high state of nature model for cabezon in Oregon.

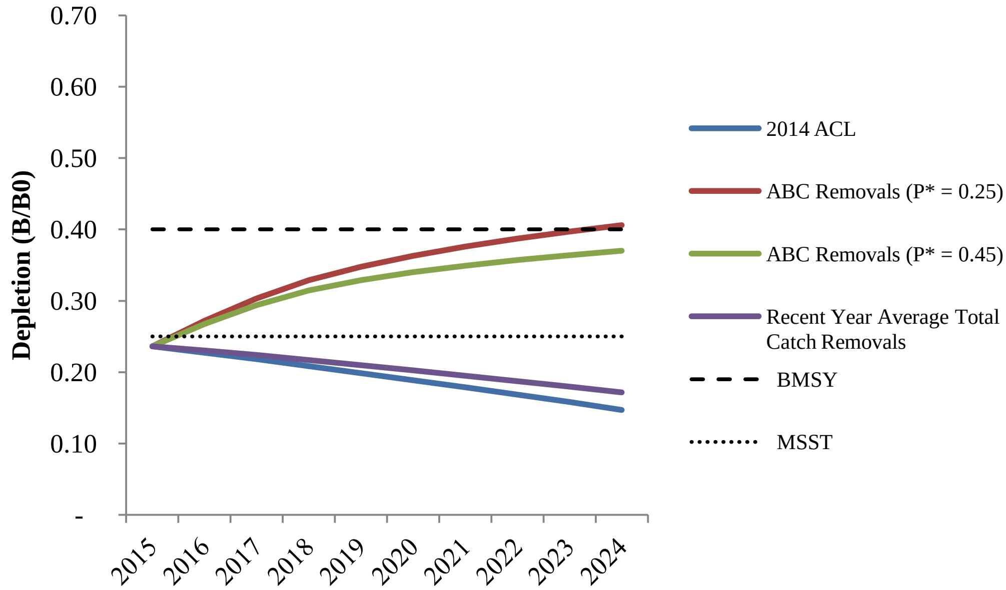


Figure 4-75. Projected depletion under alternative catch streams under the low state of nature model for cabezon in Oregon.

4.8.5.2 Lingcod North of 40º10' N lat.

The modeled catch scenarios for lingcod north of 40º10' N lat. range from an annual average catch of 893 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 3,696 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-26). Projected northern lingcod depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-76, Figure 4-77, and Figure 4-78).

Table 4-26. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for lingcod north of 40º10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	2,878
	ABC Removals (P* = 0.25; Alt. 2)	2,499
	ABC Removals (P* = 0.45; Alt. 1; Pref. Alt.)	3,060
	Recent Year Average Total Catch Removals	893
High	2014 ACL	2,878
	ABC Removals (P* = 0.25)	3,002
	ABC Removals (P* = 0.45)	3,696
	Recent Year Average Total Catch Removals	893
Low	2014 ACL	2,878
	ABC Removals (P* = 0.25)	2,115
	ABC Removals (P* = 0.45)	2,570
	Recent Year Average Total Catch Removals	893

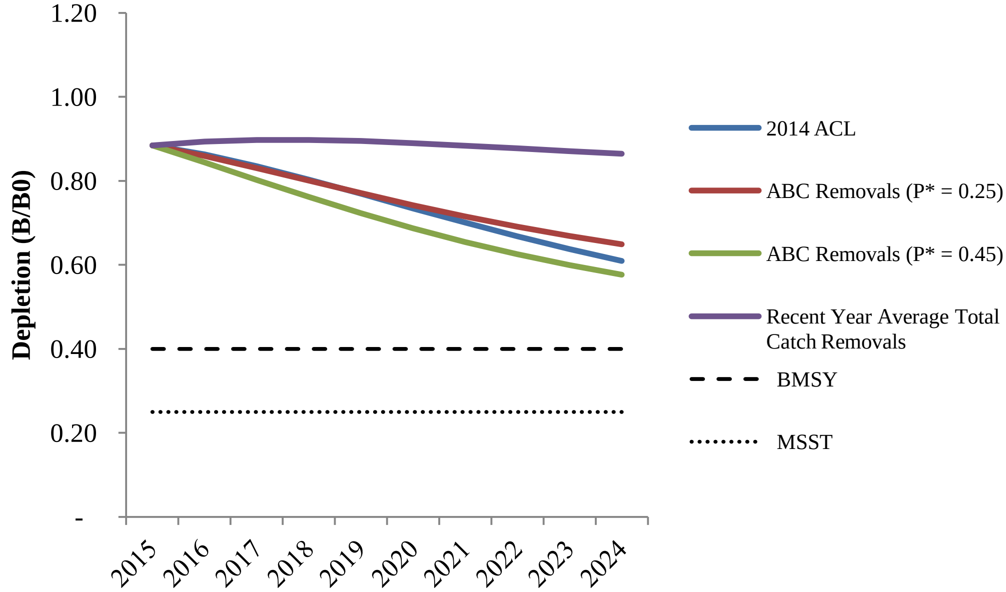


Figure 4-76. Projected depletion under alternative catch streams under the base case state of nature model for lingcod north of 40º10' N lat.

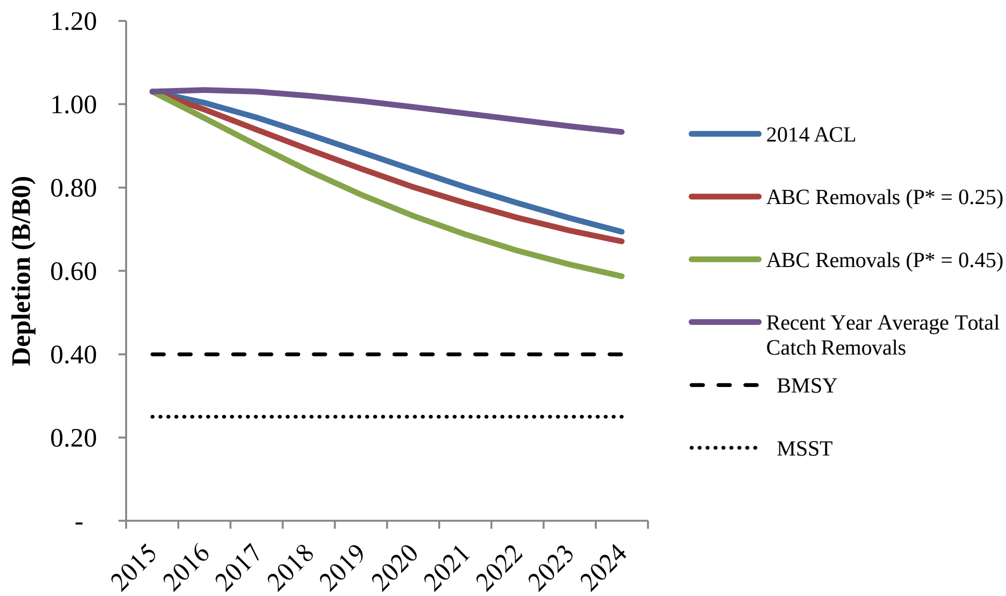


Figure 4-77. Projected depletion under alternative catch streams under the high state of nature model for lingcod north of 40º10' N lat.

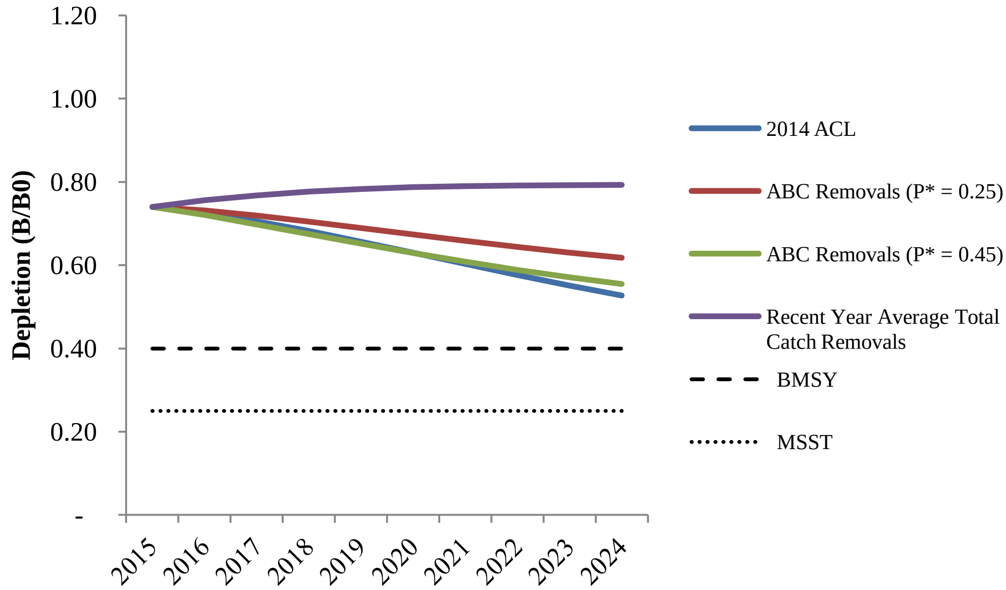


Figure 4-78. Projected depletion under alternative catch streams under the low state of nature model for lingcod north of 40º10' N lat.

4.8.5.3 Lingcod South of 40º10' N lat.

The modeled catch scenarios for lingcod south of 40º10' N lat. range from an annual average catch of 175 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 1,624 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-27). Projected southern lingcod depletions under all states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-79, Figure 4-80, and Figure 4-81).

Table 4-27. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for lingcod south of 40°10' N lat.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	1,063
	ABC Removals (P* = 0.25; Alt. 2)	859
	ABC Removals (P* = 0.4; Pref. Alt.)	1,092
	ABC Removals (P* = 0.45; Alt. 1)	1,170
	Recent Year Average Total Catch Removals	175
High	2014 ACL	1,063
	ABC Removals (P* = 0.25)	1,201
	ABC Removals (P* = 0.4)	1,519
	ABC Removals (P* = 0.45)	1,624
	Recent Year Average Total Catch Removals	175
Low	2014 ACL	1,063
	ABC Removals (P* = 0.25)	640
	ABC Removals (P* = 0.4)	810
	ABC Removals (P* = 0.45)	866
	Recent Year Average Total Catch Removals	175

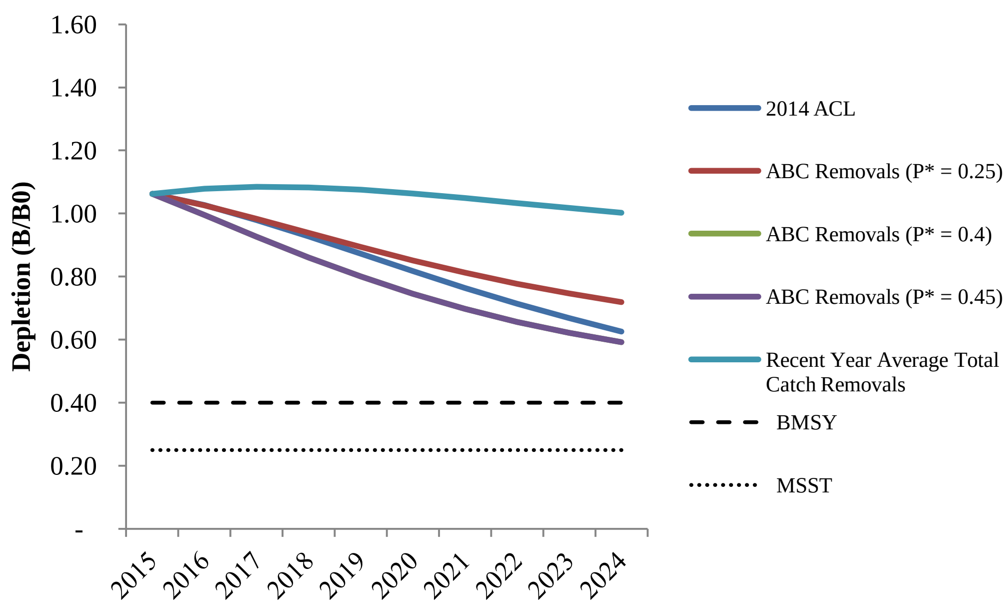


Figure 4-79. Projected depletion under alternative catch streams under the base case state of nature model for lingcod south of 40°10' N lat.

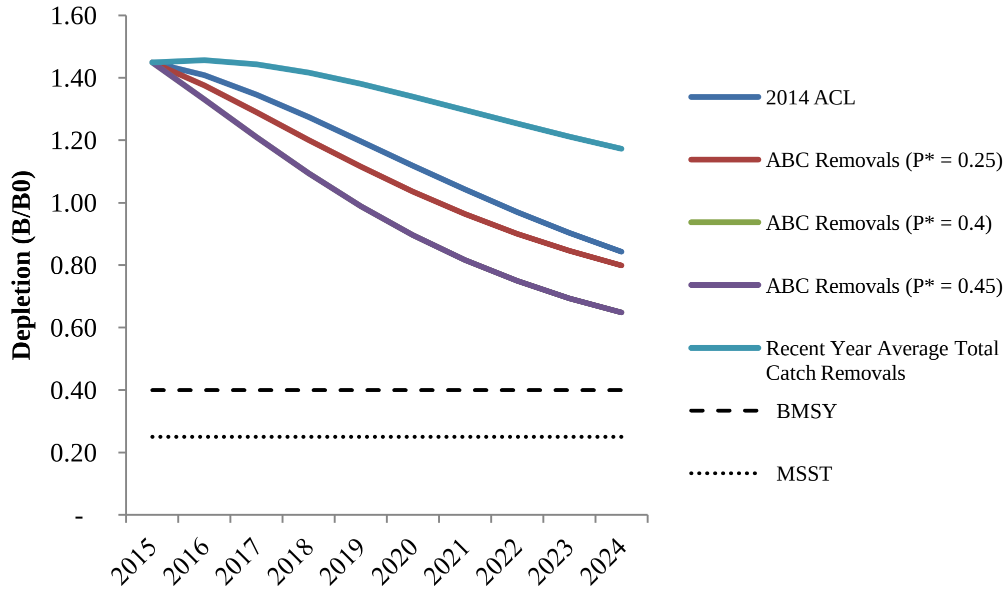


Figure 4-80. Projected depletion under alternative catch streams under the high state of nature model for lingcod south of 40º10' N lat.

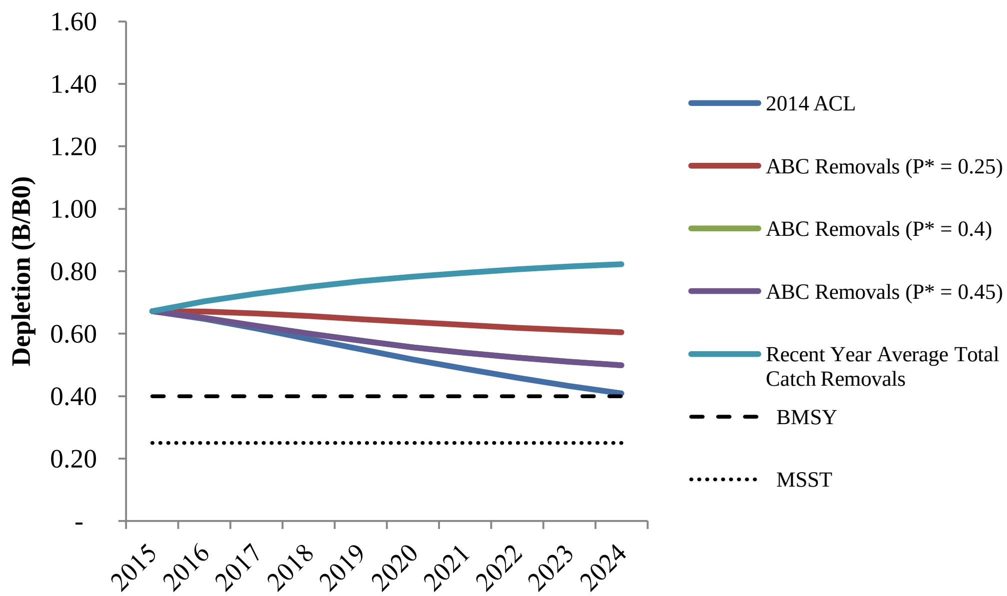


Figure 4-81. Projected depletion under alternative catch streams under the low state of nature model for lingcod south of 40º10' N lat.

4.8.5.4 Sablefish

The modeled catch scenarios for sablefish range from 4,086 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 12,335 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-28). Projected sablefish depletions for all catch scenarios under the base case state of nature are predicted to increase in abundance but remain in the precautionary zone during the projection period (Figure 4-82). Projected sablefish depletions for all catch scenarios under the high state of nature are predicted to be sustainable during the projection period (Figure 4-83). Projected sablefish depletions for all catch scenarios under the low state of nature are predicted to keep the stock at very low levels of depletion under the MSST with very little or no rebuilding (Figure 4-84).

Table 4-28. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for sablefish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	2014 ACL (No Action Alt.)	5,909
	ABC Removals (P* = 0.25; Alt. 2)	7,358
	ABC Removals (P* = 0.45; Alt. 1)	8,542
	ABC Removals (P*= 0.4; Pref. Alt.)	8,258
High	2014 ACL	5,909
	ABC Removals (P* = 0.25)	10,630
	ABC Removals (P* = 0.45)	12,335
	ABC Removals (P*= 0.4)	11,926
Low	2014 ACL	5,909
	ABC Removals (P* = 0.25)	4,086
	ABC Removals (P* = 0.45)	4,749
	ABC Removals (P*= 0.4)	4,590

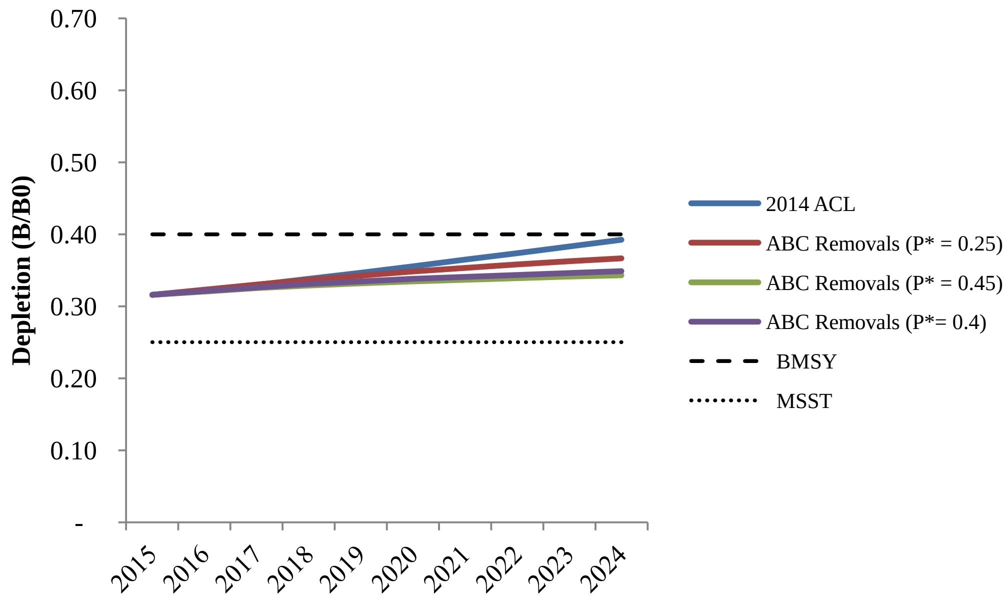


Figure 4-82. Projected depletion under alternative catch streams under the base case state of nature model for sablefish.

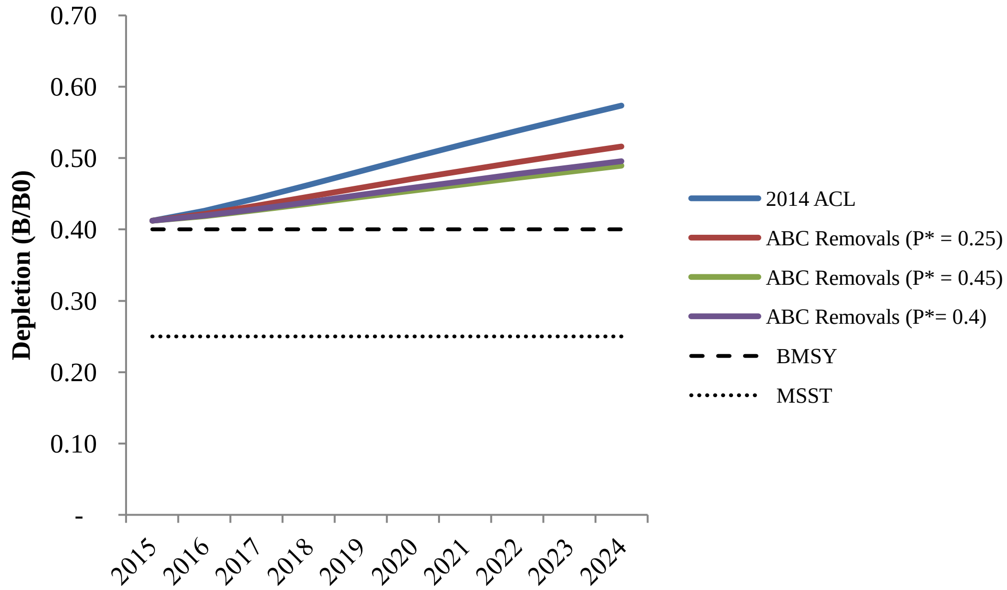


Figure 4-83. Projected depletion under alternative catch streams under the high state of nature model for sablefish.

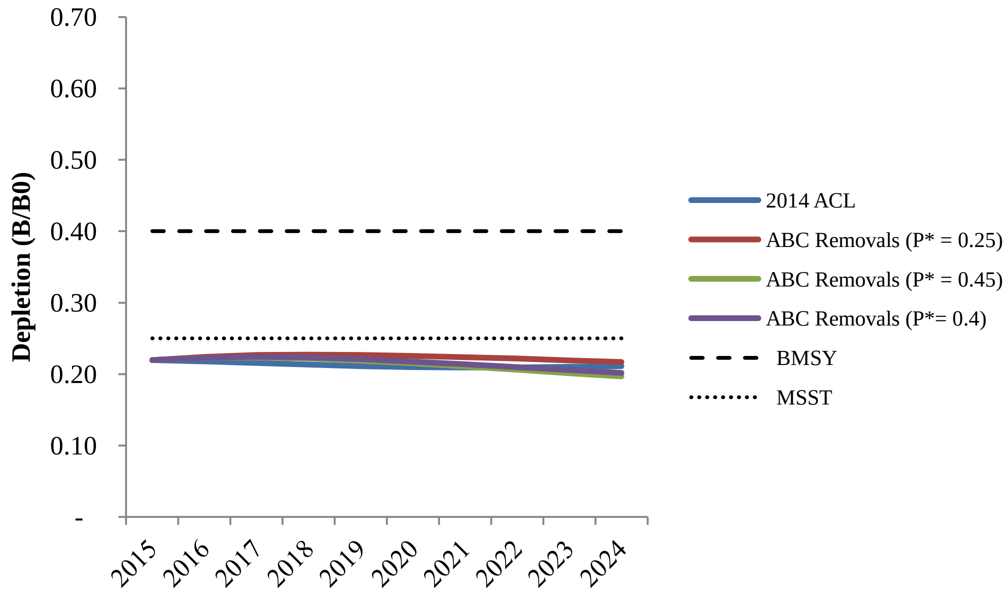


Figure 4-84. Projected depletion under alternative catch streams under the low state of nature model for sablefish.

4.8.6 Long Term Impacts of Assessed Elasmobranch Species

4.8.6.1 Longnose Skate

The modeled catch scenarios for longnose skate range from an annual average catch of 999 mt per year based on the recent year average catch scenario to an annual average catch in 2015-2024 of 2,892 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-29). Projected longnose skate depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-85 and Figure 4-86). Projected longnose skate depletions under the low state of nature for the recent year average catch scenario is predicted to be sustainable, but the other catch scenarios are predicted to drive the stock below the B_{MSY} threshold and into the precautionary zone during the projection period (Figure 4-87).

Table 4-29. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for longnose skate.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	2,014
	ABC Removals (P* = 0.45; Alt. 1)	2,382
	ACL Removals (2,000 mt constant catch; No Action Alt.; Pref. Alt.)	2,000
	Recent Year Average Total Catch Removals	999
High	ABC Removals (P* = 0.25)	2,446
	ABC Removals (P* = 0.45)	2,892
	ACL Removals (2,000 mt constant catch)	2,000
	Recent Year Average Total Catch Removals	999
Low	ABC Removals (P* = 0.25)	1,939
	ABC Removals (P* = 0.45)	2,264
	ACL Removals (2,000 mt constant catch)	2,000
	Recent Year Average Total Catch Removals	999

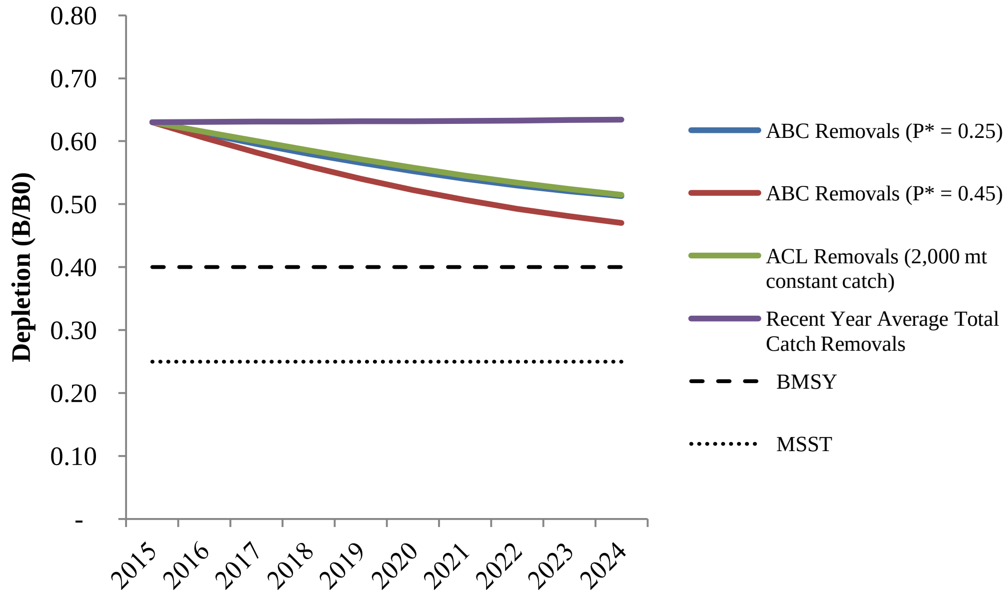


Figure 4-85. Projected depletion under alternative catch streams under the base case state of nature model for longnose skate.

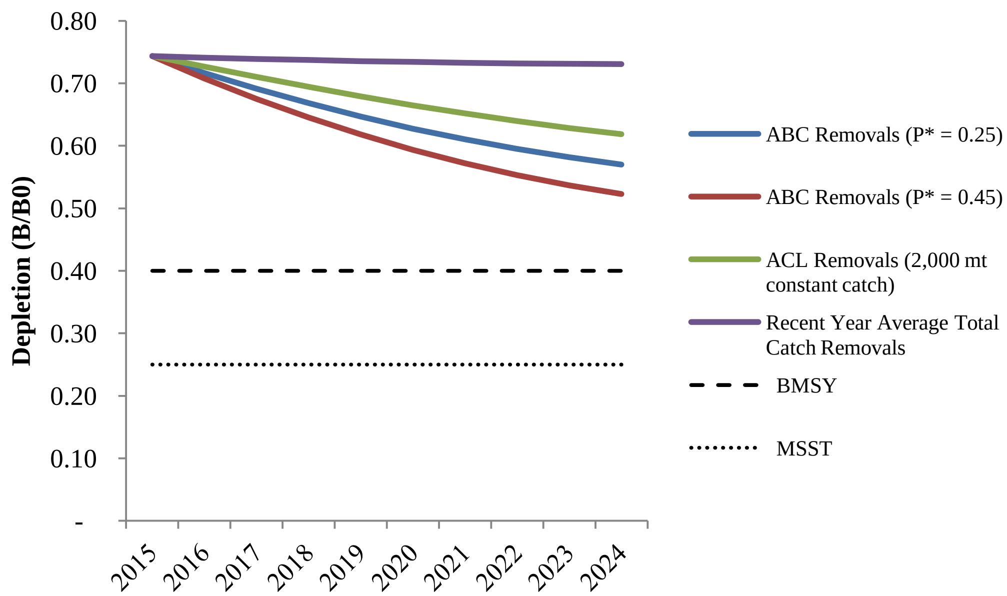


Figure 4-86. Projected depletion under alternative catch streams under the high state of nature model for longnose skate.

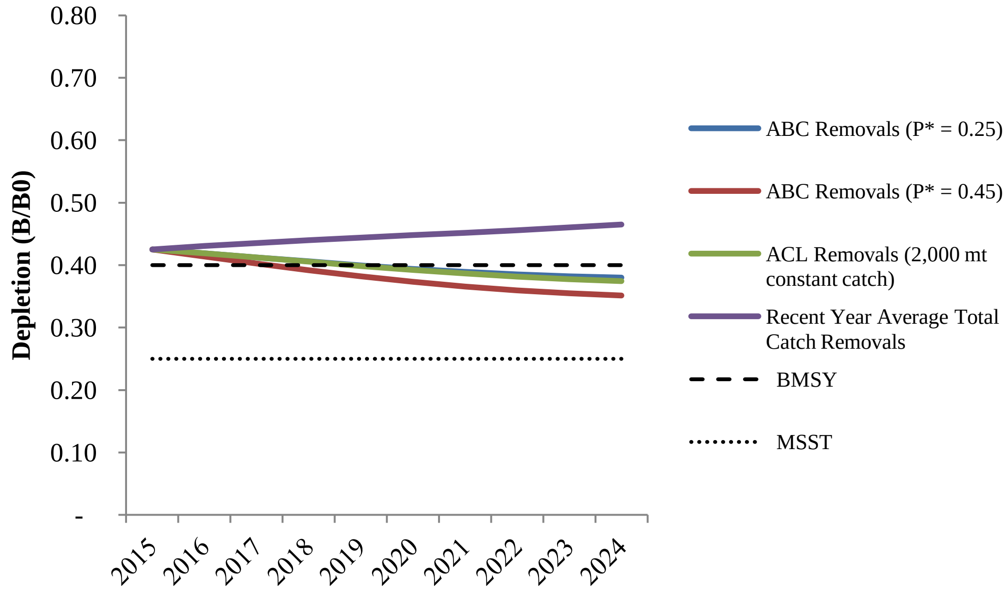


Figure 4-87. Projected depletion under alternative catch streams under the low state of nature model for longnose skate.

4.8.6.2 Spiny Dogfish

The modeled catch scenarios for spiny dogfish range from an annual average catch of 482 mt per year based on the ACL = ABC with a P* of 0.25 catch scenario under the low state of nature to an annual average catch in 2015-2024 of 5,503 mt based on the ACL = ABC with a P* of 0.45 catch scenario under the high state of nature (Table 4-30). Projected spiny dogfish depletions under the base case and high states of nature for all catch scenarios are predicted to be sustainable during the projection period (Figure 4-88 and Figure 4-89). Projected spiny dogfish depletions for all catch scenarios under the low state of nature are predicted to keep the stock in the precautionary zone during the projection period (Figure 4-90).

Table 4-30. Predicted average annual catches (mt) in 2015-2024 by state of nature and catch scenario for spiny dogfish.

State of Nature	Catch Scenario	2015-24 Average Annual Catch
Base	ABC Removals (P* = 0.25; Alt. 2)	1,560
	ABC Removals (P* = 0.35; No Action Alt.)	1,907
	ABC Removals (P* = 0.45; Alt. 1)	2,275
	Recent Year Average Total Catch Removals	1,619
High	ABC Removals (P* = 0.25)	3,775
	ABC Removals (P* = 0.35)	4,612
	ABC Removals (P* = 0.45)	5,503
	Recent Year Average Total Catch Removals	1,619
Low	ABC Removals (P* = 0.25)	482
	ABC Removals (P* = 0.35)	588
	ABC Removals (P* = 0.45)	700
	Recent Year Average Total Catch Removals	1,619

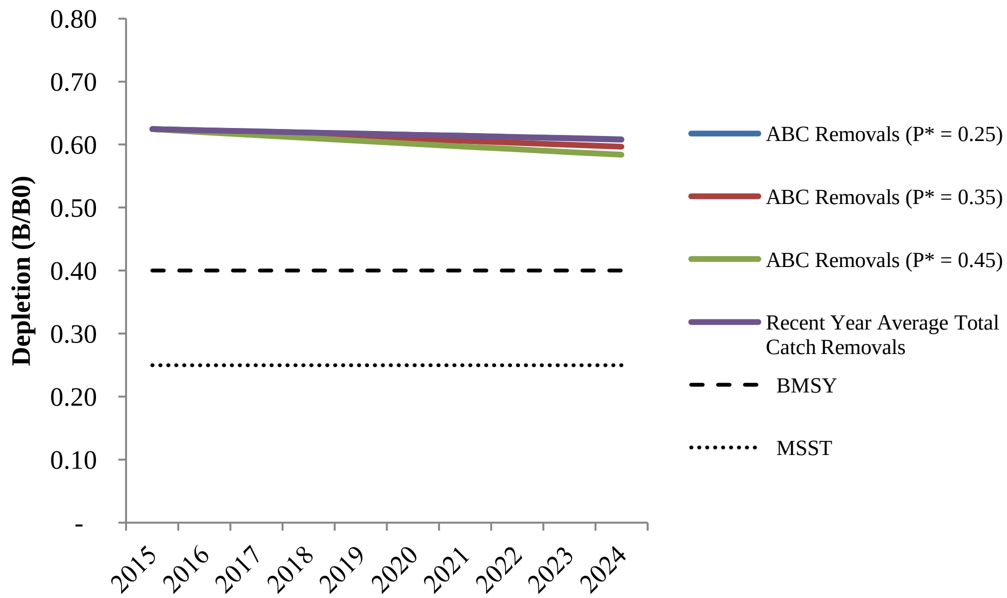


Figure 4-88. Projected depletion under alternative catch streams under the base case state of nature model for spiny dogfish.

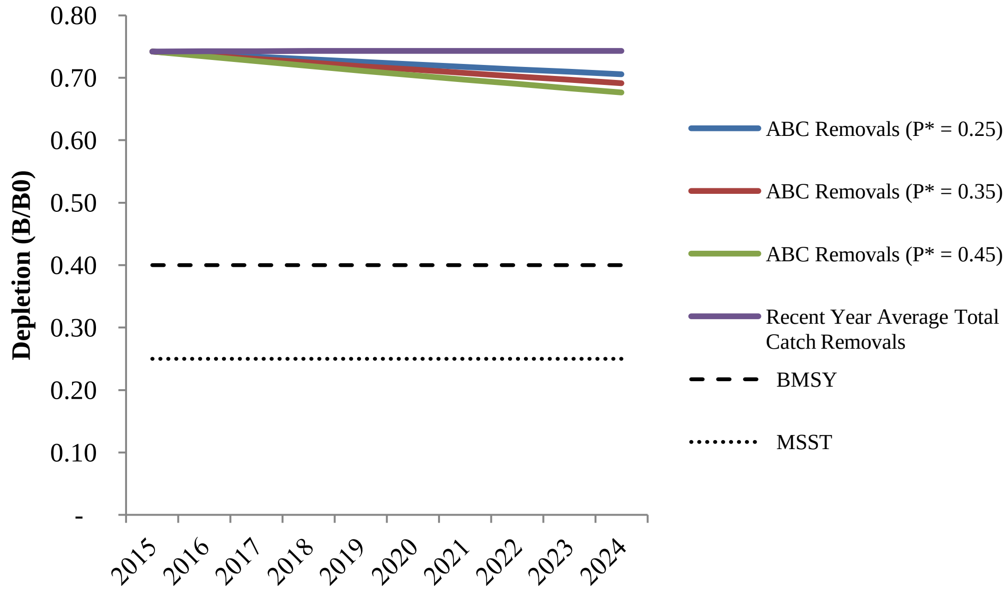


Figure 4-89. Projected depletion under alternative catch streams under the high state of nature model for spiny dogfish.

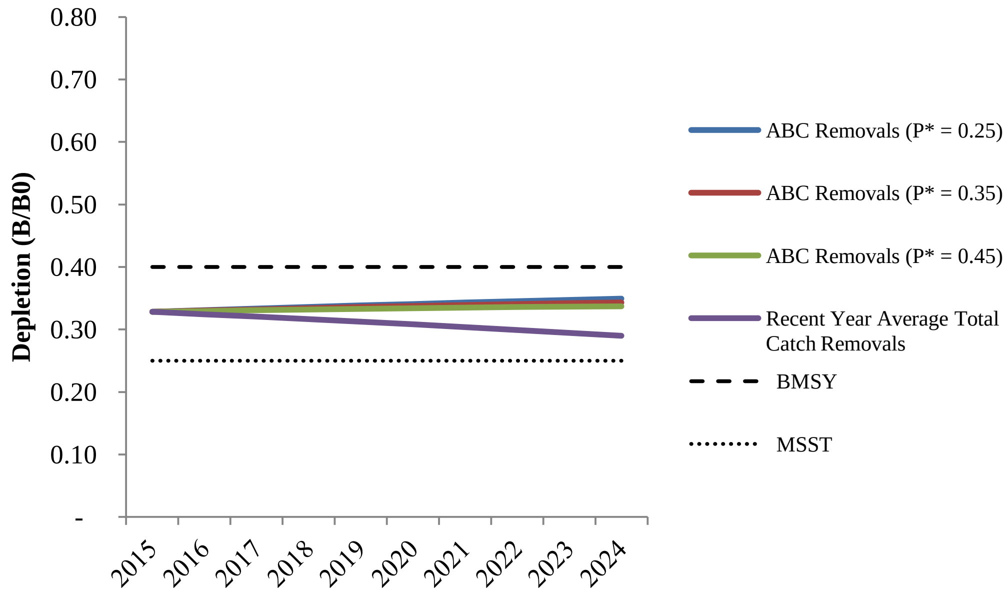


Figure 4-90. Projected depletion under alternative catch streams under the low state of nature model for spiny dogfish.

Agenda Item F.7.a
Supplemental Attachment 13
June 2014

RECOMMENDED CLARIFICATION IN PROPOSED AMENDMENT 24 FMP LANGUAGE CHANGES

For Amendment 24 Alternatives 1, 2, 3 (see Agenda Item F.7.a, Attachment 8, June 2014), the following change in the proposed amendment language for Section 5.1 is recommended. The recommended change would replace the third sentence from the end of the first paragraph of proposed amendment language in Section 5.1. The current proposed language and the recommended revision is the same in all three action alternatives.

Original Sentence (see Agenda Item F.7.a, Attachment 8, June 2014)

If the status is not known, the same method used in the previous cycle is used to compute the default HCR.

Recommended Revised Sentences

If the status has not changed or is unknown, the same method used in the previous cycle is used to compute the default HCR. This includes cases where a constant catch HCR was used in the previous cycle to set the ACL below the ABC, in which case the same constant catch numerical value is used as the default ACL for the next biennial cycle.

Rationale for the Recommended Revised Sentences

The intent of the FMP language with respect to implementing a default harvest control rule (HCR) process is to be able to specify, as a default, the harvest control rules previously analyzed with as much flexibility to incorporate new science as possible. Changes in stock status that affect a 40-10 or 25-5 ACL deduction, if that is the default, would be reflected automatically in the default specifications. Likewise, any methodological, science-based change in the OFL or the sigma value affecting an ABC specification, would automatically be the default in the specifications. In cases where P* is used to determine ABCs, the default P* would vary among the alternatives as described.

Otherwise, the default rule, whether it be a previously analyzed constant catch (i.e., constant ACL) strategy or a specific series of ACLs that are part of a strategy that is designed to endure longer than one biennial cycle (e.g., a yelloweye ramp-down type of strategy) would be specified as the default except in cases where the ACL exceeds the default ABC.

{Table 1 N: revised at 75 FR 82296, 12/30/2010; revised at 76 FR 27508, 05/11/2011; revised at 76 FR 38313, 6/30/2011; revised at 76 FR 79122, 12/21/2011; revised at 77 FR 22679, 04/17/2012; revised at 78 FR 580, 01/03/2013; revised RCA boundaries at 79 FR 21639, 4/17/2014; corrected the revised RCA boundaries, 79 FR 27196, 5/13/2014}

Table 1 (North) to Part 660, Subpart D -- Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances for non-IFQ Species and Pacific Whiting North of 40°10' N. Lat.

This table describes Rockfish Conservation Areas for vessels using groundfish trawl gear. This table describes incidental landing allowances for vessels registered to a Federal limited entry trawl permit and using groundfish trawl or groundfish non-trawl gears to harvest individual fishing quota (IFQ) species.

Other Limits and Requirements Apply -- Read § 660.10 - § 660.399 before using this table 04012014

TABLE 1 (North)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:						
1	North of 48°10' N. lat.	shore - modified[2/] 200 fm line[1/]	shore - 200 fm line[1/]	shore - 150 fm line[1/]		shore - 200 fm line[1/]	shore - modified[2/] 200 fm line[1/]
2	48°10' N. lat. - 45°46' N. lat.	100 fm line[1/] - 150 fm line[1/]					
3	45° 46' N. lat. - 40°10' N. lat.	100 fm line[1/] - modified[2/] 200 fm line[1/]	100 fm line[1/] - 200 fm line[1/]				100 fm line[1/] - modified[2/] 200 fm line[1/]

Selective flatfish trawl gear is required shoreward of the RCA; all bottom trawl gear (large footrope, selective flatfish trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope and small footrope trawl gears (except for selective flatfish trawl gear) are prohibited shoreward of the RCA. Midwater trawl gear is permitted only for vessels participating in the primary whiting season. **Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry groundfish trawl fishery landing allowances in this table, regardless of the type of fishing gear used. Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry fixed gear non-trawl RCA, as described in Tables 1 (North) and 1 (South) to Part 660, Subpart E.**

See § 660.60, § 660.130, and § 660.140 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.70-660.74 and §§ 660.76-660.79 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).

State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.

4	**Minor nearshore rockfish & Black rockfish**	300 lb/ month
5	**Whiting**	
6	midwater trawl	Before the primary whiting season: CLOSED. -- During the primary season: mid-water trawl permitted in the RCA. See §660.131 for season and trip limit details. -- After the primary whiting season: CLOSED.
7	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. -- During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.
8	**Cabezon**	
9	North of 46°16' N. lat.	Unlimited
10	46°16' N. lat. - 40°10' N. lat.	50 lb/ month
11	**Shortbelly**	Unlimited
12	**Spiny dogfish**	60,000 lb/ month
13	**Longnose skate**	Unlimited
14	**Other Fish** [3/]	Unlimited

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours, and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to the RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ The "modified" fathom lines are modified to exclude certain petrale sole areas from the RCA.

3/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skate), ratfish, morids, grenadiers, and kelp greenling.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

{Table 1 S: revised at 75 FR 82296, 12/30/2010; revised at 76 FR 27508, 05/11/2011; revised at 76 FR 38313, 6/30/2011; revised at 78 FR 580, 01/03/2013}

Table 1 (South) to Part 660, Subpart D -- Limited Entry Trawl Rockfish Conservation Areas and Landing Allowances for non-IFQ Species and Pacific Whiting South of 40^{o}10' N. Lat.

This table describes Rockfish Conservation Areas for vessels using groundfish trawl gear. This table describes incidental landing allowances for vessels registered to a Federal limited entry trawl permit and using groundfish trawl or groundfish non-trawl gears to harvest individual fishing quota (IFQ) species.

Other Limits and Requirements Apply -- Read § 660.10 - § 660.399 before using this table

01012013

TABLE 1 (South)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:						
1	South of 40^{o}10' N. lat.	100 fm line[1/] - 150 fm line [1/ 2/]					
	Small footrope trawl gear is required shoreward of the RCA; all trawl gear (large footrope, selective flatfish trawl, midwater trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope trawl gear and midwater trawl gear are prohibited shoreward of the RCA. **Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry groundfish trawl fishery landing allowances in this table, regardless of the type of fishing gear used. Vessels fishing groundfish trawl quota pounds with groundfish non-trawl gears, under gear switching provisions at § 660.140, are subject to the limited entry fixed gear non-trawl RCA, as described in Tables 1 (North) and 1 (South) to Part 660, Subpart E.**						
	See § 660.60, § 660.130, and § 660.140 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.70-660.74 and §§ 660.76-660.79 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
2	**Longspine thornyhead**						
3	South of 34^{o}27' N. lat.	24,000 lb/ 2 months					
4	**Minor nearshore rockfish & Black rockfish**	300 lb/ month					
5	**Whiting**						
6	midwater trawl	Before the primary whiting season: CLOSED. -- During the primary season: mid-water trawl permitted in the RCA. See §660.131 for season and trip limit details. -- After the primary whiting season: CLOSED.					
7	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. -- During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.					
8	**Cabezon**	50 lb/ month					
9	**Shortbelly**	Unlimited					
10	**Spiny dogfish**	60,000 lb/ month					
11	**Longnose skate**	Unlimited					
12	**California scorpionfish**	Unlimited					
13	**Other Fish [3/]**	Unlimited					

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours, and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to the RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ South of 34^{o}27' N. lat., the RCA is 100 fm line - 150 fm line along the mainland coast; shoreline - 150 fm line around islands.

3/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (excluding longnose skate), ratfish, morids, grenadiers, and kelp greenling.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

{Table 2N revised at 75 FR 82296, 12/30/2010; revised at 76 FR 11381, 03/02/2011; revised at 76 FR 27508, 05/11/2011; revised at 76 FR 38313, 6/30/2011; revised at 76 FR 79122, 12/21/2011; revised at 77 FR 24634, 04/25/2012; revised at 77 FR 47322, 08/08/2012; revised at 78 FR 580, 01/03/2013; revised at 78 FR 49190, 08/13/2013; revised at 78 FR 72586, 12/03/2013}

Table 2 (North) to Part 660, Subpart E -- Non-Trawl Rockfish Conservation Areas and Trip Limits for Limited Entry Fixed Gear North of 40°10' N. lat.

Other limits and requirements apply -- Read §§660.10 through 660.399 before using this table

11012013 and 2014

TABLE 2 (North)

		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Rockfish Conservation Area (RCA)[1/]:								
1	North of 46°16' N. lat.	shoreline - 100 fm line[1/]						
2	46°16' N. lat. - 42°00' N. lat.	30 fm line[1/] - 100 fm line[1/]						
3	42°00' N. lat. - 40°10' N. lat.	20 fm depth contour - 100 fm line[1/]						
See §§660.60 and 660.230 for additional gear, trip limit and conservation area requirements and restrictions. See §§660.70-660.74 and §§660.76-660.79 for conservation area descriptions and coordinates (including RCAs, YRCAs, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).								
State trip limits and seasons may be more restrictive than Federal trip limits or seasons, particularly in waters off Oregon and California.								
4	**Minor slope rockfish[2/] & Darkblotched rockfish**	4,000 lb/ 2 months						
5	**Pacific ocean perch**	1,800 lb/ 2 months						
6	**Sablefish**	1,850 lb/ week, not to exceed 5,500 lb/ 2 months	950 lb/ week, not to exceed 2,850 lb/ 2 months					
7	**Longspine thornyhead**	10,000 lb/ 2 months						
8	**Shortspine thornyhead**	2,500 lb/ 2 months	2,000 lb/ 2 months			2,500 lb/ 2 months		
9	**Dover sole**	5,000 lb/ month South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 0.44 in (11 mm) point to shank, and up to two 1 lb (0.45 kg) weights per line, are not subject to the RCAs.						
10	**Arrowtooth flounder**							
11	**Petrale sole**							
12	**English sole**							
13	**Starry flounder**							
14	**Other flatfish[3/]**							
15	**Whiting**	10,000 lb/ trip						
16	**Minor shelf rockfish[2/], Shortbelly, Widow & Yellowtail rockfish**	200 lb/ month						
17	**Canary rockfish**	CLOSED						
18	**Yelloweye rockfish**	CLOSED						
19	**Minor nearshore rockfish & Black**							
20	North of 42°00' N. lat.	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black rockfish or blue rockfish[4/]						
21	42°00' N. lat. - 40°10' N. lat.	8,500 lb/ 2 months, of which no more than 1,200 lb of which may be species other than black rockfish						
22	**Lingcod[5/]**	400 lb/ month CLOSED	CLOSED		800 lb/ 2 months			400 lb/ month CLOSED
23	**Pacific cod**	1,000 lb/ 2 months						
24	**Spiny dogfish**	100,000 lb/ 2 months	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
25	**Longnose skate**	Unlimited						
26	**Other fish[6/]**	Unlimited						

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ Bocaccio, chilipepper and cowcod are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.

3/ "Other flatfish" are defined at § 660.11 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.

4/ For black rockfish north of Cape Alava (48°09.50' N. lat.), and between Destruction Is. (47°40' N. lat.) and Leadbetter Pnt. (46°38.17' N. lat.), there is an additional limit of 100 lb or 30 percent by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

5/ The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42° N. lat. and 24 inches (61 cm) total length South of 42° N. lat.

6/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skates), ratfish, morids, grenadiers, and kelp greenling. Cabezon are included in the trip limits for "other fish."

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

{Table 2S revised at 75 FR 82296, 12/30/2010; revised at 76 FR 11381, 03/02/2011; revised at 76 FR 27508, 05/11/2011; revised at 76 FR 38313, 6/30/2011; revised at 76 FR 67092, 10/31/2011; revised at 76 FR 79122, 12/21/2011; revised at 77 FR 24634, 04/25/2012; revised at 77 FR 47322, 08/08/2012; revised at 78 FR 580, 01/03/2013; revised at 78 FR 49190, 08/13/2013; revised at 78 FR 72586, 12/03/2013}

Table 2 (South) to Part 660, Subpart E -- Non-Trawl Rockfish Conservation Areas and Trip Limits for Limited Entry Fixed Gear South of 40°10' N. lat.

Other limits and requirements apply -- Read §§660.10 through 660.399 before using this table — 11012013 and 2014

TABLE 2 (South)

		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:							
1	40°10' N. lat. - 34°27' N. lat.	30 fm line[1/] - 150 fm line[1/]						
2	South of 34°27' N. lat.	60 fm line[1/] - 150 fm line[1/] (also applies around islands)						
	See §§660.60 and 660.230 for additional gear, trip limit and conservation area requirements and restrictions. See §§660.70-660.74 and §§660.76-660.79 for conservation area descriptions and coordinates (including RCAs, YRCAs, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).							
	State trip limits and seasons may be more restrictive than Federal trip limits or seasons, particularly in waters off Oregon and California.							
3	**Minor slope rockfish[2/] & Darkblotched rockfish**	40,000 lb/ 2 months, of which no more than 1,375 lb may be blackgill rockfish						
4	**Splitnose rockfish**	40,000 lb/ 2 months						
5	**Sablefish**							
6	40°10' N. lat. - 36°00' N. lat.	1,850 lb/ week, not to exceed 5,500 lb/ 2 months	950 lb/ week, not to exceed 2,850 lb/ 2 months					
7	South of 36°00' N. lat.	1,880 lb/ week	2,000 lb/ week					
8	**Longspine thornyhead**	10,000 lb/ 2 months						
9	**Shortspine thornyhead**							
10	40°10' N. lat. - 34°27' N. lat.	2,500 lb/ 2 months	2,000 lb/ 2 months			2,500 lb/ 2 months		
11	South of 34°27' N. lat.	3,000 lb/ 2 months						
12	**Dover sole**	5,000 lb/ month South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 0.44 in (11 mm) point to shank, and up to two 1 lb (0.45 kg) weights per line, are not subject to the RCAs.						
13	**Arrowtooth flounder**							
14	**Petrale sole**							
15	**English sole**							
16	**Starry flounder**							
17	**Other flatfish[3/]**							
18	**Whiting**	10,000 lb/ trip						
19	**Minor shelf rockfish[2/], Shortbelly, Widow rockfish (including Bocaccio and Chilipepper between 40°10' - 34°27' N. lat.)**							
20	40°10' N. lat. - 34°27' N. lat.	Minor shelf rockfish, shortbelly, widow rockfish, bocaccio & chilipepper: 2,500 lb/ 2 months, of which no more than 500 lb may be any species other than chilipepper.						
21	South of 34°27' N. lat.	4,000 lb/ 2 months	3,000 lb/ 2 months	CLOSED	3,000 lb/ 2 months	4,000 lb/ 2 months		
22	**Chilipepper**							
23	40°10' N. lat. - 34°27' N. lat.	Chilipepper included under minor shelf rockfish, shortbelly, widow rockfish and bocaccio limits - - See above						
24	South of 34°27' N. lat.	2,000 lb/ 2 months, this opportunity only available seaward of the non-trawl RCA						
25	**Canary rockfish**	CLOSED						
26	**Yelloweye rockfish**	CLOSED						
27	**Cowcod**	CLOSED						
28	**Bronzespotted rockfish**	CLOSED						
29	**Bocaccio**							
30	40°10' N. lat. - 34°27' N. lat.	Bocaccio included under Minor shelf rockfish, shortbelly, widow rockfish & chilipepper limits - - See above						
31	South of 34°27' N. lat.	500 lb/ 2 months	300 lb/ 2 months	CLOSED	300 lb/ 2 months	500 lb/ 2 months		

Table 2 (South). Continued

		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
32	**Minor nearshore rockfish & Black rockfish**							
33	Shallow nearshore	1,000 lb/ 2 months	600 lb/ 2 months	CLOSED	800 lb/ 2 months	900 lb/ 2 months	800 lb/ 2 months	1,000 lb/ 2 months
34	Deeper nearshore							
35	40°10' N. lat. - 34°27' N. lat.	1,000 lb/ 2 months	700 lb/ 2 months	CLOSED	700 lb/ 2 months	900 lb/ 2 months		1,000 lb/ 2 months
36	South of 34°27' N. lat.		500 lb/ 2 months		600 lb/ 2 months			
37	California scorpionfish	1,200 lb/ 2 months	1,200 lb/ 2 months[6/]	CLOSED	1,200 lb/ 2 months	1,200 lb/ 2 months		
38	**Lingcod**[4/]	400 lb/ month / CLOSED	CLOSED		800 lb/ 2 months			400 lb/ month / CLOSED
39	**Pacific cod**	1,000 lb/ 2 months						
40	**Spiny dogfish**	100,000 lb/ 2 months	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
41	**Longnose skate**	Unlimited						
42	**Other fish**[5/]	Unlimited						

TABLE 2 (South)

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ POP is included in the trip limits for minor slope rockfish. Blackgill rockfish have a species specific trip sub-limit within the minor slope rockfish cumulative limit. Yellowtail rockfish are included in the trip limits for minor shelf rockfish. Bronzespotted rockfish have a species specific trip limit.

3/ "Other flatfish" are defined at § 660.11 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.

4/ The commercial mimimum size limit for lingcod is 24 inches (61 cm) total length South of 42° N. lat.

5/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skates), ratfish, morids, grenadiers, and kelp greenling. Cabezon and longnose skate are included in the trip limits for "other fish."

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

{Table 3N revised at 75 FR 82296, 12/30/2010; revised at 76 FR 11381, 03/02/2011; revised at 76 FR 27508, 05/11/2011, revised at 76 FR 38313, 6/30/2011; revised at 76 FR 79122, 12/21/2011; revised at 78 FR 580, 01/03/2013; revised at 78 FR 49190, 08/13/2013; revised at 78 FR 72586, 12/03/2013}

Table 3 (North) to Part 660, Subpart F -- Non-Trawl Rockfish Conservation Areas and Trip Limits for Open Access Gears North of 40°10' N. lat.

Other limits and requirements apply -- Read §§660.10 through 660.399 before using this table 11012013 and 2014

TABLE 3 (North)

		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:							
1	North of 46°16' N. lat.	shoreline - 100 fm line[1/]						
2	46°16' N. lat. - 42°00' N. lat.	30 fm line[1/] - 100 fm line[1/]						
3	42°00' N. lat. - 40°10' N. lat.	20 fm depth contour - 100 fm line[1/]						
	See §§660.60, 660.330 and 660.333 for additional gear, trip limit and conservation area requirements and restrictions. See §§660.70-660.74 and §§660.76-660.79 for conservation area descriptions and coordinates (including RCAs, YRCAs, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).							
	State trip limits and seasons may be more restrictive than Federal trip limits or seasons, particularly in waters off Oregon and California.							
4	**Minor slope rockfish[2/] & Darkblotched rockfish**	Per trip, no more than 25% of weight of the sablefish landed						
5	**Pacific ocean perch**	100 lb/ month						
6	**Sablefish**	300 lb/ day, or 1 landing per week of up to 1,200 lb, not to exceed 2,400 lb/ 2 months	300 lb/ day, or 1 landing per week of up to 800 lb, not to exceed 1,600 lb/ 2 months					
7	**Thornyheads**	CLOSED						
8	**Dover sole**	3,000 lb/ month, no more than 300 lb of which may be species other than Pacific sanddabs. South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 0.44 in (11 mm) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.						
9	**Arrowtooth flounder**							
10	**Petrale sole**							
11	**English sole**							
12	**Starry flounder**							
13	**Other flatfish[3/]**							
14	**Whiting**	300 lb/ month						
15	**Minor shelf rockfish[2/], Shortbelly, Widow & Yellowtail rockfish**	200 lb/ month						
16	**Canary rockfish**	CLOSED						
17	**Yelloweye rockfish**	CLOSED						
18	**Minor nearshore rockfish & Black rockfish**							
19	North of 42°00' N. lat.	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black rockfish						
20	42°00' N. lat. - 40°10' N. lat.	8,500 lb/ 2 months, of which no more than 1,200 lb may be species other than black rockfish						
21	**Lingcod[5/]**	400 lb/ month	CLOSED		400 lb/ month			CLOSED
22	**Pacific cod**	1,000 lb/ 2 months						
23	**Spiny dogfish**	100,000 lb/ 2 months	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
24	**Longnose skate**	Unlimited						
25	**Other fish[6/]**	Unlimited						

Table 3 (North). Continued

		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
26	**SALMON TROLL** *(subject to RCAs when retaining all species of groundfish, except for yellowtail rockfish and lingcod, as described below)*							
27	North	Salmon trollers may retain and land up to 1 lb of yellowtail rockfish for every 2 lbs of salmon landed, with a cumulative limit of 200 lb/month, both within and outside of the RCA. This limit is within the 200 lb per month combined limit for minor shelf rockfish, widow rockfish and yellowtail rockfish, and not in addition to that limit. Salmon trollers may retain and land up to 1 lingcod per 15 Chinook per trip, plus 1 lingcod per trip, up to a trip limit of 10 lingcod, on a trip where any fishing occurs within the RCA. This limit only applies during times when lingcod retention is allowed, and is not "CLOSED." This limit is within the per month limit for lingcod described in the table above, and not in addition to that limit. All groundfish species are subject to the open access limits, seasons, size limits and RCA restrictions listed in the table above, unless otherwise stated here.						
28	**PINK SHRIMP NON-GROUNDFISH TRAWL** *(not subject to RCAs)*							
29	North	**Effective April 1 - October 31:** Groundfish: 500 lb/day, multiplied by the number of days of the trip, not to exceed 1,500 lb/trip. The following sublimits also apply and are counted toward the overall 500 lb/day and 1,500 lb/trip groundfish limits: lingcod 300 lb/month (minimum 24 inch size limit); sablefish 2,000 lb/month; canary, thornyheads and yelloweye rockfish are PROHIBITED. All other groundfish species taken are managed under the overall 500 lb/day and 1,500 lb/trip groundfish limits. Landings of these species count toward the per day and per trip groundfish limits and do not have species-specific limits. The amount of groundfish landed may not exceed the amount of pink shrimp landed.						

TABLE 3 (North) cont'd

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ Bocaccio, chilipepper and cowcod rockfishes are included in the trip limits for minor shelf rockfish. Splitnose rockfish is included in the trip limits for minor slope rockfish.

3/ "Other flatfish" are defined at § 660.11 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.

4/ For black rockfish north of Cape Alava (48°09.50' N. lat.), and between Destruction Is. (47°40' N. lat.) and Leadbetter Pnt. (46°38.17' N. lat.), there is an additional limit of 100 lbs or 30 percent by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

5/ The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42° N. lat. and 24 inches (61 cm) total length South of 42° N. lat.

6/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skates), ratfish, morids, grenadiers, and kelp greenling. Cabezon are included in the trip limits for "other fish."

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

{Table 3S revised at 75 FR 82296, 12/30/2010; revised at 76 FR 27508, 05/11/2011, revised at 76 FR 38313, 6/30/2011; revised at 76 FR 67092, 10/31/2011; revised at 76 FR 79122, 12/21/2011; revised at 77 FR 63758, 10/17/2012, effective 11/1/2012; revised at 78 FR 49190, 08/13/2013; revised at 78 FR 72586, 12/03/2013}

Table 3 (South) to Part 660, Subpart F -- Non-Trawl Rockfish Conservation Areas and Trip Limits for Open Access Gears South of 40°10' N. lat.

Other limits and requirements apply -- Read §§660.10 through 660.399 before using this table 11012013 and 2014

#		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[1/]:							
1	40°10' N. lat. - 34°27' N. lat.	30 fm line[1/] - 150 fm line[1/]						
2	South of 34°27' N. lat.	60 fm line[1/] - 150 fm line[1/] (also applies around islands)						
	See §§660.60 and 660.230 for additional gear, trip limit and conservation area requirements and restrictions. See §§660.70-660.74 and §§660.76-660.79 for conservation area descriptions and coordinates (including RCAs, YRCAs, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).							
	State trip limits and seasons may be more restrictive than Federal trip limits or seasons, particularly in waters off Oregon and California.							
3	**Minor slope rockfish[2/] & Darkblotched rockfish**	10,000 lb/ 2 months, of which no more than 475 lb may be blackgill rockfish						
4	**Splitnose rockfish**	200 lb/ month						
5	**Sablefish**							
6	40°10' N. lat. - 36°00' N. lat.	300 lb/ day, or 1 landing per week of up to 1,200 lb, not to exceed 2,400 lb/ 2 months	300 lb/ day, or 1 landing per week of up to 800 lb, not to exceed 1,600 lb/ 2 months					
7	South of 36°00' N. lat.	380 lb/ day, or 1 landing per week of up to 1,800 lb, not to exceed 3,800 lb/ 2 months	300 lb/ day, or 1 landing per week of up to 1,600 lb, not to exceed 3,200 lb/ 2 months					
8	**Thornyheads**							
9	40°10' N. lat. - 34°27' N. lat.	CLOSED						
10	South of 34°27' N. lat.	50 lb/ day, no more than 1,000 lb/ 2 months						
11	**Dover sole**	3,000 lb/ month, no more than 300 lb of which may be species other than Pacific sanddabs.						
12	**Arrowtooth flounder**							
13	**Petrale sole**	South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 0.44 in (11 mm) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.						
14	**English sole**							
15	**Starry flounder**							
16	**Other flatfish[3/]**							
17	**Whiting**	300 lb/ month						
18	**Minor shelf rockfish[2/], Shortbelly, Widow rockfish and Chilipepper**							
19	40°10' N. lat. - 34°27' N. lat.	300 lb/ 2 months		CLOSED	200 lb/ 2 months		300 lb/ 2 months	
20	South of 34°27' N. lat.	1,000 lb/ 2 months	750 lb/ 2 months	CLOSED	750 lb/ 2 months	1,000 lb/ 2 months		
21	**Canary rockfish**	CLOSED						
22	**Yelloweye rockfish**	CLOSED						
23	**Cowcod**	CLOSED						
24	**Bronzespotted rockfish**	CLOSED						
25	**Bocaccio**							
26	40°10' N. lat. - 34°27' N. lat.	200 lb/ 2 months		CLOSED	100 lb/ 2 months		200 lb/ 2 months	
27	South of 34°27' N. lat.	200 lb/ 2 months	100 lb/ 2 months	CLOSED	100 lb/ 2 months	200 lb/ 2 months		

TABLE 3 (South)

Table 3 (South). Continued

TABLE 3 (South) cont'd

		NOV-DEC 2013	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
28	**Minor nearshore rockfish & Black rockfish**							
29	Shallow nearshore	1,000 lb/ 2 months	600 lb/ 2 months	CLOSED	800 lb/ 2 months	900 lb/ 2 months	800 lb/ 2 months	1,000 lb/ 2 months
30	Deeper nearshore							
31	40°10' N. lat. - 34°27' N. lat.	1,000 lb/ 2 months	700 lb/ 2 months	CLOSED	700 lb/ 2 months	900 lb/ 2 months		1,000 lb/ 2 months
32	South of 34°27' N. lat.		500 lb/ 2 months		600 lb/ 2 months			
33	California scorpionfish	1,200 lb/ 2 months		CLOSED	1,200 lb/ 2 months			
34	**Lingcod[4/]**	400 lb/ month / CLOSED	CLOSED		400 lb/ month			400 lb/ month / CLOSED
35	**Pacific cod**	1,000 lb/ 2 months						
36	**Spiny dogfish**	100,000 lb/ 2 months	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
37	**Longnose skate**	Unlimited						
38	**Other fish[5/]**	Unlimited						
39	**RIDGEBACK PRAWN AND, SOUTH OF 38°57.50' N. LAT., CA HALIBUT AND SEA CUCUMBER NON-GROUNDFISH TRAWL**							
40	**NON-GROUNDFISH TRAWL Rockfish Conservation Area (RCA) for CA Halibut, Sea Cucumber & Ridgeback Prawn:**							
41	*40° 10' N. lat. - 38° 00' N. lat.*	*100 fm line[1/] - 200 fm line[1/]*		*100 fm line[1/] - 150 fm line[1/]*				*100 fm line[1/] - 200 fm line[1/]*
42	*38° 00' N. lat. - 34° 27' N. lat.*	*100 fm line[1/] - 150 fm line[1/]*						
43	*South of 34° 27' N. lat.*	*100 fm line[1/] - 150 fm line[1/] along the mainland coast; shoreline - 150 fm line[1/] around islands*						
44		Groundfish: 300 lb/trip. Species-specific limits described in the table above also apply and are counted toward the 300 lb groundfish per trip limit. The amount of groundfish landed may not exceed the amount of the target species landed, except that the amount of spiny dogfish landed may exceed the amount of target species landed. Spiny dogfish are limited by the 300 lb/trip overall groundfish limit. The daily trip limits for sablefish coastwide and thornyheads south of Pt. Conception and the overall groundfish "per trip" limit may not be multiplied by the number of days of the trip. Vessels participating in the California halibut fishery south of 38°57.50' N. lat. are allowed to (1) land up to 100 lb/day of groundfish without the ratio requirement, provided that at least one California halibut is landed and (2) land up to 3,000 lb/month of flatfish, no more than 300 lb of which may be species other than Pacific sanddabs, sand sole, starry flounder, rock sole, curlfin sole, or California scorpionfish (California scorpionfish is also subject to the trip limits and closures in line 31).						
45	**PINK SHRIMP NON-GROUNDFISH TRAWL GEAR** *(not subject to RCAs)*							
46	South	Effective April 1 - October 31: Groundfish: 500 lb/day, multiplied by the number of days of the trip, not to exceed 1,500 lb/trip. The following sublimits also apply and are counted toward the overall 500 lb/day and 1,500 lb/trip groundfish limits: lingcod 300 lb/ month (minimum 24 inch size limit); sablefish 2,000 lb/ month; canary, thornyheads and yelloweye rockfish are PROHIBITED. All other groundfish species taken are managed under the overall 500 lb/day and 1,500 lb/trip groundfish limits. Landings of all groundfish species count toward the per day, per trip or other species-specific sublimits described here and the species-specific limits described in the table above do not apply. The amount of groundfish landed may not exceed the amount of pink shrimp landed.						

1/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.71-660.74. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

2/ POP is included in the trip limits for minor slope rockfish. Blackgill rockfish have a species specific trip sub-limit within the minor slope rockfish cumulative limits. Yellowtail rockfish is included in the trip limits for minor shelf rockfish. Bronzespotted rockfish have a species specific trip limit.

3/ "Other flatfish" are defined at § 660.11 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.

4/ The commercial mimimum size limit for lingcod is 24 inches (61 cm) total length South of 42° N. lat.

5/ "Other fish" are defined at § 660.11 and include sharks (except spiny dogfish), skates (except longnose skate), ratfish, morids, grenadiers, and kelp greenling. Cabezon are included in the trip limits for "other fish."

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Agenda Item F.7.b
Supplemental CDFW Report 1
June 2014

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE REPORT ON THE 2015-2016 BIENNIAL HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES

The California Department of Fish and Wildlife (CDFW) offers the following comments for management approaches of nearshore rockfish in 2015 and 2016 and beyond.

CDFW acknowledges the preferred management options in the Washington and Oregon Departments of Fish and Wildlife (WDFW/ODFW) report for management of nearshore stocks (Agenda Item F.7.b, Supplemental WDFW/ODFW Report) and supports individual flexibility in managing nearshore stocks within respective state processes. While all of the states may have different approaches to nearshore fishery management, one commonality is the understanding that a one-size fits all approach may not work for all.

During adoption of the 2013 data moderate stock assessments, many complexities were identified in the application of assessment results to nearshore rockfish management. Since these complexities will require ongoing discussion about how to proceed in the future and will likely take time to resolve, CDFW is supportive of the general management approach outlined by WDFW and ODFW for 2015 and 2016. We believe these interim measures strike a balance between responding to the newest science and minimizing disruptions to the fishery.

CDFW proposes the following approach for managing the nearshore complex from 40°10’ N lat. to 42° N lat. which recognizes our differing management needs and ability to respond to inseason actions:

- Establish a harvest guideline for minor nearshore rockfish between 42° N lat. (Oregon/California border) and 40°10’ N lat. (Cape Mendocino) which would be specified in federal regulations. This harvest guideline would be specified at 23.7 mt (Table 1; Supplemental WDFW/ODFW Report); a number which represents the No Action alternative in the EIS [i.e., expected commercial landings (Table 4-39) combined with projected recreational mortality (Table 4-50)].

- In accordance with CDFW’s policy to provide a stable fishery and minimize inseason disruptions, seasons will continue to be designed and modeled preseason in order to maximize fishing opportunity while expecting to keep harvest within specified harvest guidelines. CDFW employs the use of multi-month closures early in the year as part of the overall design to ensure that limits are not exceeded. While we are committed to our inseason tracking process and taking actions as needed in response to the latest information, season structures are designed with an expectation that we will not need to take inseason action.

- CDFW will continue to monitor harvest levels of nearshore fisheries inseason and to share catch tracking information with the other states.

- CDFW will continue to employ the same approach used for monitoring of other species with an established state harvest guideline (e.g. blue, canary, and yelloweye rockfish). Harvest levels will be monitored inseason and if projected catches are expected to exceed harvest limits we would take appropriate action in coordination with the National Marine Fisheries Service.

The 2013 data moderate stock assessment and review process was less than optimal and many lessons were learned on how to better improve the process for the future. CDFW is encouraged to see that those comments are being considered during planning and prioritization for groundfish stock assessments in 2015 (Agenda Item F.8.b, NWFSC Report).

To prevent future confusion or delays in management and regulatory development, CDFW believes a broader discussion on nearshore species assessments and management needs to occur outside the stock assessment cycle before engaging in additional full or data moderate nearshore rockfish assessments. Addressing these complex issues during a stock assessment review or on the Council floor is not optimal. If this does not occur, the issues experienced during the 2013 assessment cycle (i.e., boundary issues) are likely to be repeated again especially as the Council is currently considering the use of data moderate assessments for nearshore stocks that have been previously assessed at state boundaries (e.g. blue and gopher rockfish). CDFW also believes that these discussions should be holistic and address the complex as a whole instead of focusing solely on a few individual species as is currently being done now.

CDFW also notes that there is disconnect between management of overfished species and nearshore stocks. Overfished species are allocated to the states according to state boundaries for some sectors, but target stocks are not necessarily aligned with those same boundaries. This reduces the flexibility of the states to effectively manage their recreational and commercial nearshore fisheries. Establishing individual state harvest guidelines in federal regulations instead of sector specific limits would provide needed flexibility for state management and allow states to work out sector allocations within the respective state delegations. CDFW hopes that issues such as this would also be included in a broader scale discussion of nearshore rockfish management moving forward.

GROUNDFISH ADVISORY SUBPANEL REPORT ON FISHERIES IN 2015-2016 AND BEYOND: HARVEST SPECIFICATIONS, MANAGEMENT MEASURES, AND AMENDMENT 24

The Groundfish Advisory Subpanel (GAP) met with members of the Groundfish Management Team (GMT), Mr. John DeVore, and Ms. Kelly Ames to consider management measures for the 2015-16 cycle, and offers the following comments.

In this statement, the GAP uses the checklist found at Agenda Item F.7.a, Attachment 1, Action Item.

Recognizing that the Council is behind on its agenda, the GAP has identified the following items as ones that: 1) the GAP has identified as departing from the preliminary preferred alternative (PPA) or final preferred alternative (FPA); 2) the GAP specifically supports and adds clarification or details; or 3) is a change from our recommendations in April. However, our comments on all of the items on the checklist will at least be in the Council record.

The important ones to the GAP are:

- No. 6. Confirm EC species' designations
- No. 8. Decide FPA for Slope Rockfish complexes
- No. 9. Confirm or modify amounts deducted from the ACL
- No. 11. Trawl/non-trawl: Confirm or modify 2-year trawl and non-trawl allocations for: Overfished species: bocaccio, canary, cowcod, petrale and yelloweye
- No. 13 Non-trawl: Confirm or modify 2-year within-non-trawl HGs or within non-trawl shares for: Ovefished species including bocaccio, canary, cowcod and yelloweye
- No. 13 Non-trawl: Confirm or modify 2-year within-non-trawl HGs or within non-trawl shares for: Nearshore rockfish HG north of 40° 10'
- No. 15 Shorebased IFQ: Trawl RCA, non-IFQ trip limits
- No. 16. Non-nearshore: Non-trawl RCA seaward configuration, trip limits (including sablefish)
- No. 17 Non-Trawl RCA shoreward configuration, trip limits
- No. 18 WA recreational
- No. 19 OR recreational
- No. 20 CA recreational
- No. 21 Trawl: RCA boundary adjustments to better approximate depth
- No. 22 Trawl: Using underutilized set-asides
- No. 23 Non-trawl: Trip limit adjustments
- No. 25 Trawl: Establish new trawl RCA coordinates for 300 and 350 fm boundaries
- No. 26 Non-trawl: Provide for lingcod retention in Periods, 1, 2 and 6
- No. 27 Non-trawl recreational: One-fish canary sub-bag limit

2015-2016 Harvest Specifications

1. Confirm SSC-recommended OFLs including a revised 2016 cowcod OFL

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table I

→ The GAP confirms the SSC recommendations, including the revised cowcod 2016 OFL of 68 tons.

2. Confirm P* and ABCs. Adopt revised 2016 cowcod ABC

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 1

→ The GAP confirms the SSC recommendations, including the revised cowcod 2016 ABC of 62 tons.

3. Confirm FPA ACLs

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 1

→ The GAP agrees with the Final Preferred Alternative ACLs as listed in Table 1 of Attachment 2.

4. Confirm 4 mt ACT for cowcod

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 1

→ The GAP agrees with the Final Preferred Alternative ACTs of 4 mt in 2015 and 2016, as listed in Attachment 2, Table 2.

5. Confirm rebuilding plan parameters including a new T_{TARGET} for cowcod ABC

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications F.7.a, Att. 4, Draft Environmental Impact Statement	Table 2 Page 127, section 4.1.1.3

→ The GAP agrees with the Final Preferred Alternative T_{TARGET} of 2020 for cowcod as listed in Table 2 and corresponding to the preferred ACT.

2015-2016 Stock Complexes

6. Confirm EC species' designations and associated FMP language to be implemented under Amendment 24

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 8, Proposed Groundfish FMP Amendment Language	Table 3-2

→ The GAP agrees with the species listed in Table 3-2 in Attachment 8 as ecosystem component (EC) species. GAP members discussed Pacific grenadier (*Coryphaenoides acrolepis*) at length in April 2013 and determined it would fit well as an EC species.

Further, we understand National Marine Fisheries Service (NMFS) has concerns about removing Pacific grenadier from the fishery management plan (FMP). To that end, we reiterate our comments from April 2013, D.3.b, GAP Report on Stock Assemblages:

> "The GAP recommends an alternative for analysis that removes Pacific grenadier from the FMP. Pacific grenadier, as well as the other endemic grenadier species, are caught incidentally in West Coast fisheries and are not targeted. Furthermore, since these are deepwater species, catch of grenadiers are restricted since the prohibition on trawling deeper than 700 fm went into effect in 2006 with the final rule implementing Amendment 19. Since 2006, the average annual landings of grenadiers is 127.7 mt. Finally, the GAP notes the core distribution of grenadiers is much deeper than the 700 fm limit for West Coast trawl fisheries. Therefore, if harvest were to increase from the recent year average, there would be no biological effect of any significance since the fishery cannot access the core population."

7. Confirm FPA to manage kelp greenling coastwide, WA cabezon, and leopard shark in the Other Fish complex ABC

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Table 4-16

→ The GAP agrees with this management change.

8. Decide FPA for Slope Rockfish complexes

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Page 8, Table 2-1, preferred option

→ The GAP recommends the Council adopt its preliminary preferred alternative as the final preferred option, which would maintain the status quo slope rockfish complex and establish a new scientific sorting requirement for rougheye, shortraker, and blackspotted rockfish. This sorting requirement will better inform management decisions in the future by better tracking catches while not creating an unbearable burden for the industry (See related item, No. 25, in this document).

2015-2016 Allocations and Harvest Guidelines (HG)

9. Confirm or modify amounts deducted from the ACL to account for groundfish mortality in Tribal, non-groundfish fisheries, EFPs and research

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement F.7.b, Supplemental Tribal Report	Pages 1-2

→ The GAP agrees with the changes recommended in the supplemental Tribal report. Increasing the Tribal set-asides will help account for increasing encounters of some species as those stocks continue to rebuild.

10. Confirm or modify HGs for species managed within a complex:

- Blue rockfish in California within the nearshore rockfish complexes north and south of 40°10'

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 6

→ The GAP agrees with these, as also confirmed in our April 2014 GAP report.

- Blackgill rockfish within the slope rockfish complex south of 40°10'

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 7

→ The GAP agrees with these, as also confirmed in our April 2014 GAP report.

11. Trawl/non-trawl: Confirm or modify 2-year trawl and non-trawl allocations for:

- Overfished species: bocaccio, canary, cowcod, petrale and yelloweye

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement)	Page 223, Table 4-52

→ The GAP recommends the allocations for these species as listed in Table 4-52 of the DEIS (the preferred alternative), including allocating 35 mt of petrale to the non-trawl sector. An excerpt of the table is below.

Table 4-52. Preferred Alternative. Stock specific fishery harvest guidelines (HG) or annual catch targets (ACT) and allocations for 2015 (in mt).

Stock	Area	Fishery HG or ACT	Allocation Type	Trawl		Non-trawl	
				%	Mt	%	Mt
BOCACCIO	S of 40°10' N. lat.	340.7	Biennial	N/A	81.9	N/A	258.8
CANARY	Coastwide	106.8	Biennial	N/A	56.9	N/A	49.9
COWCOD a/	S of 40°10' N. lat.	4.0	Biennial	N/A	1.4	N/A	2.6
DARKBLOTCHED	Coastwide	317.2	Amendment 21	95%	301.3	5%	15.9
POP	N of 40°10' N. lat.	143.0	Amendment 21	95%	135.9	5%	7.2
PETRALE SOLE	Coastwide	2,579.4	Biennial	N/A	2,544.4	N/A	35.0
YELLOWEYE	Coastwide	12.2	Biennial	N/A	1.0	N/A	11.2

- Longnose skate: trawl (90%) and non-trawl (10%) allocation

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Page 223, Table 4-52

→ The GAP recommends the allocations for longnose skate as listed above (preferred alternative), as we also supported in our April 2014 GAP report.

- Shelf rockfish north trawl (60.2%) and non-trawl (39.8%) allocation

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Page 223, Table 4-52

→ The GAP recommends the allocations for shelf rockfish as listed above (preferred alternative), as we also supported in our April 2014 GAP report.

- Shelf rockfish south trawl (12.2%) and non-trawl (87.8%) allocation

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Page 223, Table 4-52

→ The GAP recommends the allocations for shelf rockfish as listed above (preferred alternative), as we also supported in our April 2014 GAP report.

12. Within trawl/at-sea: Confirm or modify the at-sea whiting set-asides adopted in April

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Page 235, Table 4-60

→ The GAP agrees with the set-asides listed in the table referenced above.

13. Non-trawl: Confirm or modify 2-year within non-trawl HGs or within non-trawl shares for:

- Overfished species including bocaccio, canary, cowcod, and yelloweye

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement F.7.a, Att. 6, Excerpted Portions of Appendix B	Page 227, Table 4-56 Table B-37

→ The GAP discussed the need for a buffer in both the nearshore and non-nearshore sectors in the event some yelloweye was transferred between sectors.

Under the current preferred alternatives, yelloweye impacts to nearshore fishery are 1.2 mt out of 1.2 mt share. The non-nearshore impacts are 0.5 mt out of 1.1 mt. Thus, the proposal is to move 0.6 mt from non-nearshore to nearshore to assist with potential yelloweye impacts due to increased lingcod trip limits and a year-round fishery north of 40° 10' (See also Nos. 23 and 26, below).

However, the GAP was concerned that the only adjustment available for the non-nearshore sector is to move the RCA line deeper, from 100 to 150 fathoms, which would prevent the attainment of targeted fisheries.

At the same time, the risk of exceeding the yelloweye ACL is low, according to GMT analysis.

Therefore, the GAP suggests transferring 0.4 mt (instead of 0.6) from the non-nearshore sector to the nearshore sector.

- Black rockfish: 58% OR, 42% CA

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Page 220, Section 4.22

→ The GAP recommends these percentages will work for Oregon and California; they are the same percentages that have been used in the past.

- Blue rockfish: 40-10 adjustment for CA

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 7

→ The GAP agrees with this; this management measure has been in place since the 2007-08 biennial specifications.

- Blackgill south of 40°10': 40-10; 60% limited entry and 40% open access fixed gears

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 2, Preferred 2015 and 2016 Harvest Specifications	Table 7

→ The GAP agrees; these percentages have been in place since the 2013-14 biennial specifications.

- Sablefish south of 36º: 55% limited entry and 45% open access fixed gears

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Section 4.2.2

→ The GAP agrees; this is status quo as listed in the draft Environmental Impact Statement (DEIS).

- Nearshore rockfish HG north of 40°10'

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement F.7.b Supplemental WDFW/ODFW report F.7.b, Supplemental CDFW report	

→ The GAP struggled with this issue. At the April meeting, the GAP agreed to the hybrid option, as we wrote in our statement. That was the assumption going into this meeting.

However, subsequent reports from the states (joint WDFW/ODFW and CDFW) prompted the GAP to discuss various options for management of nearshore rockfish.

Recognizing the necessity of remaining below 69 mt coastwide, the GAP reconsidered the hybrid option. At the same time, we considered the ability of the states to manage nearshore rockfish through an inseason process. California has noted its process takes longer and the ability to manage inseason is more difficult. Washington and Oregon can respond to inseason action much more quickly.

We also appreciate that all three states have a good reputation for working together.

Therefore, California has proposed a Federal 23.7 mt harvest guideline. Washington and Oregon have proposed joint management of the nearshore sector (45.3 mt). The consensus of the GAP is that this situation will work (we note that California's proposal of 23.7 mt is below what it would have received in the hybrid option) and the states will be accountable for staying below 69 mt total coastwide.

2015-2016 Season Structures

14. Treaty fisheries: Management measures

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	

→ The treaty tribes' representative on the GAP said only one change is being implemented: a slight modification in how the bi-monthly trip limits will be managed inseason to stay within the overall harvest targets as well as estimated impacts to overfished species.

15. Shorebased IFQ: Trawl RCA, non-IFQ trip limits

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Section 4.4.2
F.7.a, Att. 3, Executive Summary and PPA	Page 10, 11

→ The GAP remains frustrated with the reasons for Council-recommended modifications of the trawl Rockfish Conservation Area (RCA) adjustments being disapproved by NMFS. In April, the GAP commented on its desire to move forward with the action the Council made regarding the RCA in September 2013:

From our April statement:

"The GAP has requested the RCA changes go into effect in period 6 of 2013 and all of 2014, but they have not yet been implemented, despite the Council adopting those changes in September 2013. Ideally, the GAP would like to see those modifications – a seaward boundary of 150 fathoms and a shoreward boundary of 100 fathoms, for all periods – roll over into both 2015 and 2016.

"From the September 2013 PFMC decision document:

"**Consideration of Trawl Rockfish Conservation Area (RCA) Boundary Modifications**

"The Council reaffirmed their April action to establish a trawl RCA configuration between 40°10' and 48°10' N. lat. with a 100 fm shoreward boundary and 150 fm seaward boundary beginning in Period 6 in 2013 through

2014."

"By shrinking the RCA, fishermen will be able to access more areas and species other than slope rockfish. This would aid in reducing effort on rougheye rockfish. Moreover, the trawl fleet is a rationalized fishery and has IFQ for species of concern."

At this point, the GAP reiterates its desire for the preliminary preferred alternative of 100 fm shoreward and 150 fm seaward RCA lines for the area 40°10' to 48°10' N. lat., year-round.

If that is not possible, the 200-fm-modified RCA line between 40°10' to 46° N. lat., year-round, would be preferred.

16. Non-nearshore: Non-Trawl RCA seaward configuration, trip limits (including sablefish)

Reference document(s)	Page(s), section, table or chart
Pending GMT analysis	

→ The GAP understands part of this relates to analysis of non-trawl impacts relative to moving the seaward non-trawl 200 fm and 250 fm RCA management lines. The GAP generally supports this as an option, particularly if needed to protect species of concern or in the case of rougheye. However, the GAP recommends that if the Council uses these management lines, it should do so discriminately and not encompass the whole area north of 40° 10' N. lat.

→ For sablefish, the GAP recommends the sablefish trip limits under Alternative 3 in the DEIS, which is the Preliminary Preferred Alternative (PPA):

Table 4-105. Alternative 3. Sablefish trip limits north of 36° N. latitude for limited entry and open access fixed gears for 2015-2016.

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	1,025 lb/week, not to exceed 3,075 lb/ 2 months					
2015	Open Access	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 1,800 lb/ 2 months					
2016	Limited Entry	1,275 lb/week, not to exceed 3,375 lb/ 2 months					
2016	Open Access	300 lb/ day, or 1 landing per week of up to 1,000 lb, not to exceed 2,000 lb/ 2onths					

Table 4-109. Alternative 3. Sablefish trip limits south of 36° N. latitude for limited entry and open access fixed gears for 2015-2016.

Industry south of 36° N. Latitude: ***request*** **no action**

Year	Fishery	Jan-Feb	Mar-Apr	May-Jun	July-Aug	Sept-Oct	Nov-Dec
2015	Limited Entry	2,000 lb/week					
	Open Access	320 lb/ day, or 1 landing per week of up to 1,600 lb, not to exceed 3,200 lb/ 2 months					
2016	Limited Entry	2,000 lb/week					
	Open Access	320 lb/ day, or 1 landing per week of up to 1,600 lb, not to exceed 3,200 lb/ 2 months					

The GAP further notes that it may be necessary in the future to reduce slope rockfish trip limits for fixed gear north of 40°10'.

17. Nearshore: Non-Trawl RCA shoreward configuration, trip limits

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement	Sect. 4.2

→ The GAP prefers the Council's April preliminary preferred alternative. To accommodate the potential increase in lingcod trip limits and a year-round fishery, the GAP would prefer to keep the RCA lines the same, if needed.

18. WA recreational: Season dates, bag limits, length limits, area closures

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement F.7.a, Att. 3, Executive Summary and PPA	Sect. 4.2 Page 24+, Tables 4-21, 4-22

→ The GAP agrees with all of the recreation management measures in the preferred alternative as listed in Att. 3 (beginning on Page 24) for Washington as outlined in the DEIS.

19. OR recreational: Season dates, bag limits, length limits, area closures

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 4, Draft Environmental Impact Statement F.7.a, Att. 3, Executive Summary and PPA	Sect. 4.2 Page 29+, Tables 4-24 and 4-26, figure 4-2

→ The GAP agrees with all of the recreation management measures in the preferred alternative as listed in Att. 3 (beginning on Page 29) for Oregon as outlined in the DEIS.

20. CA recreational: Season dates, bag limits, length limits, area closures

Reference document(s)	Page(s), section, table or chart
F.7.b, Supplemental Revised CDFW report 2	

→ The GAP supports the recreational recommendations as presented in Agenda Item F.7.b, REVISED Supplemental CDFW Report No. 2 for season structures and RCA configurations.

Regarding the lingcod bag limit, we recommend a split bag limit within the state for lingcod: three lingcod for the Mendocino and North Coast areas (north of 38.57.5 N. lat.) and two lingcod south of that latitude line. Justification is due to the concern of the Commercial Passenger Fishing Vessel (CPFV) fleet in the Central and San Francisco zones with possible impacts to several species of concern that would require inseason action resulting of loss of time on the water.

The GAP has no objection to increasing the bag limit on lingcod to three below Point Conception at 34° N. latitude, since the species of concern mentioned above are quite rare in that area.

Further, we support the recreational recommendations as stated in Agenda Item F.7.b. Supplemental CDFW Report No. 1 regarding a California harvest guideline of 23.7 mt for the nearshore complex and other described management measures.

2015-2016 Adjustments to Existing or Routine Measures

21. Trawl: RCA boundary adjustments to better approximate depth, including the 200 fm modified line in Oregon and a 60 fm line in California

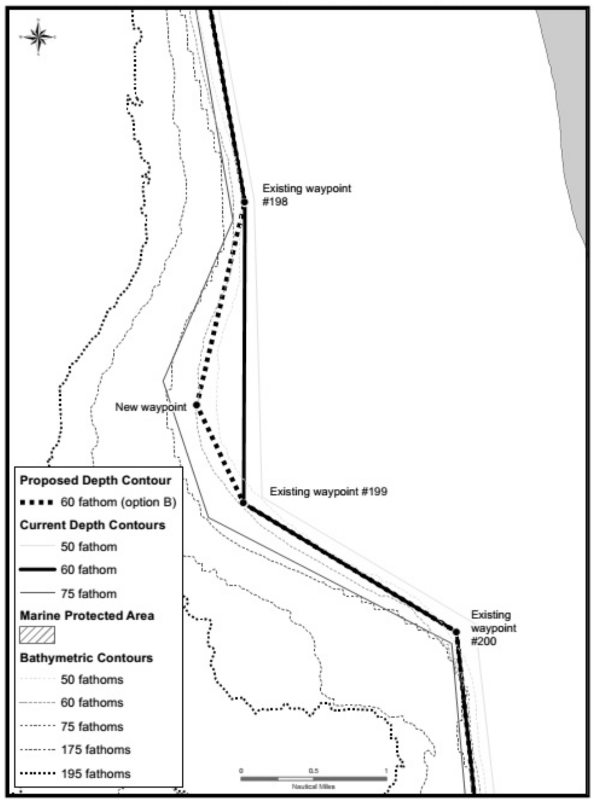
Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 6, Excerpted Portions of Appendix B	Section B.1

→ The GAP agrees these 200-fm changes should be made to conform to depth contours (the preferred option, Option 1).

Del Mar 60 Fathom RCA Changes

While industry favors its recommended correction submitted in April, the GAP realizes that absent the appropriate fine-scale cartography that shows the less-than-60 fathom ridge, the Council would be unable to grant this request. Thus the GAP favors the GMT-recommended 60 fathom line changes as shown below for Del Mar.

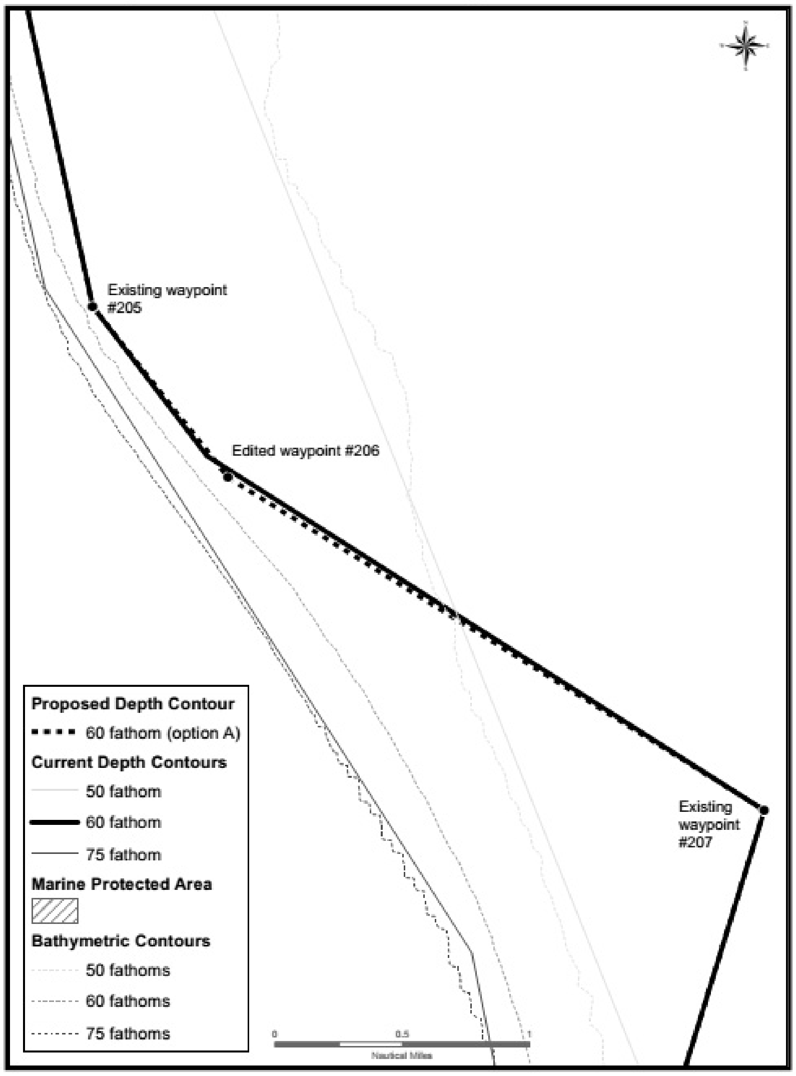
Proposed 60 Fathom RCA Line Changes - Del Mar



South of Del Mar RCA Changes

Both of the 60 fathom changes for south of Del Mar would be acceptable to the GAP (see below). However, existing waypoint #207 may be misprinted in the Code of Federal Regulations as it appears to be well inside the 50 fathom line. This was confirmed by Mr. Bob Leos of the GMT.

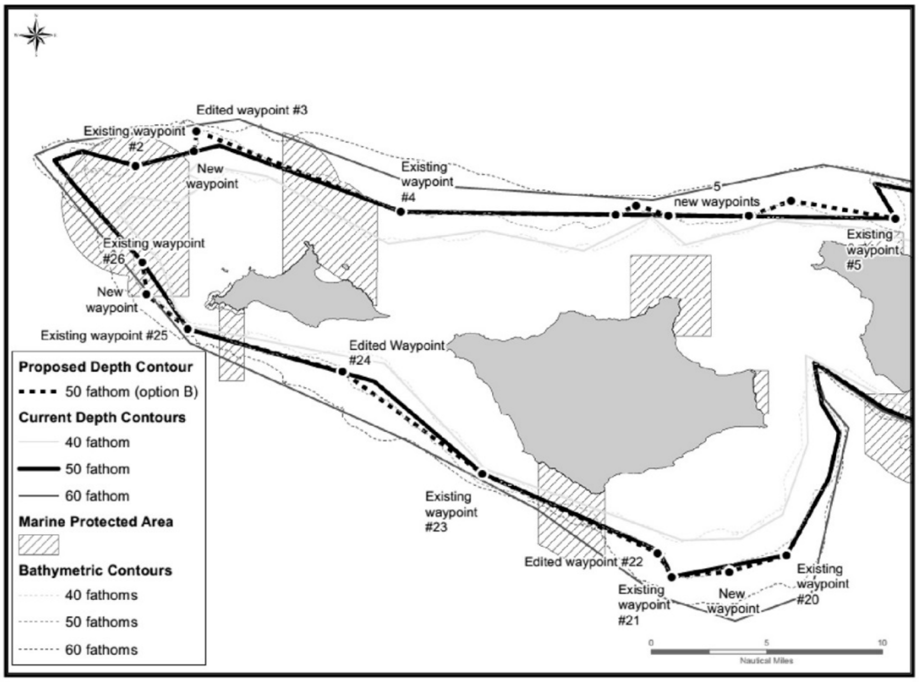
Proposed 60 Fathom RCA Line Changes - South of Del Mar



Channel Islands 50 Fathom RCA Line Changes

For the 50 fathom line in the Channel Islands, the GAP favors and greatly appreciates the following GMT option.

Proposed 50 Fathom RCA Line Changes - Northern Channel Islands



22. Trawl: Using underutilized set-asides in the projections for the shorebased IFQ carryover

Reference document(s)	Page(s), section, table or chart
Pending analysis	

→ No analysis had been done by the time the GAP considered this, but using underutilized set-asides for shorebased IFQ carryover is just common sense. In that regard, the GAP agrees with this concept. Simply, this is a reliable way to allow for carryover without taking up a lot of Council staff or NMFS time.

23. Non-trawl: Trip limit adjustments for lingcod N. of 40°10' N. lat. (increase), slope rockfish N. of 40°10' N. lat. (decrease), bocaccio S. of 34°27' N. lat. (increase), and shelf rockfish S. of 34°27' N. lat. (increase)

Reference document(s)	Page(s), section, table or chart
Appendix B F.7.b, Supplemental Revised CDFW report 2 F.7.a, Supplemental Analyses for Appendix B	 Page 104; Page 113

→ The GAP considered trip limit adjustments for lingcod N. of 40°10' N. lat. and agrees with increasing the limits. However, more discussion about that and the options for a year-round lingcod fishery are discussed in this document, No. 26.

Regarding slope rockfish, the GAP has no comment, as the analysis has not been completed yet.

With regard to bocaccio, the GAP agrees with Option 2A, which equates to 750 lbs. bimonthly for limited entry and 250 lbs. bimonthly for open access.

For shelf rockfish, the GAP agrees that Option 2A would be best. It equates to 4,000 lbs. bimonthly for limited entry when the season is open for non-trawl and 1,500 lbs. bimonthly when open for open access. This would be sufficient to address the uncertainty in overfished species (OFS) impacts.

24. Non-trawl recreational: Modifications to groundfish retention regulations in the Pacific halibut fisheries

Reference document(s)	Page(s), section, table or chart

→ The GAP understands this would allow the Council more flexibility in the halibut catch-sharing plan and supports these changes.

New Management Measures for Implementation in 2015-2016

25. Trawl: Establish new trawl RCA coordinates for 300 and 350 fm boundaries

Reference document(s)	Page(s), section, table or chart
Pending GMT analysis/statement	

→ The GAP reviewed the draft GMT analysis and had several questions:

Since this is in the 2015-16 annual harvest specifications and management measures process, does the Council intend to use them during this cycle? Many on the GAP were under the impression that voluntary reductions and mandatory sorting requirements would be used in 2015-16, to help inform the Council as to whether any management measures would be required in 2017-18. The GAP believes this approach is prudent and meets the needs of both the agency and the fleet.

If the Council chooses this as the preferred management option, how does the Council intend to implement this tool? How do we accurately measure all the sectors catch and is there a threshold for each sector that would need to be met in order to implement additional management measures?

Furthermore, data reports that show rougheye catch are on different timelines for different sectors. For example, the whiting fleets have a 24-hour turnaround time thanks to industry-funded tracking (both area-specific and catch estimates), so they know each day where the rougheye hotspots are for their vessels. However, data for open access fleets, for example, have at a minimum a two-month lag time. The GAP questions the ability of the Council/NMFS to use inseason measures effectively based on incomplete catch information.

One of the reasons there was so much industry buy-in for voluntary reduction measures was due to the belief that the Council and NMFS supported use of these measures for the 2015-2016 season. The threat of establishing these types of measures being utilized in the 2015-2016 management period is draconian and undermines the voluntary efforts of the industry to work together. At best these measures create skepticism and distrust of the process. At worst, it pits sectors of the industry against each other, which is what we were trying to avoid.

This whole discussion is frustrating to the GAP because it appears the rougheye issue is a manufactured crisis that we are constantly revisiting. This is especially troubling, given that the recent stock assessment acknowledges the stock is healthy at 7 percent above target and continuing to grow.

The Council discussion at the time of this request was basically: Do what you can in the time given. Clearly, the GMT analysis is not done. Can the Council even take, let alone consider, final action on an incomplete analysis? The GAP cannot comment on an incomplete analysis nor does the GMT or Council have time to address any concerns raised by GAP members.

The maximum depth distribution of rougheye is in the 250-fathom range. That would seem to indicate the analysis of these lines really is for comparison only – and not intended to be established – as it seems clear they would not be necessary or appropriate.

One portion of the GMT analysis considered the use of Bycatch Reduction Areas (BRAs). However, the regulations state "Bycatch Reduction Areas may be implemented in the Pacific whiting fishery: as an automatic action for species with a sector-specific allocation." Therefore, it follows that since there are no sector-specific allocations of rougheye, then these proposed reduction areas are not available tools in the whiting fishery.

To recap: 1) a full assessment has been done (which shows the rougheye stock is healthy); 2) industry reacted immediately to institute *voluntary* inseason reductions in 2014 and begin sorting shoreside (see F.7.c, Public Comment, pages 7-15); and 3) a mandatory scientific sorting requirement – at the suggestion of fishermen and processors – will be implemented in 2015 and beyond.

It is clear that industry's actions demonstrate we are taking this issue seriously and making progress on rougheye/blackspotted reductions but need more time to consider the effect of these changes before looking at, let alone implementing, management measures such as draconian RCA line changes.

26. Non-trawl: Provide for lingcod retention in Periods 1, 2, and 6

Reference document(s)	Page(s), section, table or chart
F.7.b, Supplemental CDFW Revised Report No. 2	

The GAP prefers the option listed in the CDFW Supplemental Revised Report No. 2. A 600 lb./200 lb. option in period 6 for limited entry vessels north of 40° 10' N. lat. would be a better option – and more representative of fishing behavior -- with the correlating limits during the summer months. Corresponding trip limits for LE and OA south of 40° 10' N. lat. also are preferred by the GAP. The alternative choice is similar, but with lower limits in the summer, and can be found in Table B-43 on Page 93 of Excerpts from Appendix B. The most important issue to fixed gear and open access fishermen is to have a year-round lingcod fishery.

From CDFW Supplemental Revised Report No. 2:

Table 1. Preferred trip limits for limited entry and open access lingcod north of 40° 10' N latitude.

	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Limited Entry	200	200	1,200	1,200	1,200	600/200
Open Access	100	100	600	600	600	600/100

Table 2. Preferred trip limits for limited entry and open access lingcod south of 40° 10' N latitude.

	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Limited Entry	200	CLOSED	800	800	800	400/200
Open Access	100	CLOSED	400	400	400	400/100

27. Non-trawl recreational: Implement a one fish canary rockfish sub-bag limit for the Oregon recreational fisheries

Reference document(s)	Page(s), section, table or chart
Agenda Item F7a, Att6, Excerpted portions of Appendix B	Option 1, page 124

→ The GAP recommends Option 1, retention of one canary rockfish per day, as a sub-bag limit of miscellaneous groundfish daily bag limit of 10.

This has been a popular request from Oregon anglers. As the canary stock rebuilds, canary rockfish are hard to avoid. Landing some also would provide some biological data via dockside sampling to help inform future assessments and management. Furthermore, canary retention may also reduce impacts to other nearshore species such as black rockfish.

Amendment 24 – Default Harvest Control Rules

28. Select a final preferred alternative for default harvest control rules that would be used in future bienniums, unless modified by the Council, to establish future harvest specifications

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 8, Proposed Groundfish FMP Amendment Language	Page 5

→ The GAP recommends Alternative 3, Use the harvest control rules (HCRs) in place in the previous period (biennium) as defaults.

29. Provide guidance on FMP language to implement Amendment 24

Reference document(s)	Page(s), section, table or chart
F.7.a, Att. 8, Proposed Groundfish FMP Amendment Language	Page 5+

→ The GAP understands there will be some slight wording change but agrees conceptually with the changes.

PFMC
06/24/14

FISHERIES IN 2015-2016 AND BEYOND HARVEST SPECIFICATIONS, MANAGEMENT MEASURES AND AMENDMENT 24

Contents

The Groundfish Management Team (GMT) reviewed and discussed the materials provided under Agenda Item F.7, including the Action Item Checklist (Agenda Item F.7.a., Attachment 1), which itemizes the anticipated Council actions. For several items, the GMT did not identify a need for further discussion; therefore, those items are not detailed in this report. The remaining items are discussed below in the order they appear in the Action Item Checklist.

A summary of GMT recommendations can be found at the end of the statement.

2015-2016 Harvest Specifications

Checklist Item #2: Confirm P* and ABCs. Adopt revised 2016 cowcod ABC

In November 2013, the Council selected their final preferred P* values, working from the November 2013 GMT Supplemental Report under Agenda Item H.6. In Tables 1 and 2 of the GMT statement, four species (arrowtooth flounder, Pacific cod, shortbelly rockfish and yelloweye rockfish) were mistakenly omitted. The wording of the Council motions, setting P* of 0.45 for all species unless stated otherwise (arrowtooth flounder was added as an exception in an amendment to the motion), resulted in a change in P* for Pacific cod, shortbelly rockfish and yelloweye rockfish from 0.40 to 0.45. Speaking with the motion maker and reviewing the record, it is the GMT's understanding that the change from status quo P* for these three species was unintended. **The GMT recommends that the Council consider revisiting their P* decision for Pacific cod, shortbelly rockfish and yelloweye rockfish.** The GMT notes that the annual catch limit (ACL) harvest control rule (HCR) for these three species is independent of the allowable biological catch (ABC), so if the Council were to revise their P* decision there would be no downstream effects to the ACLs, harvest guidelines (HGs), management measures, etc.

Checklist Item #5: Confirm rebuilding plan parameters including a new T_{target} for cowcod

The draft environmental impact statement (DEIS) states that the Council could consider setting a later year for T_{target} than the median time to rebuild, considering uncertainty in assessment. In concept, this approach may prevent having to revise the rebuilding plan in the next cycle if something changes. Alternatively, the Council could adopt the median time to rebuild which theoretically means that there would be a 50 percent chance of re-specifying T_{target} with the next assessment.

It is our understanding that a full assessment may be desirable in the next few years (i.e. rather than catch reports) given that there may be new information from visual surveys in the cowcod conservation area (CCA). We note that cowcod assessments are fairly uncertain due to relatively little data to inform them. While there is some administrative burden to altering T_{target} with each subsequent rebuilding analysis, the Council should weigh this against the perception of giving themselves additional time to rebuild by extending the T_{target} beyond the median time to rebuild. Ultimately, the GMT would like to see an approach whereby a window of rebuilding probability is specified (i.e. rather than focusing on a point estimate date) with thresholds indicating whether adequate progress is being made toward rebuilding. We are optimistic that the explorations of alternative rebuilding scenarios, which is intended to inform rebuilding revision rules, (Agenda Item G.7.a, Attachment 2, September 2013) currently being conducted by Chantel Wentzel can inform development of such an approach.

2015-2016 Stock Complexes

Checklist Item #6: Confirm EC species' designations and associated FMP language to be implemented under Amendment 24

The GMT was informed at this meeting that NMFS is looking for more information on the Council's recommendation to designate Pacific Grenadier as an ecosystem component (EC) species. The GMT provides a discussion on EC designation for Pacific Grenadier under Agenda Item F.7.b, Supplemental GMT Report 2

2015-2016 Allocations and Harvest Guidelines (HGs)

Checklist Item #9: Confirm or modify amounts deducted from the ACL to account for groundfish mortality in Tribal, non-groundfish fisheries, EFPs and Research.

Tribal

The GMT notes that Tables 4-51 and 4-53 in the DEIS (Agenda Item F.7.a, Attachment 4) need to be updated to reflect the set aside increases requested by the Makah Tribe in their May 21, 2014 letter to NMFS (Agenda Item F.7.b, Supplemental Tribal Report). That request was to increase English sole from 91 mt to 200 mt, Pacific cod from 400 mt to 500 mt, widow rockfish from 60 mt to 100 mt, yellowtail rockfish from 677 mt to 1,000 mt, and to include a set aside for spiny dogfish of 275 mt.

Research

The GMT provided an update to research catch under the Inseason agenda item at this meeting (Agenda Item F.4.b, Supplemental GMT Report), following initial catch reports from the trawl survey, and discussed whether an adjustment to the canary rockfish set aside is necessary. Research catch of canary rockfish in the NMFS trawl survey to date is estimated to be 2.2 mt. The Council approach is that off-the-top deductions should be equal to the maximum historical scientific research catch from 2005-2012, except for canary rockfish and yelloweye rockfish. The Council policy for yelloweye and canary rockfish was not to adopt the maximum historical catch. The Council considered the high research catch for canary rockfish in 2006 from the NMFS trawl survey a rare event and adopted a set aside of 4.5 mt, which is higher than the average research catch (2005-2012), but lower than the maximum historical value.
Recent canary rockfish catch under research has been variable in recent years but has not exceeded the 4.5 mt set aside. (2010: 1.9 mt, 2011: 0.62 mt, 2012: 3.75 mt and 2013 (preliminary): 1.5 mt). Considering the research catch from 2010-2013, the GMT does not think there is sufficient cause to recommend an increase to the canary set aside for 2015-2016.

Checklist Item #13: Confirm or modify 2-year within non-trawl HGs or within non-trawl shares for 2015-2016

Nearshore Rockfish North of 40°10' N. lat.

Since the last Council meeting, state Council representatives have discussed the implications of harvest guidelines on the Nearshore Rockfish Complex for recreational and commercial fisheries in each state. The magnitude of reduction in catch needed to remain below harvest guidelines is disproportionate among states with the greatest reductions required in Oregon, while California and Washington can still provide status quo management under at least some of the harvest guideline options. In the case of California, this is due to the already reduced season length and shallower depth restrictions in the recreational fishery (5.5 months) and shallower depth restrictions in the commercial fishery to limit mortality on yelloweye rockfish.

The California Department of Fish and Wildlife (CDFW) report (Agenda Item F.7.b., Supplemental CDFW Report 1) proposes a Federal harvest guideline of 23.7 mt, which represents the mortality under the CDFW Preferred Alternative, which is the same as the No Action alternative mortality north of 40°10 N. latitude, in the EIS [i.e., expected commercial landings (Table 4-39) combined with projected recreational mortality (Table 4-50)].

The Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) report (Agenda Item F.7.b., Supplemental WDFW/ODFW Report) outlines a trigger for inseason consultation and coordination at 62 mt or 75 percent attainment of each state's respective status quo harvest levels as noted in Table 1 of their report. The GMT acknowledges the commitment of the states to keep catch to the 69 mt coastwide ACL. The GMT recommends that inseason tracking and scheduling of the consultation call(s) are completed early enough to include projected impacts of mortality for discarded fish if non-retention of nearshore rockfish is necessary to stay within the coastwide ACL. Questions have arisen relative to the timing of season openings, the different pace of recreational and commercial fisheries in each state, and the potential for inequity in attainment between states at the time in which inseason action becomes necessary.

The GMT provides a summary of the cumulative mortality in the Oregon and Washington recreational and commercial fisheries during 2008-2012 by month to show the seasonality of the fisheries relative to the proposed 75 percent trigger, Appendix A, Figure 2. In addition the mortality in 2012 alone was analyzed to provide a more recent depiction of the rate of catch accumulation as catch has increased significantly in recent years and use of data in previous years may under project the rate of mortality accumulation Appendix A, Figure 3. These figures indicate that the trigger is likely to be reached between June and July under status quo conditions, though the one to one and a half month lag in the recreational fishery data will not allow analysts to realize it has been reached until August and mortality will continue to accrue during the intervening period and until action is taken after consultation.

The ODFW report under F.3 (Agenda Item F.3.b., Supplemental ODFW Report) proposes further analysis of Nearshore Rockfish complex management under the omnibus package. In the long-term, the states may be most satisfied by a state level management system that provides ACLs for each state resulting from assessments stratified at state boundaries. The GMT analysis of state specific harvest guidelines (HG) for the Nearshore Rockfish complex (Agenda Item F.7.a, Attachment 5) points out the inadequacy of any allocation method to truly represent the relative abundance along the coast to facilitate allocation and differential regulations over time necessitating assessment and management at a state level to facilitate improved management. ODFW has indicated that they have sufficient infrastructure to assess and manage nearshore stocks within their waters. The higher species diversity makes this less feasible in the waters off of California where 12 species of Nearshore Rockfish other than black rockfish occur (Love et al. 2002) and management would benefit from a federal nexus to provide regular assessment with assistance from the Science Centers.

Establishing an improved management system that is responsive to the needs of each state is beyond the scope of the 2015-2016 regulatory specifications process and should be addressed either in the omnibus package or in the 2017-2018 regulatory specification process. In the interim, the proposed actions of the states may be sufficient to prevent an ACL overage and will be dependent on our ability to project and track catch during the course of the season. The management measures to remain within this value have not been specified up front and will be developed inseason depending on the nature of the concern. The proposed California recreational and commercial management measures are projected to keep mortality within the HG of 23.7 mt, which is lower than all but the lowest allocation under the miles of coastline HG allocation option analyzed by the GMT (Agenda Item F.7.a, Attachment 6). California can take inseason action to keep mortality within the California state HG if needed. The GMT recognizes that these are interim measures while an improved management system can be developed that accounts for differing management between states and the potential for differing levels of depletion that results. While stock assessment authors may prefer alternative stratifications, the GMT feels that independent state ACLs based on assessments stratified at state lines would facilitate management at the state level in the future.

Checklist Item #13: Within non-trawl: Two-Year Yelloweye Sharing- consider transferring 0.6 mt of the yelloweye rockfish non-trawl allocation fishery HG from the non-nearshore to nearshore

The GMT provided an initial analysis regarding transferring 0.6 mt of the yelloweye rockfish non-trawl allocation fishery HG from the non-nearshore to the nearshore commercial fixed gear sectors under Agenda Item F.7.a., Attachment 6. The GMT provides additional analysis and discussion this issue in Agenda Item F.7.b., Supplemental GMT Report 2.

Currently, projected mortality of yelloweye rockfish is 0.6 - 0.7 mt lower than the catch share for non-nearshore fixed gear, and 0.0 to 0.1 mt lower than the catch share for nearshore fisheries. These projections are point estimates, and based on average catch over a number of years. Historical catch data show high variability in yelloweye catch among years – a simulation analysis was used to demonstrate that estimated yelloweye mortality in the fixed gear fisheries may range somewhere between approximately 40% of the point estimated (low) to approximately 175% of the point estimate (high), 90% of the time. This variability should be taken into account when catch share decisions are made. Some buffer between catch projections and catch share may lead to higher stability for these fisheries. We show that the commercial non-trawl sector would have exceeded the 2015 allocation (PPA) in 2 of 10 years. Finally, we show that the probability of west coast fisheries exceeding the ACL is 0.7 percent under status quo, and 2.1 percent if 0.6 mt of yelloweye is moved from the non-nearshore fishery to the nearshore fishery, and the entire amount is taken by the nearshore fishery.

The analyses associated with transferring up to 0.6 mt of yelloweye allocation from the non-nearshore to the nearshore sector considered both the risk of the total coastwide catch exceeding the ACL, which is low under any level of transfer, and the risk of individual sectors exceeding their allocation, which is more difficult to quantify due to variability among years and uncertainty in the estimated catches. However, a transfer from the non-nearshore sector that has had a larger buffer to the nearshore sector (for which various other management measure are being explored) is likely to reduce the overall risk of a sector exceeding its allocation.

The GMT recommends that the Council consider annual variability and the probability of exceeding the ACL when deciding whether to move 0.6 mt (or less) of yelloweye rockfish from the non-nearshore fishery to the nearshore fishery. The GMT notes that buffers between the point estimate and the catch share may reduce the chance of exceeding the catch share.

2015-2016 Season Structures

Checklist Item #15: Trawl RCA

Modified trawl RCA seaward boundary line between 40° 10' N. latitude and 45° 46' N. latitude

Currently, depth-based management tools for bottom trawl gears include rockfish conservation areas (RCA), which are used to control catch of species (e.g. target species, bycatch species, and overfished species). In the event the Council's preferred alternative RCA, which includes a 150 fm seaward RCA from 40'10 to 45° 46' N. latitude year round, is unavailable per NMFS inseason disapproval, the Groundfish Advisory Panel (GAP) has requested implementation of the seaward 200 modified line year round. Given the low bycatch rates for overfished species in the rationalized fishery, the GAP recommends increasing access to target stocks through implementation of the seaward modified 200 fathom line. This action would allow fishing participants to further demonstrate individual accountability of the shorebased trawl Individual Fishing Quota (IFQ) program to minimize bycatch and incidental catch of overfished species. This action is needed to enable participants the ability to more fully and efficiently utilize their quota pounds, while still meeting the Council's goal for sustainability of the Pacific Coast groundfish fishery. Low attainments of some economically important species and implementation of the seaward modified 200 fathom line would allow trawlers to take advantage of opportunities to maximize the potential of their business plans, while allowing the IFQ system to minimize risks to stocks of concern.

The trawl RCA Environmental Assessment (EA) prepared by NMFS demonstrates that the risk of exceeding Annual Catch Limits (ACLs) of any species or contribution Overfishing Limits (OFLs) for species within a complex by implementing the 200 fathom modified seaward boundary line between 40° 10' N. latitude and 45° 46' N. latitude is unlikely. Overfished species impacts were analyzed in the EA to characterize impacts of the implementation of the 200 fathom modified line, with a heightened emphasis on canary rockfish, darkblotched rockfish, Pacific ocean perch, yelloweye rockfish, and petrale sole. Other non-target species were analyzed in the EA, with an emphasis on spiny dogfish, longnose skate, aurora rockfish, rougheye rockfish, and shortraker rockfish. The analysis of impacts to overfished species and other non-target species under year-round implementation of the 200 fathom modified petrale line indicate that there is little risk in catch exceeding the ACL.

Regarding potential Essential Fish Habitat (EFH) impacts, the RCA EA analyzed spatial differences between the 200 fathom RCA line and the 200 fathom-"modified" line (Figure 4-4 and 4-5 in the EA) with petrale cutouts. In addition, qualitative information was provided in table 4-2 in the EA to help ascertain whether each cutout was deliberate. Furthermore, a thorough investigation of the proportion of substrate types (probable hard, mixed, and soft substrates) within the different depth zones between 40° 10' N. and 48° 10' N. latitude was completed.[1] Due to the limitations of scale from the available GIS data layers, defining substrate type percentage break-outs within each individual petrale cutout would likely not be sufficiently informative, and may be overly speculative given the small size of many of these cutouts. Since these areas have largely been open to bottom trawl gear intermittently for a number of years, much of these areas have likely been impacted at some point in recent years, and therefore have not had a chance for habitat recovery, even if effort within them is not necessarily spatially uniform. Furthermore, preliminary logbook analysis provided in Table 4-160 in Agenda Item F.7.a, REVISED Supplemental Attachment 11 suggests that petrale sole cutout areas have a very high degree of bottom trawl effort, with higher proportional (1) number of tows, (2) tow duration, and (3) total hail weight. **Therefore, the GMT concludes exceeding ACLs of any species or contribution OFLs for species within a complex, or adverse impacts to EFH is unlikely to occur by opening the petrale cut outs with a seaward year-round 200 fathom-modified line between 40° 10' N. and 45° 46' N. latitude.**

Checklist Item #16: Non-trawl trip limits (including sablefish)
Regarding the non-trawl coastwide sablefish trip limit analysis (Agenda Item F.7.a, Attachment 6, June 2014, B.10), the GMT would like to clarify a specific sentence. That sentence, found on page 119, third paragraph, states that "Projected attainment values for the four sablefish daily trip limit (DTL) fisheries under the No Action Alternative are within the range generally recommended by the Council, of between 90 and 95 percent…". The GMT does not recall the Council making that specific recommendation. Instead, the GMT often provides a range of alternatives, sometimes resulting in projections equaling or slightly exceeding 100 percent. Sablefish landings are variable among years, and depend on things such as weather, price, and successfulness of other fisheries. The Council often considers all of these factors, along with how far the fishery has advanced into the season, before making their trip limit decision. This is a matter of measuring risk. In some cases, the Council has set trip limits when projections showed 100 percent attainment, whereas in other cases the Council has selected trip limits showing projections lower than 100 percent.

Checklist Item #20: Season dates, bag limits, length limits, area closures
The GMT recommends the Council consider the CDFW preferred California Recreational Season and Depth Restrictions for 2015-2016 as described in the CDFW state report (Agenda Item F.7.b, REVISED Supplemental CDFW Report 2). The season and depth restrictions in each management area are depicted in Figure 1, which are projected to keep the mortality of target and overfished stocks presented in Table 1 and Table 2 within their respective harvest limits. In addition, an increase in the lingcod bag limit from be two to three fish, statewide can

[1] (1) 75-100 fathoms, (2) 100-150 fathoms (the core RCA not requested for opening), and (3) 150-200 fathoms (with further investigation within these depths between 40° 10' N. and 45° 46' N. latitude, and between 45° 46' N. and 48° 10' N. latitude).

be accommodated and is proposed under the CDFW preferred alternative. Though angler trips from this option are not yet available for review, they are within the range presented in the EIS.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May 15 – Oct 31 <20 fm						Closed	
Mendocino	Closed				May 15 – Oct 31 <20 fm						Closed	
San Francisco	Closed			April 15 – Dec 31 <30 fm								
Central	Closed			April 1 – Dec 31 <40 fm								
Southern	Closed		Mar 1 – Dec 31 <60 fm									

Figure 1. CDFW Preferred Alternative: California recreational groundfish season structure and depth restrictions for 2015-2016.

Table 1. CDFW Preferred Alternative: California recreational projected mortality of overfished species for 2015-2016.

Species	**Projected Mortality (mt)**
Bocaccio	117.2
Canary Rockfish	18.2
Cowcod	1.2
Yelloweye Rockfish	2.1

Table 2. CDFW Preferred Alternative: California recreational projected mortality of non-overfished species for 2015-2016. Results in parenthesis reflect lingcod mortality with a three fish bag limit.

Species	**Projected Mortality (mt)**
Black Rockfish	187.3
Blue Rockfish	58.4
Cabezon	37.1
California scorpionfish	81.1
Greenlings	17.8
Lingcod	258.7(311.3)
Minor Nearshore Rockfish North	11.8
Minor Nearshore Rockfish South	352.8
Widow Rockfish	3.6

2015-2016 Adjustments to Existing or Routine Measures

Checklist Item #22: Using underutilized set-asides in the projections for the shorebased IFQ carryover

The Council requested consideration of the likelihood that set asides will be harvested when considering the risk that carryover will cause unacceptable overage. In brief, the GMT looks to set asides together with projections of harvest across all sectors when presenting the inseason risk analysis to the example. We did so this past March and we recommended that carryover be issued for all species (Agenda Item D.4.b, Supplemental GMT Report).

We also had hoped to include a more in-depth analysis of the trends and dynamics of carryover here. We have analysis and a simulation approach that demonstrates that carryover will keep catch below the quota pounds (QP) amount issued over a multi-year period except in certain deficit QP usage situations (i.e. the deficit would have to be large enough to offset earlier surpluses in the evaluation period). We have noted multiple times that interpretations of the carryover program have taken implementation away from the original intent (D.8.b, Supp GMT, June 2012, H.5.b, Supp GMT, September 2012, H.3.b, Supp GMT March 2013). The intent was to issue carryover automatically without the inseason risk decision that is being required now. We would reiterate that the inseason risk analysis involved more workload of the team and NMFS staff than it should. We could not write our analysis up in full by this time and suggest taking it up under discussions of long-term fixes to the carryover.

Under Agenda Item F.4, the Council discussed NMFS's letter on a recent court ruling that states that shorebased IFQ species with ABC=ACL would not be permitted carryover in the 2014 season. This resulted in 19 of 30 shorebased IFQ species being allowed to have carryover. Table 3 shows a breakdown of species with carryover allowed and not allowed for 2014 and the percent attainment for that IFQ species in 2013. Sixteen of 19 species with allowances for carryover had attainment rates of less than 50 percent. Notable species for which carryover was allowed and had attainment greater than 50 percent were Dover sole, shortspine thornyhead, and longspine thornyhead. Of the remaining 11 species that carryover was not permitted for, 8 species had attainment less than 50 percent. Some on the team question the logic of the decision. If that logic is extended and we manage on how much that could theoretically be taken instead of on how much we project/expect to be used, then it would call into question bag and trip limit management. If everyone that was eligible to take the full trip and limits did, then catch would exceed the levels we were managing to.

Table 3. Percent Attainment of Sector Quota for Shorebased IFQ species in 2013 permitted and not permitted for carryover in 2014. (Generated from NOAA West Coast Groundfish IFQ Application on 06/22/2014 10:47 AM)

IFQ Species	Sector Quota (lbs)	Total Catch (lbs)	Percent Attainment
Carryover Permitted			
Bocaccio rockfish (S of 40^{o} 10')	165,126	28,332	17.16%
Canary rockfish	87,964	22,526	25.61%
Cowcod (S of 40^{o} 10')	2,205	486	22.04%
Darkblotched rockfish	587,976	256,485	43.62%
Dover sole	49,018,682	17,583,083	35.87%
Longspine thornyheads (N of 34^{o} 27')	4,100,267	2,400,808	58.55%
Minor shelf rockfish (N of 40^{o} 10')	1,119,948	65,686	5.87%
Minor shelf rockfish (S of 40^{o} 10')	178,574	44,443	24.89%
Minor slope rockfish (N of 40^{o} 10')	1,712,835	431,244	25.18%
Other flatfish	9,236,501	1,767,468	19.14%
Pacific cod	2,480,830	339,657	13.69%
Pacific halibut (IBQ) (N of 40^{o} 10')	236,660	72,707	30.72%
Pacific ocean perch (N of 40^{o} 10')	241,241	108,062	44.79%
Sablefish (N of 36^{o})	4,030,050	4,080,318	101.25%
Sablefish (S of 36^{o})	1,327,800	200,064	15.07%
Shortspine thornyheads (N of 34^{o} 27')	3,054,183	1,825,663	59.78%
Shortspine thornyheads (S of 34^{o} 27')	110,231	8,150	7.39%
Widow rockfish	2,191,016	907,513	41.42%
Yelloweye rockfish	2,205	139	6.30%
Carryover Not Permitted			
Arrowtooth flounder	8,479,264	5,365,841	63.28%
Chilipepper rockfish (South of 40^{o} 10')	2,423,983	870,774	35.92%
English sole	14,032,486	486,273	3.47%
Lingcod (N of 40^{o} 10')	2,695,305	749,955	27.82%
Lingcod (S of 40^{o} 10')	1,089,993	36,814	3.38%
Minor slope rockfish (S of 40^{o} 10')	829,181	258,778	31.21%
Pacific whiting	216,707,790	215,218,208	99.31%
Petrale sole	5,110,315	4,695,933	91.89%
Splitnose rockfish (S of 40^{o} 10')	3,346,838	101,757	3.04%
Starry flounder	1,656,774	7,705	0.47%
Yellowtail rockfish (N of 40^{o} 10')	5,809,905	1,585,755	27.29%

Nonetheless, we see little practical effect of this latest carryover policy for most species. Because attainment is so low, there is likely little interest in receiving the carryover QP. The carryover may matter to some individual operations, but on the whole, if people cannot use the QP issued for the year, then they will not be looking to use the surplus from the prior year. Carryover is most beneficial for stocks where attainment levels are high.

Based on this new ruling, the GMT suggests that the Council may need to re-examine how ACLs are calculated as the court ruling is different from the past approach of rely on ACL/ABC/OFL projections.

Checklist Item #23: Non-trawl trip limit adjustments for lingcod N. of 40º10' N. lat. (increase), slope rockfish N. of 40º10' N. lat. (decrease), bocaccio S. of 34º27' N. lat. (increase), and shelf rockfish S. of 34º27' N. lat. (increase)

The GMT comments on #23 will be forthcoming in GMT Report 3.

New Management Measures for Implementation in 2015-2016

Checklist Item #25: Establish New RCA Coordinates for 300 and 350 fathom boundaries
At the April 2013 meeting, the Council requested "... trawl RCA boundary alternatives at 300 fm and 350 fms for analysis." The regulatory definition of trawl gears includes bottom trawl and midwater gears, and as such, the GMT analyzed the impacts of implementing depth closures for bottom trawl gears targeting Dover sole, thornyheads, and sablefish, and midwater gears targeting Pacific whiting (i.e., shorebased IFQ and at-sea). The available analysis can be found in Agenda Item F.7.b Supplemental GMT Report 2.

Expansion of Seaward of RCA Boundaries
Depth-based management tools for bottom trawl gears include RCAs to control catch of species, for example, target species, bycatch species, and overfished species. Currently, the shoreward boundary is 100 fathoms and the seaward RCA boundary from 48°10' to 45°46' N. latitude is 150 fathoms and 200 fathoms from 45°46' to 40°10' N. latitude. The GMT was only able to conduct a cursory exploration of the impacts of expanding the RCA to 250 fathoms, based on the data summarized in Agenda Item F.7.b Supplemental GMT Report 2.

However, that analysis of impacts does capture the essential difference between leaving the area open and closing out to 250 fm in terms of rougheye impacts. Likewise, it should be easy to understand the difference in magnitude of the implications from placing the RCA line at 250 fm and closing everything beyond 100 fm without knowing exactly what species might be caught and in what amounts. This is unlikely to be predicted with a high degree of certainty regardless, since we have never had occasion to use such measures in conjunction with the IFQ fishery.

Substantial reductions of rougheye rockfish would be expected if fishing were prohibited from the 100 fathom shoreward boundary to a seaward 250 fathom (Table 1, Agenda Item F.7.b Supplemental GMT Report 2). From 2002-2012, 75 percent (105 mt) of rougheye were caught on observed hauls from 150 fathom to 250 fathom. In that same time period, 37 percent of the observed bottom trawl hauls occurred in bottom depths from 150 to 250 fathom (Table 3, Agenda Item F.7.b Supplemental GMT Report 2). Changes in target species catch per unit effort (CPUE) and overfished species bycatch rates, as a result of expanding the seaward RCA boundary to 250 fathom would also be expected though there was insufficient time for analysis. Future analysis should also consider analyzing only 2011-2012 data, years in which the bottom trawl sector was rationalized as different patterns may be evident.

New Management Measures - 300 and 350 fathom RCA

It is the GMT's understanding that the proposal to establish new coordinates approximating the 300 and 350 fathom depth contours were intended to provide options for reducing encounters with rougheye rockfish. Under this scenario, fishing would be allowed from 300/350 fathoms to 700 fathoms. Approximately 94 percent of observed hauls occurred in the area 150 to 300 fathoms and 97 percent from 150 to 350 fathoms, a substantial disruption to fishing operations (Table 3, Agenda Item F.7.b Supplemental GMT Report 2). Under this scenario, new fishing opportunities and target strategies would need to be explored from 300/350 fathoms to 700 fathoms. Changes in target species CPUE and overfished species bycatch rates, as a result of expanding the seaward RCA boundary to 300/350 fathoms are also expected though there was insufficient time for analysis.

Application of the 300 and 350 fathom Line to Midwater Gears

Currently, the only depth-based management tool available for the Pacific whiting sectors are called Bycatch Reduction Areas (BRA), since vessels are allowed to fish in the trawl RCA during the primary whiting season (i.e., the trawl RCAs do not apply). BRA apply to vessels on Pacific whiting trips using midwater gear during the primary whiting season and prohibit fishing shoreward of the 75, 100, and 150 fathom depth contours (see regulations at 660.131(c)(4) Subpart D). BRAs are automatic actions implemented by NMFS when NMFS projects that a sector will exceed an allocation for a non-whiting groundfish species specified for that sector before the sector's whiting allocation is projected to be reached.

For 2015-2016, the Council has not proposed sector-specific allocations for rougheye/blackspotted. As such, the criteria for NMFS to use automatic actions for implementing BRAs do not appear to be satisfied. This is in contrast to RCA adjustments for bottom trawl gears which are recommended by the Council and, most typically, implemented through inseason action. The GMT recommends that if the Council is interested in BRAs to control rougheye rockfish catch that they be designated as routine and not as an automatic action.

At-Sea Sectors

Rougheye rockfish catches by depth in depths in areas shoreward of 300 or 350 fathoms can be found in Table 1 of Agenda Item F.7.b Supplemental GMT Report 2. From 2002-2012, 92 percent of the at-sea hauls occurred in depths shallower than 300 fathoms (Table 3, Agenda Item F.7.b Supplemental GMT Report 2). As such, it appears that prohibiting fishing shallower than 300 fathoms could result in a substantial disruption of fishing operations compared to historical activities. Changes in Pacific whiting CPUE and overfished species bycatch rates, as a result of concentrating fishing activity on the slope are also expected though there was insufficient time for analysis. Future analysis should also consider analyzing only 2011-2012 data, years in which the at-sea sectors were rationalized as different patterns may be evident. Further, evaluating the individual sectors (e.g., CP and MS) might also be warranted.

Shorebased Midwater Whiting

As noted in Agenda Item F.7.b Supplemental GMT Report 2, the WCGOP data contained average depth of fishing, instead of bottom depth. As such, the summary of impacts, similar to what was provided above for the at-sea and bottom trawl sector, were not able to be derived.

Summary

Changes in target species CPUE and overfished species bycatch rates are also expected under these management measure proposals but were not able to be analyzed. For example, if deeper areas were closed off to bottom trawling, then effort shifts to more shoreward areas could severely curtail fishery operations due to limited availability of canary and yelloweye quota. Possible changes in revenue, other incidental species (e.g. Shelf Rockfish Complex), effects on port communities, etc. should ideally be explored prior to implementation; however, there was insufficient time to perform these analyses prior to or at this meeting.

The GMT was only able to conduct limited analysis to facilitate decision-making in the time available between the April and June Council meetings. With more time we could have more fully analyzed available catch data to explore the possible effects on target and incidental species from the use of any of the lines, by sector. The GMT anticipates that a detailed consideration of the impacts would be considered in the specific circumstances calling for their possible use.

While some on the team worry about the analysis that could not be done, others emphasize that this was intended to "add tools to the toolbox." The lines are not for immediate implementation. While recognizing that opportunity for public input on impacts was limited at this meeting and that more analysis could be done, many of the impacts analysis pointed to as shortcomings here could be closely examined if circumstances called for a close look. Likewise impacts could be more carefully and more effectively considered in the specific circumstances calling for their possible use. It is often more useful to compare and contrast impacts against other options available at the time. At this time, we do not have immediate need for the lines. And the impacts of the lines would be speculative. Yet we can say with some confidence that the 300 and 350 fathom lines would reduce bycatch of rougheye more than the existing 250 fm line and cause no more adverse economic consequences than the other tools available in the case that existing lines and tools are insufficient (i.e. a complete closure or a closure out to 700 fm might be necessary). The Council therefore may wish to include the lines for this contingency. In this view, the decision on how much "analysis" is sufficient to justify the policy purpose is not the GMT's to make.

The GMT also recommends that future efforts attempt to identify more discrete area closures, similar to the rougheye groundfish conservation area analysis, which was moved into the Omnibus prioritization. The Council has successfully implemented yelloweye rockfish conservation areas, for example, in lieu of closing larger areas of the coast.

Checklist Item #26: Non-Trawl: Allow Lingcod Retention in Periods 1, 2, and 6

The GMT will have a statement on item #26 in Supplemental GMT Report 3.

Checklist Item #27: Recreational: Canary Rockfish Bag Limit

In April 2014, the Council forwarded (limited) retention of canary rockfish in the recreational fishery in Oregon only. Retention in California and Washington were eliminated from further consideration at that time. Since April, the GMT attempted to clarify the background information and the analysis.

Under the current regulation of non-retention for canary rockfish, annual impacts from the Oregon recreational fishery are projected to be 3.1 mt, from discard mortality. The analysis indicates that allowing a one fish sub-bag limit (of the 10 fish daily bag limit, no more than one may be a canary rockfish) would increase the annual projected impacts to 8.1 mt, which is 3.6 mt (30 percent) below the preferred alternative Oregon recreational fishery HG of 11.7 mt in 2015. Allowing canary rockfish to be part of the regular bag limit (10 fish), with no sub-limit, is projected to increase impacts to 9.5 mt, still under the Oregon recreational HG by 19 percent.

Concern has been expressed that increasing mortality from the recreational fishery could impact the canary rockfish rebuilding progress. However, the GMT understands that the rebuilding plan assumes that the entire ACL is attained annually. The annual total mortality from the Oregon recreational fishery (and all fisheries) is variable and uncertain; however, the estimated additional catch is within that margin of error around the HG.

The GMT also expressed concern regarding potential for changes in angler behavior that could increase canary rockfish mortality resulting from allowing a one fish bag limit to exceed projections from a bag analysis. Despite these concerns, the GMT is supportive of a one fish bag limit as buffers are in place to accommodate unaccounted for mortality and the capability of ODFW to implement timely inseason action to prohibit retention inseason to curtail accrual of canary rockfish mortality. The GMT notes that this a one fish bag limit will allow for biological sampling of landed catch to obtain otoliths and other pertinent biological information on retained catch to better inform future assessments.

Amendment 24 – Default Harvest Control Rules

Checklist Item #28: Select a final preferred alternative for default harvest control rules that would be used in future bienniums, unless modified by the Council, to establish future harvest specifications

The GMT did not have time to discuss the harvest control rules at this meeting. The GMT continues to support Alternative 3 as being the most reflective of how the Council has operated and will most likely continue to operate in the future.

GMT Recommendations

Subject	Title	GMT Input
Checklist Item #2	Confirm P* and ABCs. Adopt revised 2016 cowcod ABC	Consider revisiting their P* decision for Pacific cod, shortbelly rockfish and yelloweye rockfish
Checklist Item #5	Confirm rebuilding plan parameters including a new T-target for cowcod	No recommendation
Checklist Item #6	Confirm EC species' designations and associated FMP language to be implemented under Amendment 24.	The GMT provides clarification under F.7.b Supplemental GMT Report 2
Checklist Item #9	Confirm or modify amounts deducted from the ACL to account for groundfish mortality in Tribal, non-groundfish fisheries, EFPs and Research.	Revise the set asides to reflect the updates to tribal fisheries The GMT does not recommend increasing the canary rockfish set aside for 2015-2016
Checklist Item #13	Confirm or modify 2-year within non-trawl HGs or within non-trawl shares for 2015-2016.	Consider annual variability and the probability of exceeding the ACL when deciding whether to move 0.6 mt (or less) of yelloweye rockfish from the non-nearshore fishery to the nearshore fishery.
Checklist Item #15	Trawl RCA	The GMT concludes that adverse impacts to EFH would not likely occur by opening, year-round, the petrale cut outs with a year-round 200 fathom-modified line between 40° 10' N. and 45° 46' N. latitude.
Checklist Item #16	Non-trawl trip limits	No recommendation
Checklist Item #20	Season dates, bag limits, length limits, area closures	The GMT recommends the Council consider the revised Final Preferred California Recreational Season and Depth Restrictions as described in the CDFW state report.
Checklist Item #22	Using underutilized set-asides in the projections for the shorebased IFQ carryover.	The GMT suggests that the Council may need to re-examine how ACLs are calculated as the court ruling is different from the past approach of rely on ACL/ABC/OFL projections.

Subject	Title	GMT Input
Checklist Item #23	Non-trawl trip limit adjustments for lingcod N. of 40º10' N. lat. (increase), slope rockfish N. of 40º10' N. lat. (decrease), shortspine thornyhead N. of 34º27' N. lat. (no change) bocaccio S. of 34º27' N. lat. (increase), and shelf rockfish S. of 34º27' N. lat. (increase).	See Agenda Item F.7.b, Supplemental GMT Report 3
Checklist Item #25	Establish New RCA Coordinates for 300 and 350 fm boundaries.	No recommendation
Checklist Item #26	Allow Lingcod Retention in Periods 1, 2, and 6.	See Agenda Item F.7.b, Supplemental GMT Report 3
Checklist Item #27	Canary Rockfish Bag Limit	The GMT is supportive of a one-fish sub-bag limit.
Checklist Item #28	Select a final preferred alternative for default harvest control rules that would be used in future bienniums, unless modified by the Council, to establish future harvest specifications.	The GMT continues to support Alternative 3.

Appendix A. Historical Nearshore Rockfish Catches.

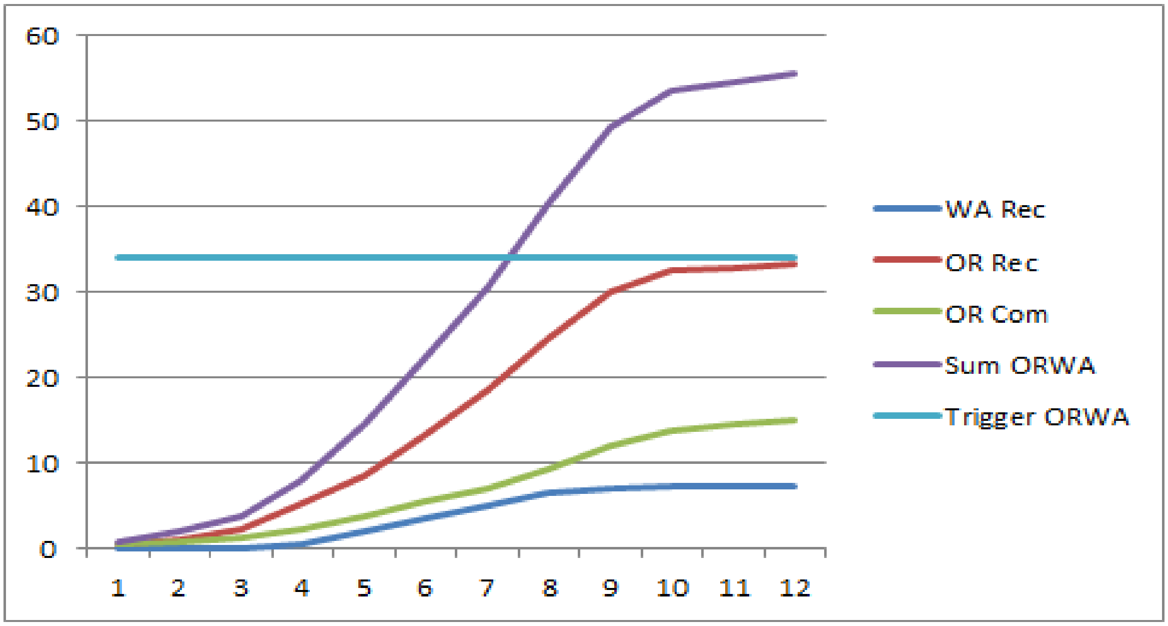


Figure 2. Average monthly cumulative Nearshore Rockfish complex mortality in the Washington and Oregon fisheries from 2008-2012 compared to trigger proposed in the WDFW/ODFW state report.

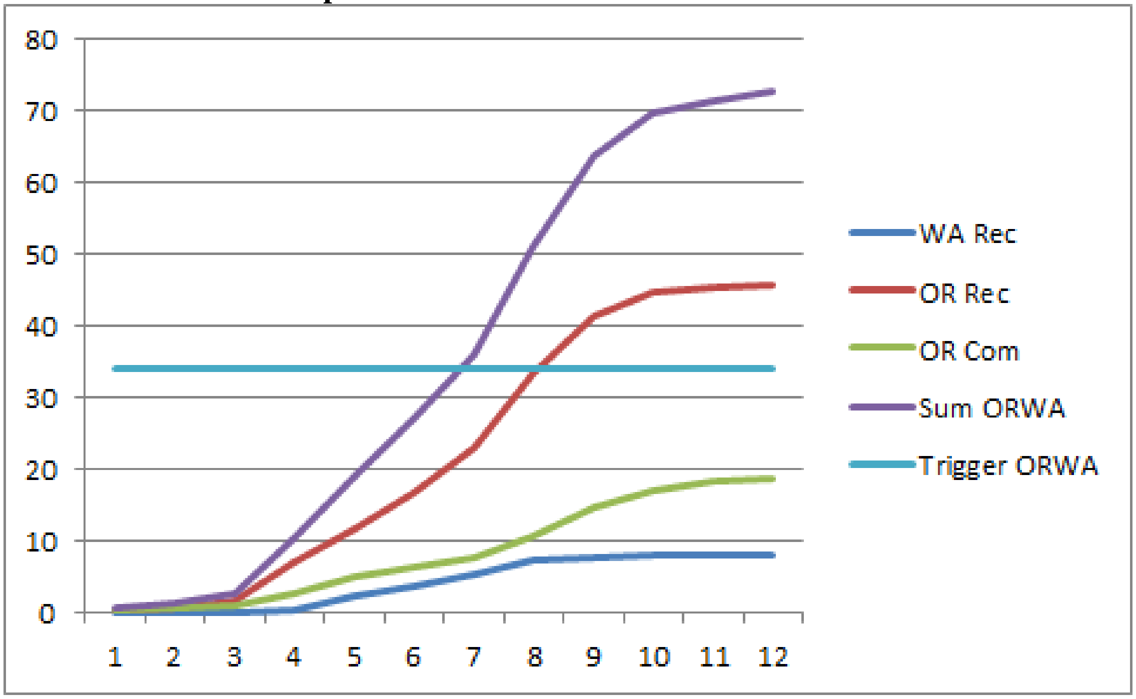


Figure 3. Average monthly cumulative Nearshore Rockfish complex mortality in the Washington and Oregon fisheries from 2012 compared to trigger proposed in the WDFW/ODFW state report.

GROUNDFISH MANAGEMENT TEAM REPORT ON FISHERIES IN 2015-2016 AND BEYOND HARVEST SPECIFICATIONS, MANAGEMENT MEASURES, AND AMENDMENT 24

Checklist Items #26 and #26 – Trip Limit Analyses

The remaining management measures shown in **Agenda Item F.7.a, Attachment 6**, June 2014: are provided below. Those management measures deal with trip limit alternatives for lingcod, slope rockfish, shortspine thornyhead, bocaccio rockfish, and shelf rockfish. They also summarize allowing lingcod retention during the currently closed period (December – April).

Checklist Item #23: Non-trawl trip limit adjustments for lingcod N. of 40º10' N. lat. (increase), slope rockfish N. of 40º10' N. lat. (decrease), bocaccio S. of 34º27' N. lat. (increase), and shelf rockfish S. of 34º27' N. lat. (increase)

Slope Rockfish N. of 40º10' N. latitude

The GMT reviewed the trip limit analysis submitted at this meeting, (Agenda Item F.7.b, Supplemental GMT Report 2) and provides the following guidance regarding the use of trip limits for slope rockfish for the non-trawl fishery north of 40°10' N. latitude. In sum, the GMT does not believe that reductions to trip limits will provide meaningful reductions to rougheye rockfish mortality, because rougheye rockfish is mostly caught incidentally while targeting sablefish (i.e., is mostly not targeted). Rougheye rockfish represents only a small fraction of overall catch (i.e., highly valued sablefish is the main target), and only a portion of the slope rockfish complex. Therefore, trip limits will likely not reduce rougheye rockfish mortality substantially, especially during unobserved trips.

Lingcod north of 40°10' N. latitude, shortspine thornyhead north of 34°27' N. latitude, bocaccio south of 34°27' N. latitude, and shelf rockfish south of 34°27' N. latitude

Trip limit analyses were completed for the 2015-2016 biennial management cycle for lingcod north of 40°10' N. latitude, shortspine thornyhead north of 34°27' N. latitude, and for bocaccio and the minor shelf rockfish complex south of 34°27' N. latitude in Agenda Item F.7.a, Attachment 6 for each of the trip limits in Table 1. We want to highlight for the Council that the lingcod analysis summarized here was revised and included in Agenda Item F.7.a., Supplemental Attachment 10. In addition, this lingcod analysis should be used only for current "summer" fishery (i.e., for the months May – November), and assumes no lingcod retention for December-April (i.e., "winter" months). See Item #26 for combined "summer" and "winter" lingcod trip limit analyses.

The estimated mortality amounts for these four fishery sectors are as follows.

Table 1 . Proposed trip limits for the four fishery sectors analyzed for the 2015-2016 biennial management cycle. Trip limits are reported in pounds per vessel per two-month period (or by month for the OA lingcod sector), when fishing is allowed. For lingcod, reference to Agenda Item F.7.a Supplemental Attachment 10, June 2014. For the other fishery sectors, reference to Agenda Item F.7.a Attachment 6, June 2014.

Fishery Sector	Option 1a - No Action	Option 1b (no winter retention)	Option 1c (no winter retention)
Lingcod LE	800 lb/2 months	1,200 lb/2 months	1,600 lb/2 months
Lingcod OA	400 lb/month	600 lb/month	800 lb/month

Fishery Sector	Option 1 - No Action	Option 2a	Option 2b
Shortspine thornyhead LE only	2,000 lb for periods 1-3 2,500 lb for periods 4-6	2,250 lb for periods 1-3 2,500 lb for periods 4-6	2,500 lb for all periods
Bocaccio LE	300 lb for periods 1 & 3 500 lb for periods 4-6	750 lb/2 months	1,000 lb/2 months
Bocaccio OA	100 lb for periods 1 & 3 200 lb for periods 4-6	250 lb/2 months	500 lb/2 months
Minor shelf rockfish complex LE	3,000 lb/2 months	4,000 lb/2 months	5,000 lb/2 months
Minor shelf rockfish complex OA	750 lb/2 months	1,500 lb/2 months	2,500 lb/2 months

For lingcod, Option 1b estimates a combined limited entry (LE) and open access (OA) mortality of 56.9 mt (4.2 percent of the lingcod non-trawl allocation amount). Option 1c estimates a combined LE + OA mortality of 75.9 mt (5.6 percent of the allocation). For shortspine thornyheads, Option 2a has a mortality estimate of 80.3 mt (96.4 percent of the non-trawl allocation). Option 2b has a mortality estimate of 83.4 mt (98.9 percent of the allocation). For bocaccio, Option 2a has a combined LE + OA mortality estimate of 8.8 mt (3.4 percent of the non-trawl allocation). Option 2b has a combined LE + OA mortality estimate of 15.5 mt (6 percent of the allocation). For the minor shelf rockfish complex, Option 2a has a combined LE + OA mortality estimate of 399 mt (29 percent of the non-trawl allocation). Option 2b has a combined LE + OA mortality estimate of 416 mt (30 percent of the allocation).

The GMT recommends that the Council consider Option 1b for lingcod if the Council is only interested in increasing trip limits and not providing for winter retention (analysis of the combined trip limit and retention is provided below in item #26 below). This alternative moderately increases May-October trip limits (e.g., increase by 400 lbs / 2 months for LE).

The GMT recommends status quo (No Action alternative) trip limit amounts for shortspine thornyhead because any increased trip limits could cause the total estimated attainment to exceed the allocation amount.

The GMT recommends Alternative 2a for bocaccio (very modest trip limit increases) mainly because bocaccio is still considered an overfished species and until the stock is declared no longer overfished, it is prudent to continue to manage the stock conservatively. West Coast Groundfish Observer Program (WCGOP) data were examined for the bocaccio fishery regarding potential mortality impacts to overfished species in the southern California bocaccio sector. Of those trips that were observed during 2011 and 2012 that had bocaccio, no encounters of overfished species were noted. Nevertheless, it can be assumed that some overfished species are probably taken occasionally, albeit in small quantities. Increased on-board observer data would facilitate better mortality estimates of overfished species taken in this fishery.

Lastly, the GMT recommends Alternative 2a for the minor shelf rockfish complex mainly because of the uncertainty associated with mortality of overfished species taken in this fishery sector. Despite this uncertainty, however, there are several items that need to be pointed out. Yelloweye rockfish are uncommon south of central California and are infrequently taken in the shelf rockfish fishery. Canary rockfish, while more common than yelloweye in southern California, are most abundant from central California north and tend not to be encountered in the southern California fisheries. Bocaccio, while taken in southern California with an apparent increasing stock status, are actively managed with its own conservative trip limits in what is a very small fishery. The number of vessels that have tapped into the bocaccio limited entry sector, for example, has averaged less than 10 per year for the past four or five years. There is a very limited interaction with cowcod, and since there is a complete prohibition on the take of cowcod by the fixed-gear fisheries; the commercial fleet avoids them as much as possible.

Checklist Item #26: Non-Trawl: Allow Lingcod Retention in Periods 1, 2, and 6 (along with combined Options taken from #23 (above).

The GMT provided an analysis to evaluate impacts of allowing lingcod retention by the commercial non-trawl fisheries during the currently closed season (December through the following April). Lingcod had a full stock assessment in 2009, when it was found to be fully recovered. Lingcod mortality has been far below the ACL north and south of 42^{o} N. latitude, with 34 percent and 16 percent attainment in 2012, respectively. The primary concern of this measure is impacts to overfished species. Two options were provided in the analysis. Option 1 used WCGOP data to estimate encounter rates during the currently closed season (Table 2). The winter trip limits shown under Option 1 in this statement are lower than the average expected catch of lingcod during the currently closed season (i.e., when lingcod are not targeted and must be discarded at sea). Hence, the GMT suggests that proposed Option 1 trip limits under this management measure (during December – April) represents the incidental catch of lingcod (i.e., non-targeted) during winter months. Since this level of catch may be incidental, it is unlikely that fishing behavior would change, and therefore overfished species impacts should be similar to No Action. The other option analyzed provides for landings that are higher than what are incidentally caught during the currently closed season. Therefore, fishing behavior may be more likely to change if this option is chosen (e.g., increased targeting) and catch of overfished species (e.g., yelloweye rockfish) may increase.

Table 2. Proposed commercial fixed gear trip limits for north and south of 40°10′ N. latitude by sector, under Option 1 for the currently closed season (December - April). The remaining trip limits (May - October) are status quo limits currently available during the open season. This table was excerpted from Agenda Item F.7.a, Attachment 6, June 2014. See Table 6 for combined trip limits ("winter" and "summer" and changes regarding LE and OA South).

Sector	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec	
LE North	200 lb/2 months		800 lb/ 2 months			400 lb	100 lb
LE South	200 lb/2 months		800 lb/ 2 months			400 lb	100 lb
OA North	100 lb/ month		400 lb/ month				100 lb
OA South	100 lb/ month		400 lb/ month				100 lb

A motion was made at the April 2014 Council meeting to task the GMT to complete an analysis that considers the following trip limit options for both the LE and OA non-trawl fixed-gear lingcod fishery sectors that examines a modified season structure. Table 3 trip limit options analyzed.

Table 3. Lingcod commercial coastwide trip limits for the non-trawl fixed-gear fisheries, showing "summer" and "winter" lingcod alternatives.

Proposed lingcod trip limits that apply to the area **NORTH** of 40°10' N. latitude with a year-long season structure						
LE	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Option 2a	200 lb/2 mo	200 lb/2 mo	1,200 lb	1,200 lb	1,200 lb	600 lb Nov, 200 lb Dec
Option 2b	200 lb/2 mo	200 lb/2 mo	1,600 lb	1,600 lb	1,600 lb	800 lb Nov, 200 lb Dec
OA						
Option 2a	100 lb/mo	100 lb/mo	600 lb/month (100 lb Dec)			
Option 2b	100 lb/mo	100 lb/mo	800 lb/month (100 lb Dec)			

Proposed lingcod trip limits that apply to the area **SOUTH** of 40°10' N. latitude with a year-long season structure						
LE	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Option 2a	200 lb/2 mo	Closed	800 lb	800 lb	800 lb	400 lb Nov, 200 lb Dec
Option 2b	200 lb/2 mo	Closed	800 lb	800 lb	800 lb	400 lb Nov, 200 lb Dec
OA						
Option 2a	100 lb/mo	Closed	400 lb/month (100 lb Dec)			
Option 2b	100 lb/mo	Closed	400 lb/month (100 lb Dec)			

The trip limits in Table 3 result in the following lingcod mortality estimates (Table 4) and the overfished species mortality (Table 5) for 2015 (under a P*0.45 approach).

Table 4. Lingcod coastwide commercial mortality estimates (mt) under Option 2a and Option 2b with the percent attainment of the non-trawl allocation.

Limited entry + open access coastwide lingcod mortality estimates (mt) at p*=0.45			
Option	Estimated take (mt)	Non-trawl allocation	Percent of Allocation
2a	135.1	1,950.7	6.9%
2b	73.4	1,950.7	8.9%

Note: South of 40°10' N. latitude the fishery will continue to be closed. The non-trawl allocations are a combination of those for north and south of 40°10' N. latitude as presented in Agenda Item C.4.a Supplemental REVISED Attachment 2, April 2014.

Table 5. Overfished species mortality estimates (mt) under Option 2a and Option 2b that reflect a coastwide season structure modification.

	Coastwide estimated mortality (mt) of OFS under options with an expanded season structure	
	Option 2a	Option 2b
Bocaccio	0.4	0.4
Canary rockfish	6.7	6.8
Cowcod	0.0	0.0
Darkblotched rockfish	0.2	0.2
Yelloweye rockfish	1.2	1.3

Recommendation:

If the Council wants to increase lingcod trip limits during both the "summer" and "winter" seasons, then the GMT recommends the Council adopt Option 2a from Table 6, which increases lingcod trip limits for LE and OA, north and south of 40º 10' N. latitude during "winter" and "summer" seasons. The GMT expects no change in fishing behavior or in catch of overfished species by allowing incidental catch of lingcod during the currently closed season ("winter"; December – April).

If the Council chooses to allow "winter" retention of lingcod, while retaining status quo "summer" trip limits, then the GMT recommends the trip limit structure shown in Table 5, with the exception of LE and OA south of 40º 10' N. latitude, where lingcod retention would continue to be prohibited during March and April. This is because rockfish retention is prohibited during this period south of 40º 10' N. latitude.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE REPORT ON 2015-2016 BIENNIAL HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES

The California Department of Fish and Wildlife (CDFW) hosted a teleconference in early June to discuss potential groundfish regulation changes for 2015 and 2016 and to solicit input from the public to help develop the State's recommendation to the Council. Participants on the call represented all fishing sectors throughout the state. While there were differing opinions expressed on preferred management measures, most on the call expressed a desire to extend the seasons in the recreational fishery wherever possible and to provide for increased lingcod opportunities in the commercial fishery and allow some incidental-level catch in months that are presently closed. Maintaining a precautionary approach and preventing early closure of fisheries was important to all participants.

Based in part on public input received during the teleconference, CDFW offers the following recommendations for Council consideration in deciding final preferred season structures and management measures for 2015-16.

California Commercial Fisheries

Season Structures

CDFW supports maintaining the status quo RCA boundaries for the commercial nearshore fishery (20 fm[1] between 42° N and 40° 10' N latitude; 30 fm between 40° 10' N latitude and 34° 27' N. latitude; 60 fm south 34° 27' N. latitude) as the Final Preferred Alternative. In the event that more yelloweye are made available to the nearshore fishery, deeper depth restrictions north of 40° 10' N latitude may be explored.

Management Measures

Lingcod Trip Limits

CDFW supports option 2a for increasing the lingcod trip limit for the limited entry and open access sectors north of 40° 10' N latitude (Table 1). In addition, CDFW supports providing access to lingcod during periods 1, 2, and 6 for north of 40° 10' N latitude and for periods 1 and 6 south of 40° 10' N latitude (Table 2).

Table 1. Preferred trip limits for limited entry and open access lingcod north of 40° 10' N latitude.

	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Limited Entry	200	200	1,200	1,200	1,200	600/200
Open Access	100	100	600	600	600	600/100

Table 2. Preferred trip limits for limited entry and open access lingcod south of 40° 10' N latitude.

	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sept/Oct	Nov/Dec
Limited Entry	200	CLOSED	800	800	800	400/200
Open Access	100	CLOSED	400	400	400	400/100

[1] The 20 fm RCA is defined by depth, not waypoints.

California Recreational Fishery

Season Structure

In accordance with CDFW's policy to provide a stable fishery and minimize inseason disruptions, seasons are designed to maximize fishing opportunity while keeping harvest within specified harvest guidelines. This includes multi-month closures early in the year as part of the overall design to ensure that limits are not exceeded. Although allowable levels of cowcod and yelloweye rockfish increased slightly compared to prior years, canary rockfish and minor nearshore rockfish north of 40° 10' N latitude constrain the recreational fishery and are one of the main factors affecting season lengths.

CDFW supports the following recreational RCA configuration and season structures (Fig 1). The season structure prioritizes increasing season lengths when possible, maintaining a precautionary approach, and recognizing the constraints imposed from canary and minor nearshore rockfish. Compared to the 2014 season structure, the proposal for 2015-16 would provide a modest increase in season length in the Mendocino management area (2 months), the San Francisco management area (6 weeks) and the Central management area (one month), while the Southern management area would maintain its season length but allow for an increase in allowable fishing depth to 60 fathoms. The Northern area would remain at status-quo seasons and depths.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern	Closed				May 15 – Oct 31 <20fm						Closed	
Mendocino	Closed				May 15 – Oct 31 <20fm						Closed	
San Francisco	Closed			April 15 – Dec 31 <30fm								
Central	Closed			April 1 – Dec 31 <40fm								
Southern	Closed		Mar 1 – Dec 31 <60 fm									

Figure 1. California recreational groundfish season structure for 2015-2016.

Management Measures

CDFW supports the No Action alternative for groundfish bag limits and size limits with one exception - lingcod bag limit. Increasing the lingcod bag limit from two fish to three fish is intended to provide more opportunity for anglers to achieve their allocation of lingcod. Mortality of lingcod in recent years has been far less than the non-trawl allocation; therefore increasing the bag limit to three fish is not expected to exceed the non-trawl allocation, let alone the entire ACL.

Lingcod was last assessed in 2009 and at that time the stock was healthy, with a depletion level of 74%. Ten year catch projections in the assessment indicate that the depletion level at the start of 2015 would be 68.4%. Given that mortality has been far below the ACL in each of the years since the assessment was conducted, it is likely that depletion is actually much higher (i.e. more optimistic). Although the stock assessment did have considerable uncertainty, it is clear that the stock is healthy with a depletion level well above 40%, and a small increase in projected catches by both the commercial and recreational sectors is not expected to pose undue risk to this stock or affect stock status.

Agenda Item F.7.b
REVISED Supplemental GMT Report 2
June 2014

GROUNDFISH MANAGEMENT TEAM REPORT ON FURTHER ANALYSIS OF SELECT HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES FOR 2015-2016

Contents

Establish New Rockfish Conservation Area (RCA) Coordinates – 300 and 350 fathoms

Section B.2 under Agenda Item F.7.a, Attachment 6, Excerpt of Appendix B of the Preliminary Draft Environmental Impact Statement (EIS), provides background information about how the proposed 300 and 350 fathom rockfish conservation area (RCA) lines were created (i.e., using GIS software and the judgment of the analyst) and how they might be further modified. The proposed waypoints for these lines were provided for the area north of 40°10' N. latitude only. The proposed waypoints could be further modified if any of the following are desired by the Council: match the proposed RCA lines to the existing 250 fathom RCA line when they cross that existing RCA line; create proposed RCA lines that are "bumped out" and parallel the existing 250 fathom RCA line; and/or engage the fishing industry and fisheries enforcement officers in the practicalities associated with implementing these proposed lines and modifying them as appropriate.

For this analysis, observer data were used: West Coast Groundfish Observer data (WCGOP) and North Pacific Observer data (NORPAC). Haul level PacFIN landings data were not analyzed in time to be submitted as part of this report but total landings and average annual price for targeted species from 2002-2012 were used. "Rougheye/blackspotted" in this analysis combines rougheye, blackspotted, and an undifferentiated rougheye/shortraker group. Depth bins in Tables 1-7 were based on average depth of fishing for bottom trawl gears (limited entry trawl/catch shares sector) and shoreside whiting sector, and bottom depth (rather than fishing depth) was used for the at-sea whiting sector. Depth bins were defined by existing and proposed RCA lines to investigate incremental change in rougheye/blackspotted catch as depths increased. Latitude bins were defined by existing latitudinal breaks for RCAs in regulation. Figures 1-3 are basic maps of these latitudinal areas and the proposed and existing RCA lines.

When considering the following analysis and time period analyzed (2002-2012), the following should be noted:

- the 100-150 fathom area has been closed coastwide to bottom trawl since 2004 and is referred to as the "core RCA" area;
- the 150-200 fathom area from 45° 46 to 40° 10' N. latitude has been closed in some years since 2004, except for when the petrale modified RCA has been in place;
- outside of the depths and areas mentioned above, fishing has occurred except when RCA areas have been closed seasonally;
- the bottom trawl gear category used in this analysis (within the Limited Entry trawl/catch shares sector) and the shoreside whiting sector (midwater trawl gear) have been part of the catch shares fishery (individual fishing quota or IFQ) since 2011; an analysis of rougheye/blackspotted catch before and after 2011 may be informative but time to do so at this meeting was not available; and
- the shoreside whiting sector was subject to full retention as an exempted fishing permit fishery (EFP) since the 1990s. No observer coverage was required for this sector during

this period. This explains why the data years available for this sector were 2011-2012 only, and why the number of hauls in this sector were much lower than for the other two (Table 3). The data years available for the at-sea whiting sector and bottom trawl gear category were 2002-2012.

The relevance of using set, up, or average fishing depth information from the WCGOP data for this analysis has been a topic of GMT discussion during this meeting. For bottom trawl gears, these variables would seem appropriate but for midwater gears used in the shoreside whiting sector, using this variable may be questionable. Though bottom depth would be more appropriate for this analysis because RCAs approximate depth regardless of where in the water column fishing is occurring, bottom depth information is not available from the WCGOP. Given the available data, a spatial analysis using latitude and longitude coordinates of fishing locations for the shoreside whiting sector would be a better way of characterizing fishing effort in the depth and latitude ranges presented below. However, time was not available for this analysis at this meeting. For midwater gears used by the at-sea whiting sector, both fishing and bottom depth information are available from the NORPAC, and bottom depth was used in this analysis.

Biological impacts:

Table 1 provides estimates of total observed catch of rougheye/blackspotted. Table 2 provides estimates of average observed rougheye/blackspotted catch per target species haul; i.e., total catch of rougheye/blackspotted (Table 1) divided by the total number of hauls that caught a targeted species (Table 3). Pacific whiting is the target for the at-sea whiting sector; Dover sole, thornyheads, and sablefish (DTS) were the target species for the bottom trawl gears; and sablefish is the target for the LE/OA fixed gear sectors. All nominal and species group market categories were included for the DTS target species (e.g., nominal shortspine thornyhead) and species groups (e.g., undifferentiated rougheye/shortraker group) were included for this analysis. Table 4 provides estimates of average observed catch per haul of target species in each sector. Tables 5-7 provide information about rougheye/blackspotted catch within latitude and depth bins, by sector.

<u>No Action:</u> In Tables 1-7, the following depth bins are relevant to No Action: 100-150, 150-200, and 200-250 fathoms.

<u>Options:</u> In Tables 1-7, the following depth bins are relevant to the proposed RCA lines: 250-300, 300-350, and greater than 350 fathoms.

Table 1. Rougheye/blackspotted rockfishes, total observed catch (metric tons), by fishery sector and depth (fathoms), north of 40° 10' N. lat., 2002-2012. Shoreside whiting is from 2011-2012 only. Average fishing depth was used for bottom trawl and shoreside whiting; bottom depth was used for at-sea whiting.

	0 – 100	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
Bottom trawl	--	7.09	43.39	62.17	27.40	4.50	3.88
Shoreside whiting	2.04	22.05	17.48	5.95	3.04	0.07	0.73
At-sea whiting	0.05	0.55	10.85	63.61	113.98	66.07	76.95

Table 2. Rougheye/blackspotted rockfishes, average observed catch (metric tons) per haul, by fishery sector and depth (fathoms), north of 40° 10' N. lat., 2002-2012. Shoreside whiting is from 2011-2012 only. Average fishing depth was used for bottom trawl and shoreside whiting; bottom depth was used for at-sea whiting.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
Bottom trawl	0.012	0.016	0.010	0.004	0.001	0.001
Shoreside whiting	0.021	0.026	0.019	0.034	0.005	0.031
At-sea whiting	0.000	0.002	0.011	0.027	0.033	0.024

Table 3. Target species, total number of observed hauls, by fishery sector and depth (fathoms), north of 40° 10' N. lat., 2002-2012. Shoreside whiting is from 2011-2012 only.
Average fishing depth was used for bottom trawl and shoreside whiting; bottom depth was used for at-sea whiting.

	0 – 100	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
Bottom trawl	--	609	2,737	6,191	7,655	3,454	3,816
Shoreside whiting	1,252	870	680	320	90	14	24
At-sea whiting	2,297	5,629	5,185	5,655	4,200	2,031	3,195

Table 4. Target species, average observed catch per haul, by fishery sector and depth (fathoms), north of 40° 10' N. lat., 2002-2012. Shoreside whiting is from 2011-2012 only. Average fishing depth was used for bottom trawl and shoreside whiting; bottom depth was used for at-sea whiting.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
Bottom trawl	0.48	0.65	1.39	1.74	1.62	1.68
Shoreside whiting	50.79	39.30	40.31	47.31	50.40	64.93
At-sea whiting	43.35	45.35	45.91	48.71	51.27	46.35

Table 5. Bottom trawl gears (limited entry trawl/catch shares sector), total observed catch (metric tons) of rougheye/blackspotted rockfishes, by latitude and average fishing depth (fathoms), north of 40° 10' N. lat., 2002-2012.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
North of 48°10'	0.10	0.01	0.08	0.62	0.02	0.03
48°10' - 45°46'	6.16	36.48	45.46	18.91	3.66	3.24
45°46' - 40°10'	0.83	6.90	16.63	7.87	0.83	0.61

Table 6. Shoreside whiting sector, total observed catch (metric tons) of rougheye/blackspotted rockfishes, by latitude and average fishing depth (fathoms), north of 40° 10’ N. lat., 2011-2012.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
North of 48°10'	*	*	*	*	*	*
48°10' - 45°46'	17.59	10.94	5.02	2.74	0.07	0.73
45°46' - 40°10'	5.07	6.55	0.92	0.31	0.00	*

*No rougheye/blackspotted rockfish were observed in this depth/latitude combination.

Table 7. At-sea whiting sector, total observed catch (metric tons) of rougheye/blackspotted rockfishes, by latitude and bottom depth (fathoms), north of 40° 10’ N. lat., 2002-2012.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
North of 48°10'	0.06	0.11	0.04	0.06	0.47	1.78
48°10' - 45°46'	0.17	6.49	49.82	109.95	64.20	74.12
45°46' - 40°10'	0.32	4.25	13.75	3.97	1.40	1.06

Socioeconomic impacts:

When considering average observed catch per haul of Pacific whiting, the shoreside and at-sea whiting sectors have rates relatively consistent through all depth ranges, 100 fathoms to greater than 350 fathoms (Table 4). Average observed catch per haul of DTS for bottom trawl gears generally increased as depth increased (Table 4). This suggests that targeted species may be caught in depths deeper than the deepest Trawl RCA line currently in regulation (250 fathoms). However, the number of hauls from which this information was derived is small for the shoreside whiting sector in particular (Table 3). Despite the potential ability of these sectors to catch their target species in deeper depths, the cost to reach these areas, in terms of fuel and time, and potential risks for safety at sea, may increase.

The following tables provide information about the estimated value of target species in each depth and latitude bin. Relative proportions for each sector were calculated for each depth/latitude combination based on the observed catch of target species across each sector. Each proportion was then multiplied by the total landings of the target species across all years during the 2002-2012 time period (pounds; PacFIN landings data). Finally, this target species landings estimate for each depth/latitude combination was multiplied by the average annual price per pound for that target species (average annual price, 2002-2012). These values were standardized by haul for each depth/latitude combination (total value / number of years) and shown in Table 8, Table 9, and
Table 10.

Table 8. Bottom trawl gears (limited entry trawl/catch shares sector), average revenue per year of target species, by latitude and average depth (fathoms), north of 40° 10’ N. lat., 2002-2012.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
North of 48°10'	$13,460	$1,116	$988	$2,664	$4,550	$2,154
48°10' - 45°46'	$44,995	$282,522	$788,126	$1,109,092	$463,763	$361,634
45°46' - 40°10'	$19,799	$191,484	$1,516,672	$2,470,546	$1,032,441	$1,358,144

Table 9. Shoreside whiting sector, average revenue per year of target species, by latitude and average depth (fathoms), north of 40° 10’ N. lat., 2011-2012.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
North of 48°10'	*	*	*	*	*	*
48°10' - 45°46'	$6,320,390	$2,293,280	$751,860	$595,605	$113,929	$277,478
45°46' - 40°10'	$5,189,580	$3,415,674	$2,003,679	$314,079	$36,806	*

*No rougheye/blackspotted rockfish were observed in this depth/latitude combination.

Table 10. At-sea whiting sector, average revenue per year of target species, by latitude and bottom depth (fathoms), north of 40° 10' N. lat., 2002-2012.

	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350	> 350
North of 48°10'	$1,337,976	$528,586	$20,228	$21,856	$22,761	$34,938
48°10' - 45°46'	$675,257	$1,083,297	$2,033,576	$2,691,441	$1,659,671	$2,916,940
45°46' - 40°10'	$4,313,874	$4,274,529	$4,444,756	$2,408,422	$924,021	$755,396

Discussion

As mentioned above, depth ranges were chosen at 50 fathom increments to explore whether rougheye/blackspotted catch in the midwater and bottom trawl sectors showed concentrations across different depths. The latitudinal breaks in this analysis are based on current regulations associated with existing RCA lines. However, these latitudinal ranges are large. For example, 45°46' to 40°10' N. lat. covers an area from northern California to just south of the Columbia River (Figure 2). It may be worthwhile to explore smaller, more discrete latitudinal areas to more precisely focus in on high rougheye/blackspotted bycatch areas; we did not have time to do so at this meeting.

Other information about areas with higher bycatch rates of rougheye/blackspotted, such as information presented by Dave Fraser relative to the at-sea and shoreside whiting sectors, may be helpful for informing other, more discrete latitudinal (and depth) areas such as groundfish conservation areas (GCAs) or "hot spots" (Agenda Item C.9.b, Supplemental GMT Report, April 2014). If the Council chose to evaluate different or more management lines than those that have been used in regulation, we provide the following for a historical perspective. Since the inception of RCAs on the west coast, we have implemented RCAs within the following number of management areas north of 40° 10' N. latitude: one area (2002-2006), seven areas (2007-2008), four areas (2007-part of 2014), and three areas (part of 2014).

For bottom trawl gears, the highest total catch of rougheye/blackspotted rockfishes (2002-2012) were observed between 48°10' and 45°46' for the 150-200 and 200-250 fathom depth areas (Table 5). The corresponding average revenue per year of DTS is moderate in these areas (Table 8). The average revenue per year of DTS is highest in areas between 45°46' N. lat. and 40°10' N. lat. where bottom depths are 200 fathoms or more (Table 8). The corresponding total observed catch of rougheye/blackspotted (2002-2012) in these depth/latitude areas was lower than in other areas (Table 5).

For the shoreside whiting sector, the highest total catch of rougheye/blackspotted rockfishes (2002-2012) were observed between 48°10' and 45°46' for the 100-150 and 150-200 fathom depth areas (Table 6). The corresponding average revenue per year of Pacific whiting was high in these areas (Table 9). The average revenue per year of the target species is highest in areas between 48° 10' and 45° 46' N. latitude for the areas between 100-200 fathoms, and 45° 46' to 40° 10' N. latitude for the 100-250 fathoms (Table 9). The corresponding total observed catch of rougheye/blackspotted (2002-2012) in these depth/latitude areas was low (Table 6).

For the at-sea whiting sector, the highest total catch of rougheye/blackspotted rockfishes (2002-2012) were observed between 48° 10' and 45° 46' for the depth area from 200 fathoms and higher (Table 7). The corresponding average revenue per year of Pacific whiting was moderate to high in these areas (

Table 10). The average revenue per year of the target species is highest in areas between 48° 10' and 45° 46' N. latitude in depths from 200 fathoms and deeper, and from 100-300 fathoms between 45° 46' and 40° 10' N. latitude (

Table 10). The corresponding total observed catch of rougheye/blackspotted (2002-2012) in these depth/latitude areas ranged from low to high (Table 7).

There has been some discussion about the ability of rougheye/blackspotted rockfishes, as well as rockfishes (*Sebastes spp.*) in general, to survive in depths deeper than 250 fathoms. The recent stock assessment for blackgill rockfish indicated that this species has "among the deepest distribution of all of the California Current *Sebastes* and live at the edge of the low oxygen (hypoxic) conditions that characterize the slope waters of the California Current" (Agenda Item G.4.a, Attachment 13, September 2011). The stock assessment also reported that blackgill are known to have a depth distribution of 48-420 fathoms (87-768 meters) but only one blackgill rockfish was caught in a haul greater than 328 fathoms (600 meters) in the ten years that the NWFSC combined bottom trawl survey has been conducted. It should be noted that the historical nomenclature of rougheye and blackspotted rockfishes have been confused with shortraker and blackgill rockfishes, so the current understanding of the depth distribution of blackgill rockfish may or may not be directly comparable to rougheye/blackspotted rockfish. Regarding rougheye and blackspotted rockfishes, the Alaska Fisheries Science Center (AFSC) surveys from 1961-2005 (7,775 tows) found blackspotted rockfish in deeper depths than rougheye rockfish; both were observed in depths up to 275 fathoms. Also of note, two rougheye rockfish were caught with midwater trawl gear in the Gulf of Alaska at a maximum gear depth of 275-500 fathoms over 985-1,038 fathoms of bottom depth (Orr and Hawkins, 2007). Although these may be rare occurrences, the presence of rougheye away from the bottom suggests that management decisions related to midwater fisheries should not be focused purely on bottom depths or oxygen levels, but ideally be based on spatial areas where rougheye occur. However, as stated above, the GIS analysis required could not be conducted in time for this meeting. Such an analysis would be best done under Agenda Item F.3.a in the Omnibus List.

References:

Field, J. and D. Pearson. 2011. Status of the blackgill rockfish, *Sebastes melanostomus*, in the Conception and Monterey INPFC areas for 2011. Pacific Fishery Management Council Meeting, Agenda Item G.4.a, Attachment 13, September 2011.

Orr, J.W. and S. Hawkins. 2008. Species of the rougheye rockfish complex: resurrection of Sebastes melanostictus (Matsubara, 1934) and a redescription of *Sebastes aleutianus* (Jordan and Evermann, 1898) (Teleostei: Scorpaeniformes). *Fishery Bulletin* 106(2): 111-134.

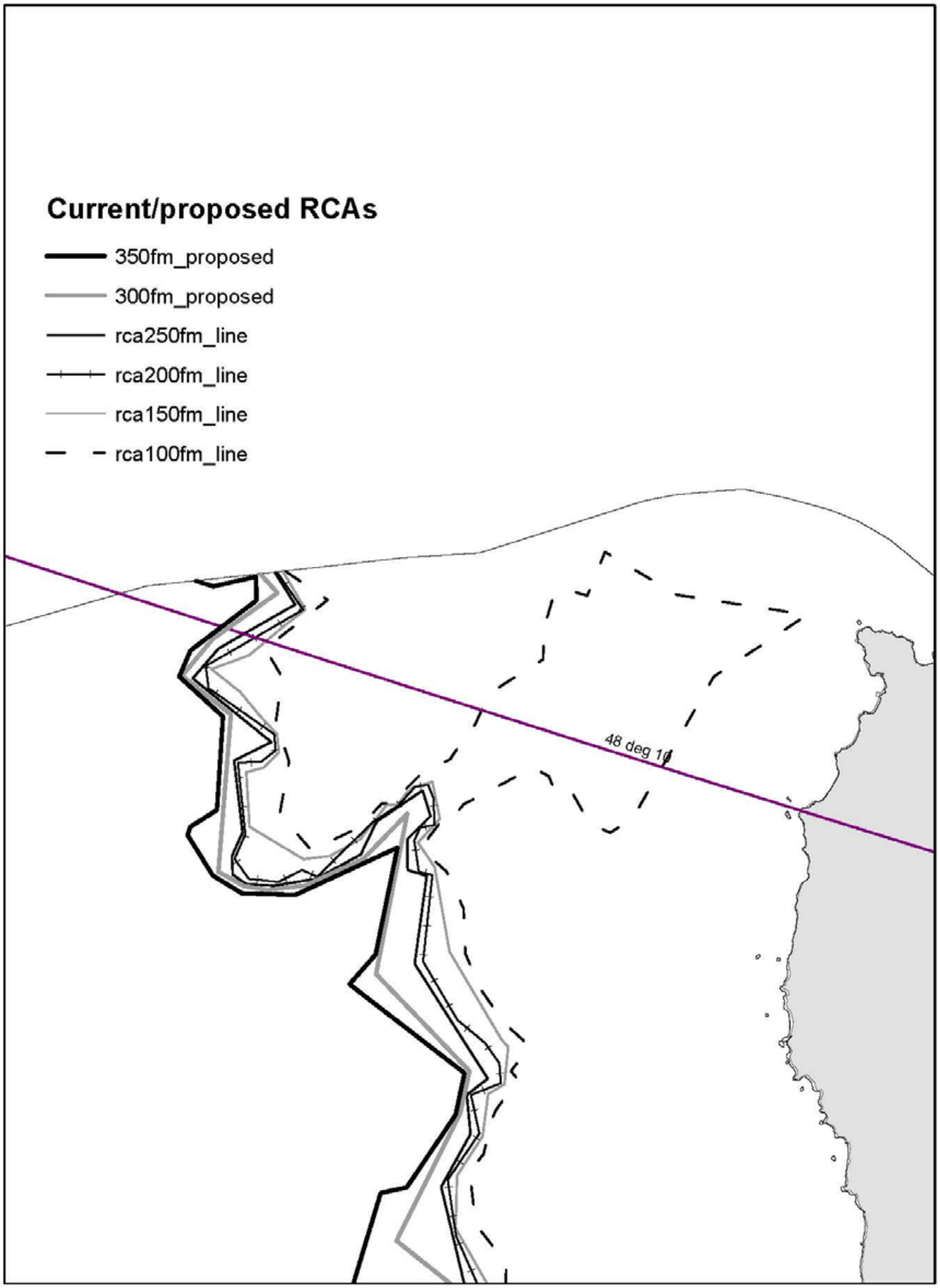


Figure 1 . Proposed and existing RCA lines, north of 48° 10’ N. latitude.

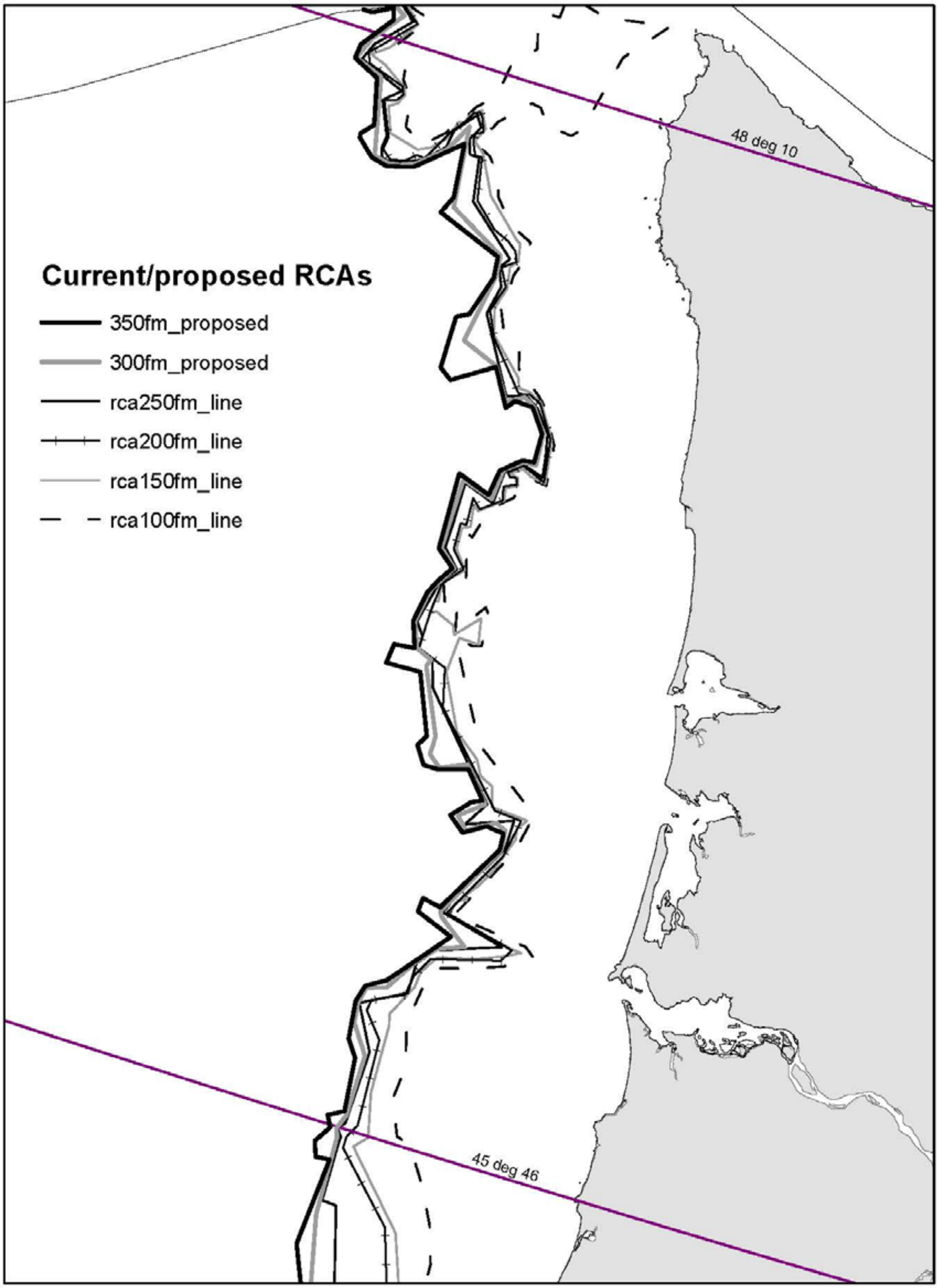


Figure 2. Proposed and existing RCA lines, between 45° 46' and 48° 10' N. latitude.

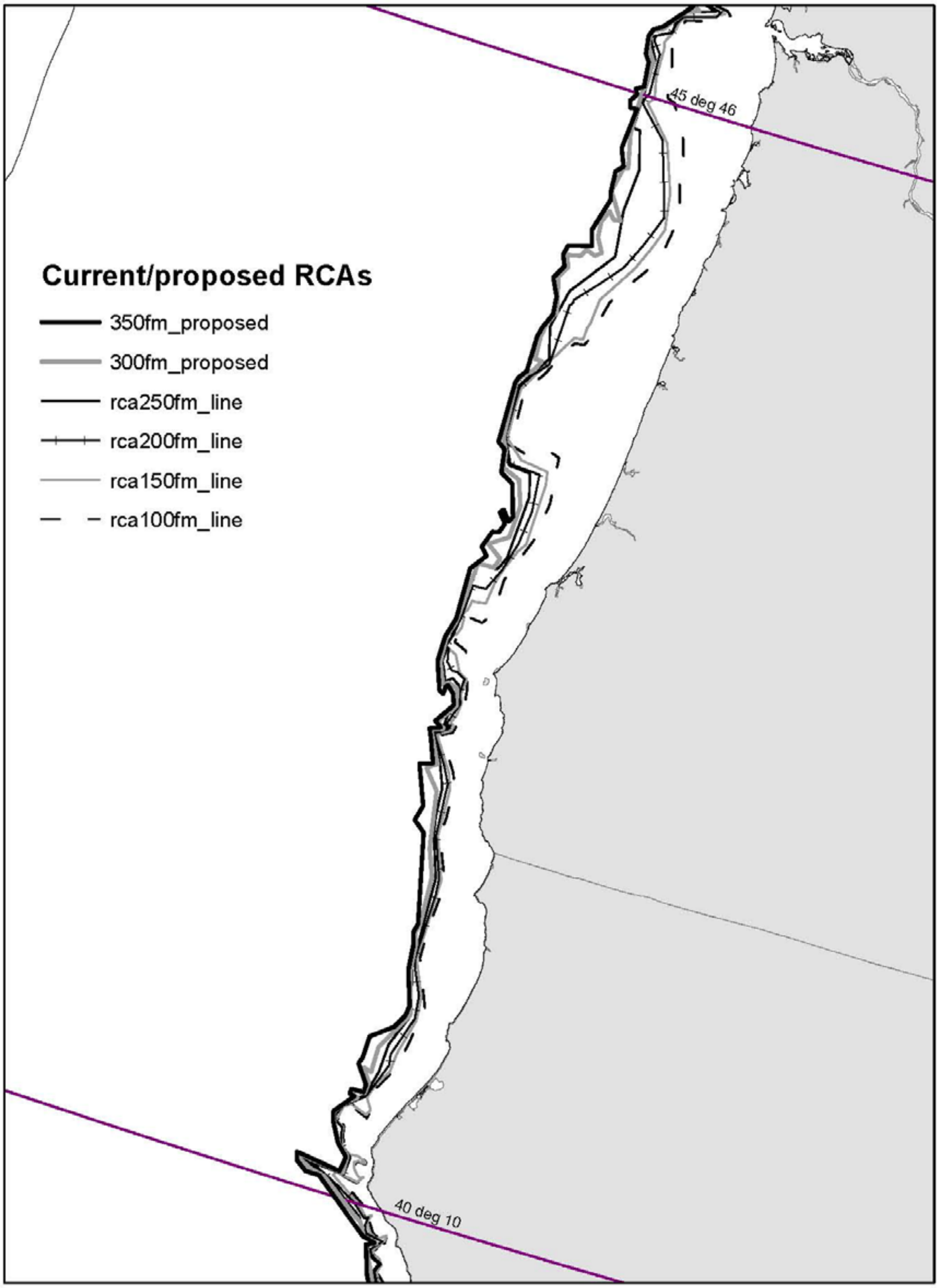


Figure 3. Proposed and existing RCA lines, between 40° 10' and 45° 46' N. latitude.

GMT Discussion on Ecosystem Component Species' Designations

The GMT was informed at this meeting that the National Marine Fisheries Service (NMFS) is looking for more information on the Council's recommendation to designate Pacific grenadier as an ecosystem component (EC) species. We understand the questions relate to Pacific grenadier's marketability and the stock possibly being the focus of targeting by some vessels. We also understand that there are some inconsistent statements in the groundfish fishery management plan (FMP), which states that there is a developing fishery for grenadiers, and the Draft environmental impact statement (EIS), which states that they are "not explicitly targeted and their low value does not provide an incentive to develop target strategies." The National Standard 1 (NS1) Guidelines point to targeting as a factor as possibly disqualifying a stock for EC species designation. And given that Pacific grenadier show landings of ~ 130 metric of tons per year, the question is whether the stock is really appropriate for designation as an EC species.

With all the issues we are considering at this meeting, we did not have time to fully summarize the information and analysis that we have brought forth in GMT reports from the September 2013 and November 2013 Council meetings, and in other statements regarding classification of stocks in the FMP.

We did not have time to attempt to capture and synthesize the Council's reasoning and use of all the information we and others presented when making the EC species recommendation. We can speak, however, to the matter of how the GMT attempted to present the policy choices to the Council. We did not see that policy choice as revolving around the question of whether Pacific grenadier was targeted or not. Instead we saw the decision as presenting novel circumstances. The EC species concept is new and there is not much experience applying it. We try and explain how we viewed the policy decision.

First, we were aware that Pacific grenadier is landed, marketed, and possibly targeted in some regions, mainly in Central California, and advised the Council to this fact. The complicating factor was that giant grenadier is caught in similar magnitudes and faces the same risk of overfishing as Pacific grenadier. Giant grenadier is not targeted or marketable however. Some people may be marketing California grenadier.

With the data available, we thought we could look to many factors in helping the Council decide how to classify stocks in the Groundfish FMP. In taking a risk-based view, we recommended that the Council look to the risk of overfishing as the primary factor for evaluating the FMP's classification of stocks. In this view, the targeting and retention language in the Guidelines were really proxies for weighing that risk and the relative need for conservation and management. We saw them as helpful guides but not necessarily determinative for all stocks. And in some cases, we thought that other evidence might show that they might not be the best guides to conservation and management need.

To illustrate this, we pointed out that overfishing could be of high concern even for species that are only caught incidentally and discarded. The risk could be higher for such a stock than for a stock that is targeted and marketable. We pointed to spiny dogfish as an example from the Groundfish FMP where this was the case. It would be contrary to the Magnuson-Stevens Act to not be concerned over overfishing risk just because a stock was not landed or sold.

Moreover, the Northwest Fisheries Science Center (NWFSC) was able to produce overfishing limits (OFLs) and acceptable biological catches (ABCs) for the grenadiers. We also had reliable estimates of how total catch compared to those harvest specifications. We thought that these numbers provided a much more direct way for the Council to evaluate conservation and management need than did the NS1 Guidelines EC species criteria.

With this information, the risk of overfishing either stock seemed low. It was also noted that the OFLs were based on the NWFSC bottom trawl survey and so biomass estimates were likely on the low side. The survey does not go deeper than 700 fathoms. Grenadiers habitat extends beyond 700 fathoms.

In sum, we thought it was reasonable for the Council to bring Giant grenadier into the FMP or to designate them as EC species. We just did not see a basis for treating them differently as to their FMP classification because they are caught in very similar amounts and face the same general risk of overfishing. We saw the Council's policy decision as centering on the question of whether that risk was high enough to warrant conservation and management as an "in the fishery" species. We did not think the differential marketability of Pacific grenadier presented clear reason to classify it differently.

Of note, the recommendation on Pacific grenadier was made in the context of reorganization of the Other Fish stock complex. As that complex was completely reorganized, it was likely that Pacific grenadier would be an "individually managed" species if left as an FMP species. We also broached the issue of bringing in all grenadier species because of catch accounting reasons. There are several species of grenadier that can be difficult to identity and so managing them as either an EC species or in the fishery complex could further accurate identification.

Increased access to WCGOP data allowed us to produce new looks at grenadier catches that we did not produce last fall (Figure 4 and Figure 5). This data suggests that giant grenadier and Pacific grenadier are retained to similar degrees and that catches of giant grenadier are greater than those for Pacific grenadier.

Lastly, as we noted under Agenda Item F.3.b Supplemental GMT Report, the Council has yet to have much discussion on what requirements might go along with EC species designation. We envisioned that they will be monitored to the same extent as they are now. Changes in landings can be tracked and brought to the Council's attention. The trawl survey will continue to catch grenadiers and periodic updates of their biomass estimates would low evaluation of population trends. Yet the Council may wish to consider doing more. We understand that similar issues are being considered under Ecosystem Initiative 1 and the unmanaged forage fish.

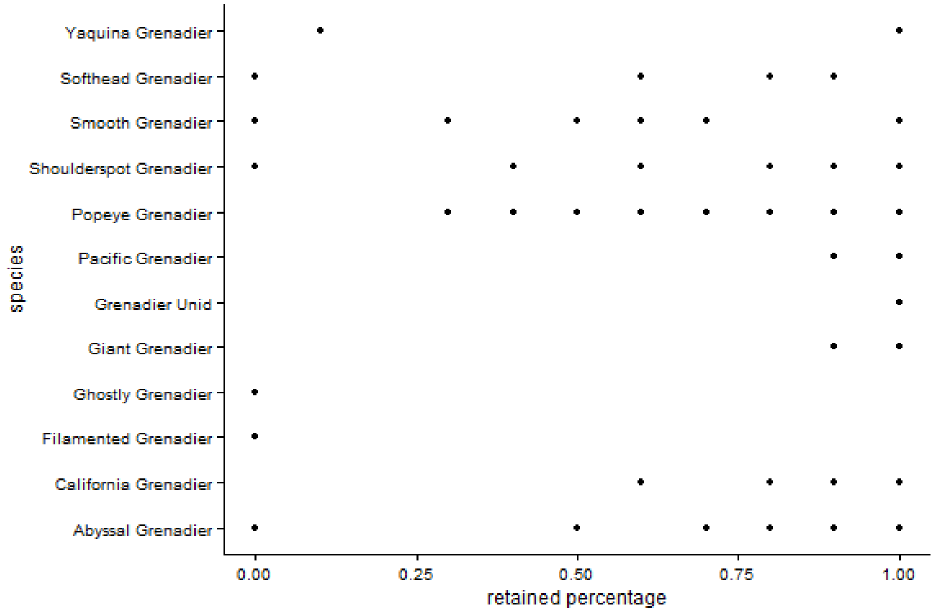


Figure 4. Annual retention species from observed trips across all sectors monitored by WCGOP (2002-2012). For context, more than 90 percent of the catch comes in the bottom trawl fishery.

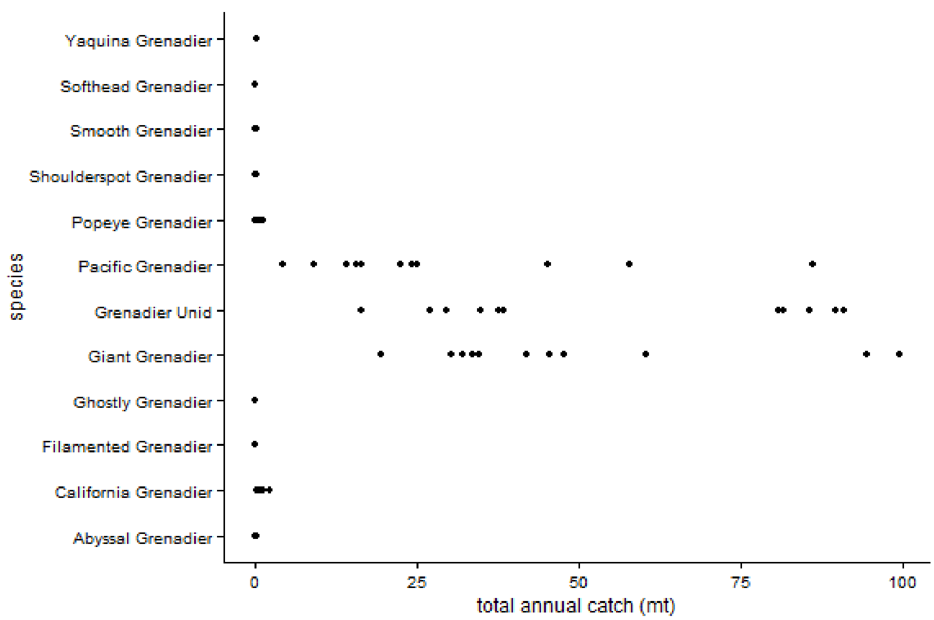


Figure 5. Annual observed total catch across all sectors, 2002-2012. Estimates are not expanded and intended only to show relative catches among grenadier species.

Two-year Yelloweye Rockfish Sharing (Non-Trawl) - Evaluating the Uncertainty of Yelloweye Rockfish Catches in the Nearshore and Non-Nearshore Commercial Fixed Gear Sectors

The GMT discussed the management measure designed to move 0.6 mt of yelloweye rockfish from the non-nearshore fixed gear sector to the nearshore fixed gear sector (see Agenda Item F.7.a, Attachment 6, June 2014; B.4 pages 27-40). The intent of this measure is to reduce the probability of the nearshore fixed gear sector from exceeding its catch share of yelloweye rockfish. Clarifications and additional analyses are provided below.

We understand that the Council may recommend moving any amount between 0.0 mt to 0.6 mt between the two sectors (e.g., the Council could choose to move 0.3 mt from the non-nearshore sector to the nearshore sector). This analysis provides results only for the upper extreme potential shift between sectors (0.6 mt). Results for anything in between may be roughly interpolated from these results.

Yelloweye Rockfish Share Between Sectors

Yelloweye rockfish has been a constraining species for attaining target species by both the non-nearshore and nearshore fixed gear fisheries for more than a decade. The Council considers the two-year allocations for yelloweye rockfish every biennial cycle based on projected impacts, i.e., forecasts of total fishing mortality provided by the GMT, and other factors. The nearshore and non-nearshore sectors are assigned a "share" of the non-trawl allocation. The sector's shares and projected impacts (i.e., total fishing mortality) under the Preliminary Preferred Alternative (PPA), both with and without a transfer of 0.6 mt, are shown in Table 11. Without a transfer (No Action) the non-nearshore fishery shows a surplus buffer of 0.6 to 0.7 mt, whereas the nearshore fishery shows a buffer of 0.0 to 0.1 mt. On the other hand, if a 0.6 mt transfer were made from non-nearshore to nearshore, then the projected catch for the non-nearshore fishery would be only 0.0 to 0.1 mt lower than its catch share, whereas the nearshore fishery would realize a buffer of 0.6 to 0.7 mt between its projected yelloweye catch and its share.

Table 11. The sector shares and projected impacts of yelloweye rockfish with and without the transfer of 0.6 mt (under Preliminary Preferred).

		Without transfer		With transfer	
		2015	**2016**	**2015**	**2016**
Nonnearshore	Share	1.1	1.2	0.5	0.6
	Projection	0.5	0.5	0.5	0.5
	Difference	0.6	0.7	0.0	0.1
Nearshore	Share	1.2	1.3	1.8	1.9
	Projection	1.2	1.2	1.2	1.2
	Difference	0.0	0.1	0.6	0.7

[a/]Note that in Agenda Item F.7.a, Attachment 6, June 2014, the nearshore projected catches were based on no action (1.1 mt). Those projections were change in this table to Preliminary Preferred projections for consistency

Summary of Results

One of the main conclusions of the report shown in Agenda Item F.7.a, Attachment 6, June 2014 (B.4, pages 27-40) was that there was a high level of variability in annual yelloweye catches for both the nearshore and non-nearshore fishery, and this variability should be taken into account when deciding upon yelloweye sharing between these sectors (Table 11). Presently, projected catches are provided as point estimates based on average historical catches. Annual variability should be taken into account when evaluating these projections relative to harvest targets.

Mortality of yelloweye rockfish from 2003–2012 ranged from 0.1 mt to 2.5 mt for the nearshore fishery and 0.3 to 1.6 mt for the non-nearshore fishery (Table 12). Highlighted cells represent those years where the yelloweye rockfish mortality would have exceeded the Preliminary Preferred catch share for 2015. These sectors, combined, would have exceeded each of their 2015 PPA catch share on five occasions; the non-trawl commercial fishery as a whole, however, would have exceeded their allocation (at the 2015 PPA level) of yelloweye rockfish only twice in 10 years.

Table 12. Variability of total mortality estimates for yelloweye rockfish in the nearshore and non-nearshore commercial fixed gear sectors, 2003-2012. Highlighted cells represent cases where the catch would have exceeded the 2015 catch share (1.1 mt for non-nearshore and 1.2 mt for nearshore) and the sum of the two catch shares (2.3 mt). Data source: West Coast Groundfish Observer Data (WCGOP), GMMultiYr_DataProduct Dec. 23, 2013.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nearshore	0.3	1.1	0.9	0.8	1.9	2.5	0.5	0.1	0.8	1.8
Non-nearshore	1.6	1.1	0.6	0.7	0.7	0.8	1.2	0.3	0.3	0.3
Total	1.9	2.2	1.5	1.5	2.6	3.3	1.7	0.4	1.1	2.1

Numerous tables were provided in Agenda Item F.7.a, Attachment 6, June 2014, B.4 (pages 27-40) that further illustrate annual variation in yelloweye mortality by the fixed gear fisheries. Summarized results from some of these tables are shown in Table 13. A challenge to the management of yelloweye (and other infrequently caught species) is that the variability in mortality estimates is a combination of the variability in encounter rates and the sampling error associated with extrapolating from the fraction of those rare encounters that are observed. The large sampling error suggests that observation error is a large part of the variability in observed mortality. This uncertainty should not prevent the council from taking action, but illustrates the challenges in projecting the impacts of any management measure and the difficulty in quantifying those impacts if and when they occur. To put this sampling error into perspective, for the nearshore fishery, the 90% interval around the point estimate ranges from 47% of the point estimate (e.g., about half) to 171% of the estimate (i.e., about double).

Table 13. Comparison of nearshore and non-nearshore observer effort (trips) and catch of yelloweye rockfish (mt) using various metrics. Data source: WCGOP.

Metric	Nearshore	Non-nearshore
Average number of trips observed (2003-2012)	288	331
% WCGOP coverage (2003-2012)	5.4%	19.7%
Average % of observed trips with yelloweye (2004-2012)	9.8%	3.6%
Catch share (Preferred Alt., 2015)	1.2	1.1
Projected catch (Preferred Alt, 2015)	1.1	0.5
Avg. mortality (2003-2012)	1.1	0.8
Std. Dev. mortality (2003-2012)	0.8	0.4
Estimated sampling error (90% interval of estimated catch / true catch)	47% – 171%	37% – 179%

Impacts to the Nearshore Fishery

Under the PPA, the nearshore fishery season structure would remain as described in Agenda Item F.7.a, Attachment 3, June 2014. The shoreward RCA would remain at 30 fathoms for Oregon and 20 fathoms for northern California (north of 40º 10´ N. latitude). Landings of target species would remain as shown in Table 4-19 in that attachment. However, the Council is considering actions that may increase the catch of yelloweye rockfish by the nearshore fishery (i.e., increase lingcod trip limits). Clearly, since we provide point estimates for projected yelloweye catch relative to harvest targets, any increase in harvesting lingcod, or other management measures that may liberalize this fishery, may result in projected yelloweye catch that may exceed the nearshore allocation.

Shifting as much as 0.6 mt of yelloweye rockfish to the nearshore fishery would provide socioeconomic benefits. Those beneficial impacts may include:

- California and Oregon
    - Provide the opportunity to increase trip limits for lingcod during May - October, and allow lingcod retention during the currently closed season (December – April).
- Oregon
    - Increase landings of black rockfish from 120 mt (PPA) to 137.9 mt (state landing cap).
    - Increase the likelihood of retaining the 30 fm RCA (moved from 20 fm to 30 fm in 2013).
- California

- Increase landings of nearshore species.
- Move the RCA from 20 fm to 30 fm north of 40º 10´ N. latitude.

Table 14. Projected yelloweye rockfish mortality estimates (metric tons; Oregon and California combined when considering alternative RCA structures for California north of 40°10' N. latitude. Projections are shown for the No Action alternative and the PPA if the current non-trawl RCA shoreward boundary were changed from 20 fathoms to 30 fathoms.

	20 fathoms	30 fathoms	Change
No Action	1.1	1.5	+0.4
PPA	1.2	1.5	+0.3

Shifting as much as 0.6 mt of yelloweye rockfish from the non-nearshore fishery to the nearshore fishery may therefore allow increased landings and revenue of lingcod and other nearshore groundfish species. Allowing this sector to fish to 30 fathoms (instead of 20 fathoms) may also open (or help to keep open) productive fishing grounds, which may result in fewer days at sea, higher revenue per day, and less gear conflicts. In addition, allowing fishing out to 30 fathom may reduce the catch of other nearshore rockfish which, depending on Council Action, may become a constraining species group for commercial and recreational fisheries.

Additional yelloweye impacts relative to management measures currently being considered by the Council, and relative to potential increases in landings, are shown in Table 15.

Table 15. Projected increase in yelloweye rockfish catch by the nearshore fixed gear fishery under various management measures and increased landings, relative to those shown for the PPA.

Action	Yelloweye Impact
Increase Lingcod Trip Limit Coastwide (Alt 2a)[a]	+0.1
Increase Lingcod Trip Limit Coastwide (Alt 2b)[a]	+0.2
Increase Oregon Landings of black rockfish from 120 mt to 138.7 mt	+0.1
Increase RCA for northern California from 20 fm to 30 fm	+0.3

[a]These increased trip limits include allowing lingcod retention during the closed season for both limited entry (200 lbs / 2 months) and open access (100 lbs / month). The GMT projects no additional yelloweye mortality at these lingcod trip limits during the closed season, because no additional effort or targeting for lingcod would be expected (see Agenda Item F.7.a, Supplemental Attachment 10, June 2014, Table B-38).

Impacts to the Non-Nearshore Fishery

Shifting the entire 0.6 mt from the non-nearshore fishery to the nearshore fishery would result in no buffer for the non-nearshore fishery (Table 11), and therefore increase the likelihood of yelloweye catches exceeding the non-nearshore catch share. In the event this fishery exceeded its catch share, the primary management measure available to reduce yelloweye catch is to move the seaward boundary of the non-trawl RCA deeper. Table 16 illustrates the projected yelloweye rockfish mortality at available RCAs. The No Action and PPA provides for a 100 fathoms seaward RCA.

Table 16. Projected yelloweye rockfish mortality for the non-nearshore fixed gear fishery under PPA sablefish allocations for 100 fathom (PPA), 125 fathom, and 150 fathom seaward RCAs.

Seaward RCA	Yelloweye Mortality (mt)
100 fm (PPA)	0.5
125 fm	0.4
150 fm	0.2

Moving the RCA deeper in this fishery may close productive fishing grounds which may (a) cause vessels to travel farther (increasing fuel cost) and fish longer (more days at sea) to catch their sablefish tier limit or daily trip limit, and (b) increase gear conflicts.

Other Considerations

Importance of Fishery Stability

Stability in fisheries is important, as it is in any business. The way we currently manage these fixed gear fisheries may, in general, lead to instability. For example, using point estimates (average landings) to project catches for fisheries that show variable catches annually, promotes instability in management measures applied to the fishery because these fisheries show high inter-annual variation in catches (see Table 12 and Table 13). The likelihood of exceeding annual harvest limits increases as the buffer between the projected catch estimate and the harvest limit decreases.

Fairness

Some may argue that there is inequity in the current yelloweye catch share situation, where one sector (i.e., non-nearshore fixed gear) appears to have a substantial yelloweye buffer relative to projected catch whereas the other sector (nearshore) has little to no buffer before reaching its catch share. Note that what may be most important is not whether one sector exceeds its catch share, but instead that the sectors combined do not exceed the sum of their catch shares. Regardless, the inter-annual variability of yelloweye catch should be addressed and the risk of exceeding catch shares discussed when making a decision to adjust the current catch share structure.

Remaining below the ACL

The ultimate goal is to ensure that groundfish fisheries remain below their ACLs. Even though GMT scorecards typically project that most of the yelloweye rockfish ACL will be harvested (e.g., for 2015, the PPA projects that 15.6 of 18.0 mt of the ACL will be taken; see Agenda Item F.7.a, Attachment 3, June 2014), in reality, all fisheries combined have not caught more than 70 percent of the ACL during recent years (Table 17Table 16). Reasons include: (a) set-asides are based on high or highest catches attained and (b) even though some sectors may exceed their allocation, it is unlikely that all sectors will exceed each of their allocations at the same time. The result has been annual catches much lower than the ACL or OY (Table 16).

Table 17. Annual yelloweye rockfish mortality relative to the ACL (or OY) for 2008-2012. Data: from the West Coast Groundfish Observer Program Reports on Estimated Discard and Catch.

Year	Mortality (mt)	ACL (or OY)	% of ACL
2012	12	17	68%
2011	9	17	52%
2010	8	14	54%
2009	11	17	63%
2008	12	20	58%

Simulations to Explore the Risk of Exceeding the Coastwide ACL

A simple simulation exercise was conducted to explore the risk of exceeding the coastwide ACL for yelloweye. This analysis follows the general idea of previous GMT work on estimating risk associated with spiny dogfish and rougheye rockfish, but due to time limitations is not as thorough (see Agenda Item C.4.b, REVISED GMT Report, April 2014 and Agenda Item F.7.a, Attachment 6, June 2014).

First, the recorded catches from each sector were examined for trends over the period 2004 to 2011 which had the most complete and accessible data. Catch of yelloweye declined significantly (based on linear model fit to estimated mortality) for the Tribal Shoreside and Washington Recreational sectors. The largest changes occurred prior to 2007. The more recent period from 2007-2011 had no significant trends in catch for any sector and therefore was chosen as the basis for the analysis. The average and standard deviation of catch was calculated for each sector. These values were then used to simulate values from a normal distribution of catches for each sector. Some sectors had zero values in some years which made the use of a lognormal assumption problematic. The simulated values were truncated at zero to avoid negative values, but were not limited below the allocation for any sector, thus allowing simulated values to exceed the allocations. The simulated sector-specific catches were summed to form a simulated distribution of total coastwide catch.

The simulation was then repeated with a set of changes intended to provide an upper bound to the potential impact of a shift of 0.6 mt from the non-nearshore fixed gear sector to the nearshore fixed gear sector. Although the projected increase for the nearshore sector is only 0.1, the simulated values were increased by 0.6 to provide an upper limit. Furthermore, the standard deviation of the simulated catches from the nearshore sector was doubled, again to provide a conservative estimate of potential changes, not because the variability is expected to increase. Lastly, the non-nearshore sector simulations were left unchanged under the assumption that a reduction of 0.6 mt from the allocation would not further constrain that sector. Research catch set-asides are difficult to predict for future years so as a conservative estimate, the 2014 set-aside value of 3.3 mt was added to the total simulated catch in all cases.

The resulting distribution of simulated coastwide catches (Figure 6) show that the overall probability of exceeding the 18 mt ACL for 2015 is less than 0.7 percent under the status-quo patterns and increases to 2.1 percent with the changes made to provide an upper limit for the magnitude of the increase under a transfer of 0.6 from the non-nearshore allocation to the nearshore sectors. The probabilities associated with the higher 19 mt ACL for 2016 are 0.4 percent and 1.1 percent, with and without the change in allocations.

This simulation exercise depends on numerous simplifying assumptions, including the assumption that future catches will have the same mean and standard deviation as catches over the period 2007-2011, that variability in catches among sectors are independent. Past patterns have depended on inseason management measures to keep catches within the sector shares and such measures will continue to be used in the future in ways that are difficult to include in this simple analysis. This analysis also did not include the estimation uncertainty that was explored in greater detail in Agenda Item F.7.a, Attachment 6, June 2014 (B.4, pages 27-40). Future catch projections would ideally include both true variability in catch and estimation uncertainty. Therefore, the probabilities calculated here should only be considered as qualitative estimates of the relatively low risk of exceeding the ACL and the relatively small increase in that risk even if the average catch increased by 0.6 mt, which is unlikely under the management measure being considered.

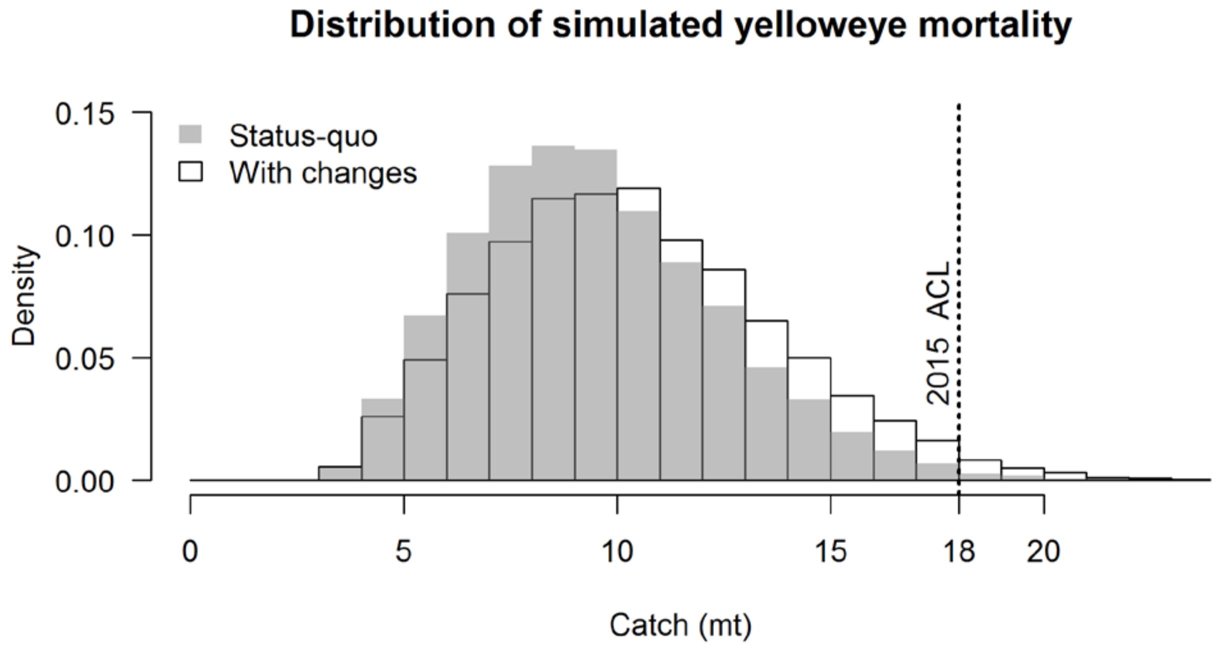


Figure 6. Distribution of simulated yelloweye catches under status-quo management measures and with maximum changes associated with a shift of 0.6 mt allocation from the non-nearshore to the nearshore (blue). The simulations depend on many simplifying assumptions and are intended to represent an upper bound of the impact of changes in allocations.

Recommendations

The GMT recommends that the Council consider annual variability and the probability of exceeding the ACL when deciding whether to move 0.6 mt (or less) of yelloweye rockfish from the non-nearshore sector to the nearshore sector. The GMT notes that buffers between the point estimate and the catch share may reduce the chance of exceeding the catch share.

Slope Rockfish Trip Limit Reductions

The Council requested an evaluation of a trip limit targeted at rougheye rockfish similar to what was established and implemented for blackgill rockfish in 2013. After much consideration of the data, the GMT concluded that a trip limit would not likely be effective for reducing fishing mortality on rougheye.

We recommend instead that the Council look to area-based management measures like hotspots or rockfish conservation areas to reduce encounters with rougheye for the fixed gear sectors. Such area measures are under consideration within the omnibus management measures planning.

If the Council wishes to further consider trip limits, we would suggest looking to switching the limited entry fishery to a ratio based trip limit like in place for open access. Many on the team are skeptical that the ratio approach would be effective. It could be analyzed for implementation outside this main management measures process.

Limited time prevents us from fully summarizing all the analyses we considered in reaching this conclusion. To summarize the reason supporting the finding:

1. Only a few percentage of vessels in the limited entry and open access sectors are actually taking the existing limits.
2. Sablefish provide the main economic incentive in the fishery and rougheye and other slope rockfish appear to be caught incidentally. Trip limits are effective to the degree that they affect the incentive to target. They do not create a disincentive to avoid the incidentally caught fish and fish over the limit can simply be discarded.

The analysis is based on landings data from PacFIN as well as observer data from the West Coast Groundfish Observer Program. The focus is mainly on areas north of 40^0 10’ N. latitude because that is where the bulk of rougheye catch is taken.

Seasonal Patterns in Slope Rockfish Landings

Periods 3 thru 5 (May thru October) are where the majority of slope rockfish are landed in the open access and limited fixed gear sectors (

Table 18; Figure 7 and Figure 8). For one thing, we note that this pattern would make inseason adjustments impractical because of the timing with which we would know if landings are tracking high or low and in which a trip limit change could be implemented.

Table 18. Total landings of limited entry slope rockfish north by period combined over 2007-2013.

Period	Lbs. landed	Percent
1	17,722	2%
2	90,175	8%
3	293,048	26%
4	322,068	29%
5	349,671	32%
6	33,521	3%

Table 19. Total open access north landings of slope rockfish by period over 2007-2013.

Period	Lbs. landed	Percent
1	3,703	4%
2	11,497	12%
3	27,606	28%
4	23,665	24%
5	26,394	27%
6	5,170	5%

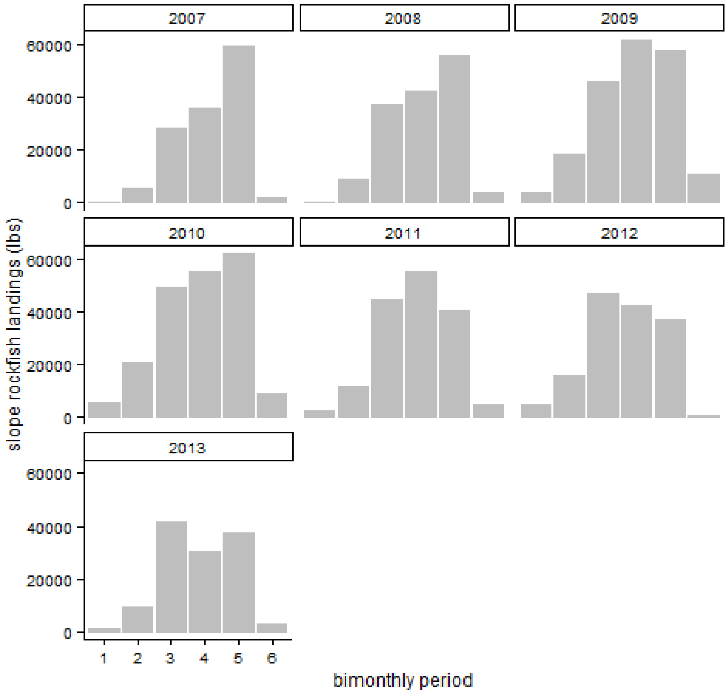


Figure 7. Limited entry fixed gear landings of slope rockfish by bimonthly period and year in the north.

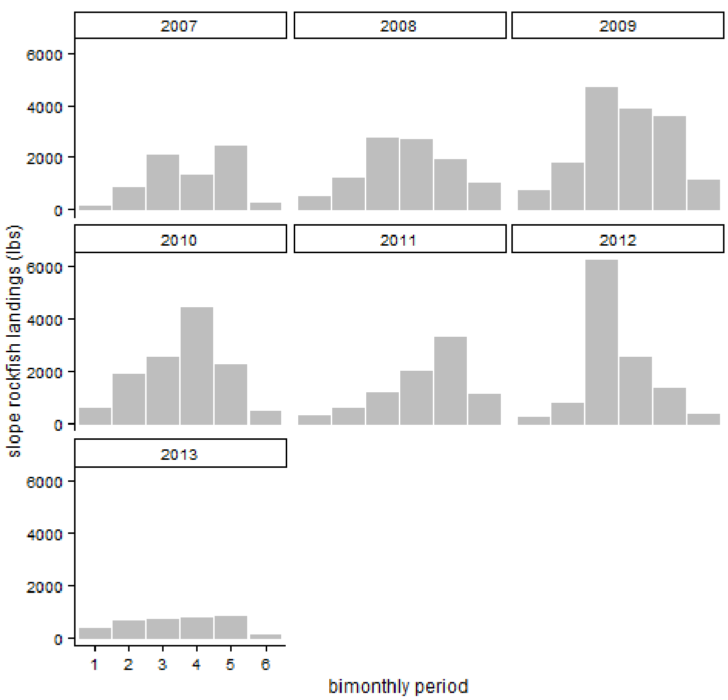


Figure 8. Open access fixed gear landings of slope rockfish by year and period in the north.

The Council targeted a trip limit at blackgill while leaving it in the slope rockfish south stock complex. The GMT and Council were comfortable with the likely effectiveness of that trip limit because of targeting of blackgill in the south. In contrast, the GMT does not see reason to believe rougheye have been widely targeted. Likewise, we do not see indication that vessels differentiate among the slope rockfish and we understand that the various slope species are similarly marketable. To affect the landings of rougheye, a trip limit would likely still be best focused on all species as a whole as opposed to specifically on rougheye. Figure 3 shows that the slope species are retained to similar degrees. Figure 4 and Figure 5 show that rougheye (REYE), blackgill (BLGL), Darkblotched (DBRK), and redbanded (RDBD) are the most frequently caught species.

Table 20 shows that rougheye have contributed less revenue on a vessel basis than blackgill. With blackgill, vessels reportedly set gear in different locations specifically to target the species. For rougheye we did not see such a pattern. The data reported in

Table 21 show that sablefish are caught 99.9 percent of the fixed gear hauls showing that hauls are not being set just to target slope rockfish. Sablefish provides the main economic incentive. We would therefore expect the trip limit for rougheye would create less of an incentive than did the trip limit for blackgill.

Likewise, we do not see indication that vessels differentiate among the slope rockfish and we understand that the various slope species are similarly marketable. To affect the landings of rougheye, a trip limit would likely still be best focused on all species as a whole as opposed to specifically on rougheye. Figure 9 shows that the slope species are retained to similar degrees. Figure 10 and Figure 11 show that rougheye (REYE), blackgill (BLGL), Darkblotched (DBRK), and redbanded (RDBD) are the most frequently caught species.

Table 20. Comparison of rougheye and blackgill in terms of their contribution to vessel revenues in the fixed gear sectors, 2007-2013. The set of vessels used here includes only vessels making landings of the species in at least six of the seven years. Data for blackgill is only for areas south of 36^0 N. latitude.

	Average Revenue		Average Percent Revenue		90th Percentile Revenue		90th Percentile Revenue	
Year	Rougheye	Blackgill	Rougheye	Blackgill	Rougheye	Blackgill	Rougheye	Blackgill
2007	$415.08	$2,042.52	0.46%	12.71%	$1,611.91	$6,619.80	1.64%	44.29%
2008	$587.85	$3,390.13	0.66%	9.78%	$1,554.38	$8,419.80	1.41%	20.32%
2009	$928.49	$5,901.00	0.70%	11.80%	$2,875.66	$13,330.40	1.89%	42.14%
2010	$873.50	$6,970.48	0.70%	12.00%	$1,725.18	$17,995.60	1.50%	36.17%
2011	$814.38	$10,714.26	0.53%	11.35%	$2,027.02	$5,554.40	1.10%	46.97%
2012	$929.38	$4,930.70	1.07%	16.99%	$2,096.47	$11,412.00	2.66%	74.60%
2013	$1,061.29	$422.09	1.71%	4.36%	$2,214.68	$1,015.60	2.99%	5.93%

Table 21. Haul level catches of sablefish and slope rockfish on observed fixed gear sets, 2002-2012.

2002-12	Total lbs	% of lbs	# of sets	% of sets
North of 40 10' N lat.				
Total sets	11,716,974	100.0%	8,644	100.0%
Sablefish	11,303,171	96.5%	8,633	99.9%
Slope rockfish (all)	413,804	3.7%	5,278	61.1%
Rougheye/blackspotted	169,152	1.5%	2,418	28.0%
Shortraker	36,738	0.3%	703	8.1%
Rougheye/shortraker	49,361	0.4%	244	2.8%
South of 40 10' N. lat.				
Total sets	1,833,997	100.0%	2,999	100.0%
Sablefish	1,695,176	92.4%	2,909	97.0%
Slope rockfish (all)	138,821	8.2%	1,268	43.6%
Rougheye/blackspotted	2,543	0.1%	55	1.9%
Shortraker	81	0.0%	7	0.2%

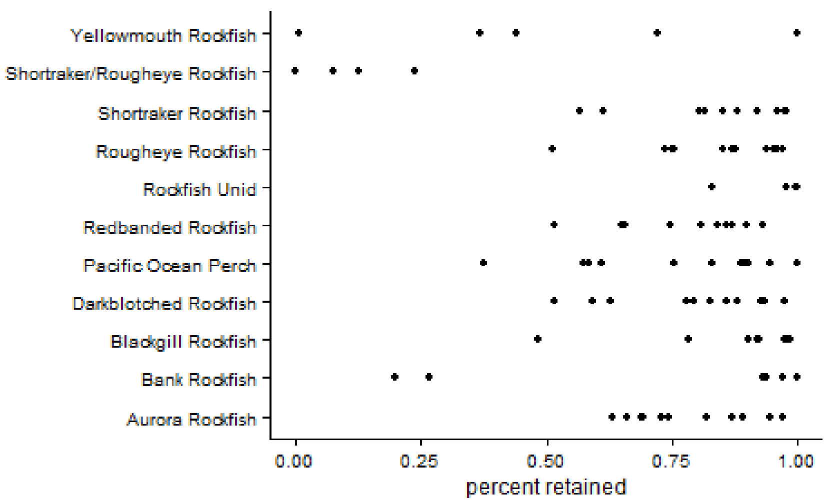


Figure 9. Annual retention rates of slope rockfish caught in the nonnearshore fixed gear sectors. This suggests that most slope rockfish

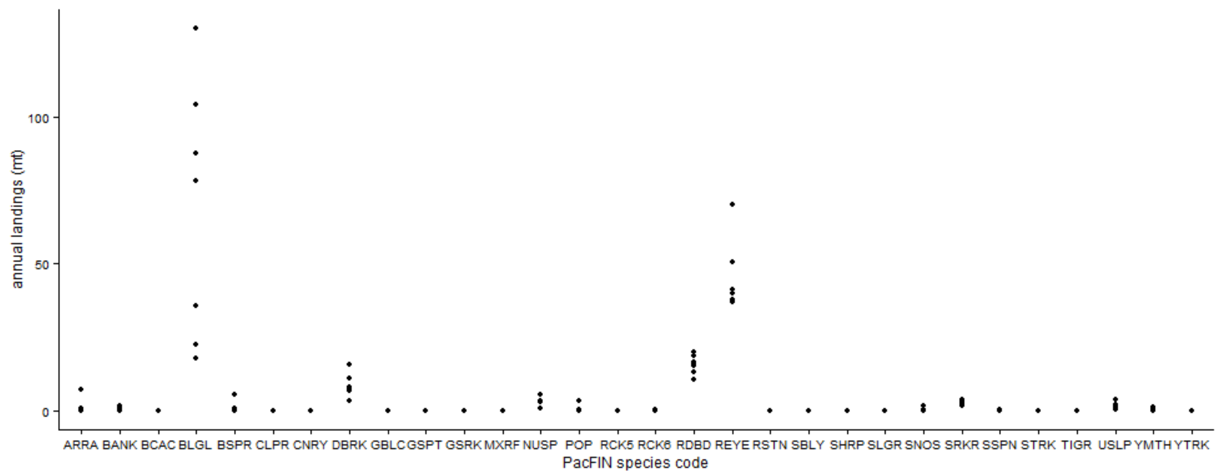


Figure 10. Annual landings by species under the slope rockfish market category under the open access and limited entry slope rockfish trip limits, 2007-2013.

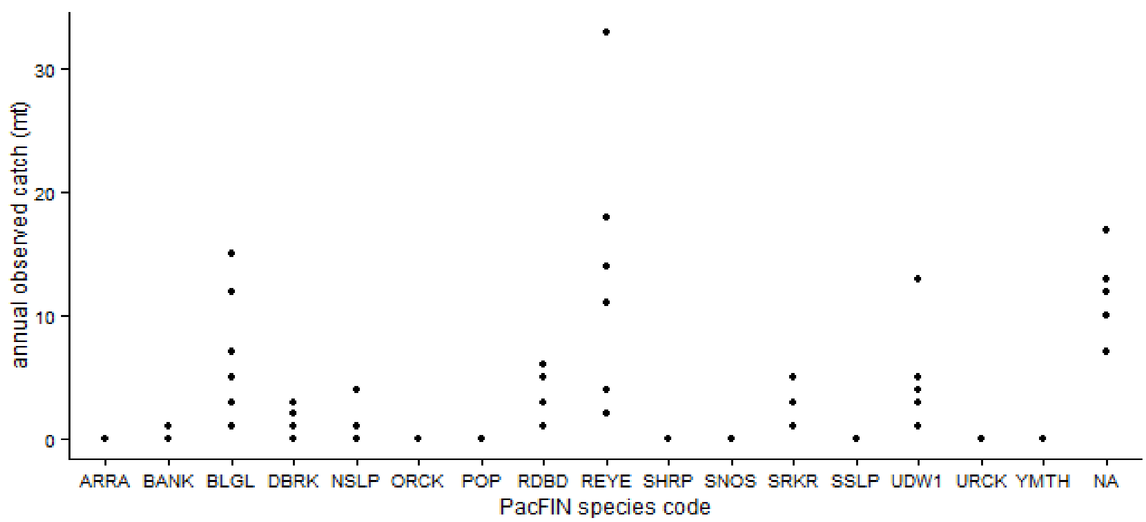


Figure 11. Observed catches (i.e. not expanded to total catches) of slope rockfish 2007-2012.

A Small Percentage of Vessels Are Taking the Current Limits

The current slope rockfish limits in the north are 4,000 lbs per bimonthly period for limited entry. For open access, it is a true trip limit where the weight of slope rockfish can be no more than 25 percent of the weight of sablefish landed. Darkblotched is included as a slope rockfish for purposes of the trip limits.

So few vessels are taking the trip limit that we had trouble displaying the data in a way that abides the “rule of three” that is intended to protect confidentiality. No vessels in the limited entry sector have taken their limits in period 1,2, or 6. We can only report to the 90th percentile level by year while still complying with the rule of 3. Figure 12 shows bimonthly landings up to that 90th percentile level. The upper 10th percentile in this set of years includes a minimum of 3, a maximum of 7, and an average and median of ~5 vessels per period (i.e. there could between 3 and 7 but most likely only 5 vessels past the rightmost points in the figure). Table 22 shows that between 3.7 percent and 14.6 percent of vessels take at least 3,600 lbs of slope rockfish in at least one period over 2007-2013.

As for the open access sector, fewer than 10 percent of vessels take the full amount of slope rockfish allowed by the 25 percent limit. We did not have time to identify a way of reporting how many vessels took the full limit while complying with the rule of 3.

Nonetheless, these patterns in the limited entry and open access sectors suggest that trip limit reductions would not greatly reduce landings. Again, we would worry that the trip limit would create regulatory discards that would reduce landings but not reduce total mortality.

Figure 12. Percentiles of sablefish landings by period, for periods 3-5, and year in the Limited Entry North sector.

Table 22. Number of unique vessels landing at least 3,600 lbs of slope rockfish in a period ("high liners") by year vs. total unique vessels making landings in the LE north sector.

YEAR	"High Liners"	All	% of Hi-Liners
2007	9	69	13.0%
2008	8	76	10.5%
2009	12	82	14.6%
2010	8	85	9.4%
2011	3	81	3.7%
2012	8	77	10.4%
2013	6	64	9.4%

Table 23. Open access north – slope rockfish as a percentage of sablefish landed per trip (e.g., in 2010 the 90th percentile means that weight of slope rockfish was 15 percent or less of the weight of sablefish landed on 90 percent of the trips).

	2007	2008	2009	2010	2011	2012	2013
50th	0%	0%	0%	0%	0%	0%	0%
70th	0%	1%	3%	2%	2%	2%	1%
80th	2%	3%	7%	6%	5%	5%	3%
90th	12%	10%	19%	15%	16%	19%	11%

Patterns in the depth and latitude of sets made on trips where rougheye and shortraker are caught

Lastly, we examined trips that catch rougheye or shortraker to see how they compare against trips that do not catch these species. The following plots (Figure 13 - Figure 16) compare all sets made on a trip so as to compare patterns in the latitude and depth. The plots follow the same structure. The outer shape is a violin plot, which is similar to a histogram but is smooth (instead of binned") and turned vertical and mirrored. In short, the "peaks" contain more sets than the "valleys. Inside the violin plots are boxplots, which display the median (thick middle line) and the 25th and 75th percentiles on the lower and upper edges of the box. The median identifies the midpoint at which half of the sets fall above and below.

As expected, trips that catch rougheye or shortraker make sets further north than those that do not. They also tend to make hauls shallower than the trips that do not.

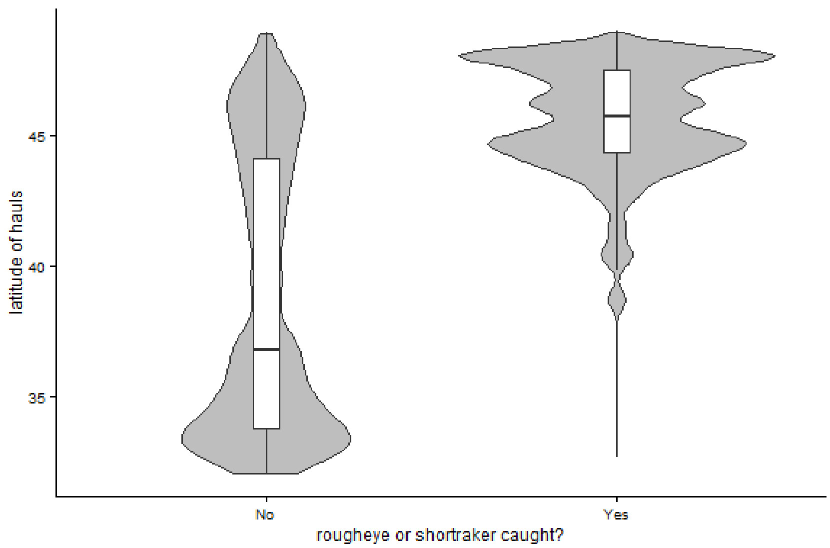


Figure 13. Comparing sets by latitude coastwide. See text above for explanation.

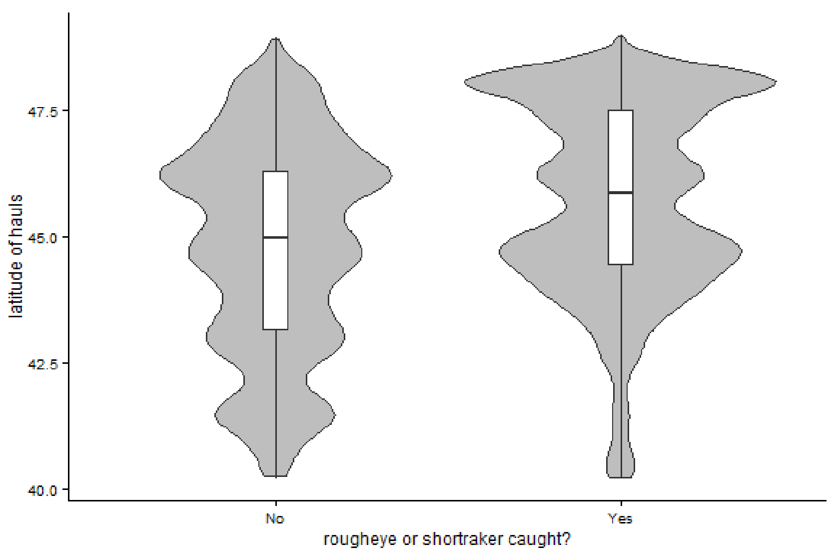


Figure 14. Comparing latitude of sets in the area just north of 40^{o} 10’ N. latitude. See text above for explanation.

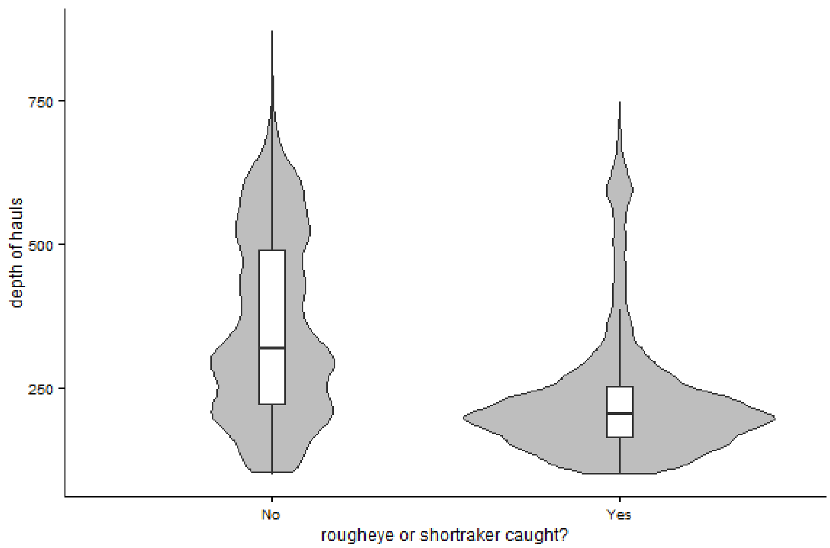


Figure 15. Comparing trips by depth of sets in areas coastwide. See text above for explanation.

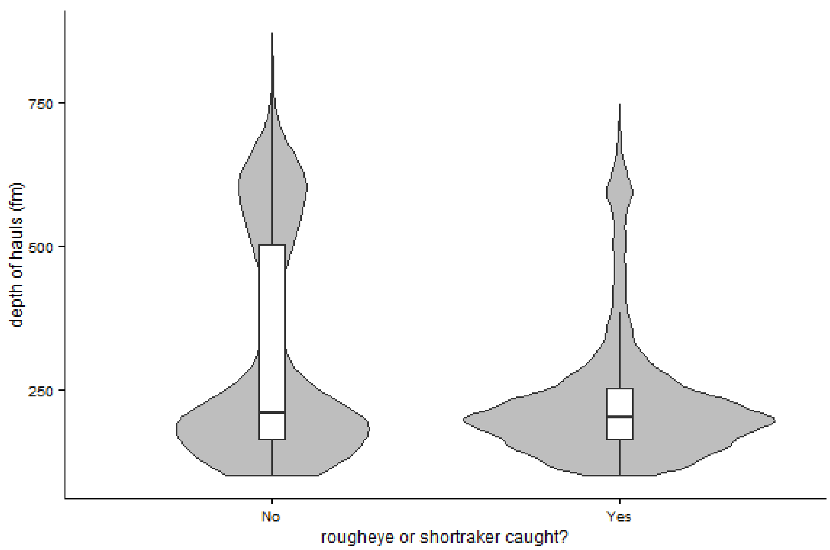


Figure 16. Comparing trips by depth of sets in areas north of 40⁰ 10’ N. latitude. See text above for explanation.

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON FISHERIES IN 2015-2016 AND BEYOND: HARVEST SPECIFICATIONS, MANAGEMENT MEASURES, AND AMENDMENT 24

The Scientific and Statistical Committee (SSC) reviewed various documents related to establishing harvest specifications for the 2015-2016 fisheries and for Amendment 24 to the Groundfish Fishery Management Plan. The supplemental material for this agenda item became available during the SSC meeting. Therefore, the SSC did not have time to review it.

Cowcod Overfishing Level (OFL)

The SSC recommends the updated 2016 OFL of 68 mt for cowcod (Table 1, Agenda Item F.7, Attachment 2).

Harvest Specifications Draft Environmental Impact Statement

Dr. Kit Dahl and Mr. John DeVore provided the SSC with an overview of the Draft Environmental Impact Statement (DEIS) (Agenda Item F.7 Attachment 4). The DEIS is a comprehensive evaluation of the long- and short-term environmental and socioeconomic impacts of future catches. The short-term analyses (Sections 4.1 – 4.7) are related to the 2015-2016 fisheries while the long-term analyses (Sections 4.8 - 4.12) relate to the process of determining default harvest specifications.

Socioeconomic and Biological Analyses

Most of the short-term socioeconomic analyses are based on models which have been previously reviewed by the SSC. However, the methods used for projecting trawl catches for 2015-2016 fisheries have not been reviewed. The SSC was briefed on the methods and finds them to be reasonable. The projections of attainment are likely to be very uncertain given the fishery may still be in a transitional phase to the catch share program. The SSC has also not reviewed the approach used to evaluate the implications of trip limits for lingcod during the closed season. The SSC should review this analysis for the 2017-2018 harvest specifications process.

The projected long-term socioeconomic impacts are highly uncertain. Historical variation in ex-vessel revenue is due to many factors, such as management and changes in markets, and it is not clear how these factors will impact revenue in the future. However, the SSC agrees that the evaluation of long-term socioeconomic impacts is reasonable given the available information.

The biological analyses in the DEIS have been updated based on previous comments by the SSC. These analyses are sufficiently complete.

Atlantis Model Results

The Atlantis model is used in the DEIS to explore the long-term biological implications of the default harvest specifications. The SSC reviewed a preliminary version of the analysis based on this model in April 2014. The analysis has been updated based on the suggestions from the SSC. In particular, results are now provided to evaluate impacts on marine mammal and seabird populations. A methodology panel is scheduled (June 30 - July 2, 2014) to review the Atlantis model and report to the Council in September 2014.

The outcomes of the Atlantis model are scaled to results for a benchmark scenario in which productivity is set to base levels and catches are based on the 'recent averages' scenario. Across a broad range of catch levels, there do not appear to be large impacts of the groundfish fishery on other components of the ecosystem, although, and as expected, biomass levels for target species are lower for the higher catch scenarios.

SAFE Document

Mr. John DeVore summarized the contents of the draft groundfish SAFE document (Agenda Item F.7 Attachment 7). The draft SAFE follows the revised National Standard 2 guidelines for SAFE documents and has been developed with input from NMFS staff and stock assessment teams. It contains a considerable amount of information which will be valuable to the Council, scientists, and the public. The SSC will be involved in the review of the next version of the document through its Groundfish and Economics Subcommittees. The SSC highlights that the time needed to update this document every biennial cycle may be substantial.

PFMC
06/22/14

ZIONTZ CHESTNUT
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Via Email and First Class Mail

May 21, 2014

William W. Stelle, Jr.
Regional Administrator
National Marine Fisheries Service
7600 Sand Point Way NE
Seattle, WA 98115-0070

Re: Makah Treaty Groundfish Fisheries in 2015-2016

Dear Mr. Stelle:

We have been asked to write to you on behalf of the Makah Indian Tribe. Pursuant to 50 C.F.R. § 660.324(d), we wrote to you on November 4, 2013, to describe the Tribe's intended groundfish fisheries in 2015 and 2016 and its requests for treaty groundfish regulations and allocations to accommodate those fisheries.

In our November 4, 2013, letter, we noted that the Tribe intended to request increases in the tribal set asides for yellowtail rockfish, widow rockfish and Pacific cod in 2015 and 2016. However, we explained that, because of then-current market constraints, the Tribe had not yet determined the amount of the increases it would request. We stated that Tribal representatives would confer with your staff to determine those amounts before the June 2014 Pacific Fishery Management Council meeting. Tribal representatives have since conferred with your staff regarding increases in tribal set asides for these and one other species (English sole).

In accordance with the procedures adopted by the Pacific Fishery Management Council and National Marine Fisheries Service for revisions to tribal requests for groundfish regulations and allocations (which allow for requested revisions to be submitted before the June Council meeting), the Tribe now requests the following increases in tribal set asides for 2015 and 2016:

English sole, currently 91, mt increase to 200 mt;

Pacific cod, currently 400, mt increase to 500 mt;

widow rockfish, currently 60, mt increase to 100 mt; and yellowtail rockfish, currently 677, mt increase to 1000 mt.

In addition, the Tribe is anticipating an impact of 275 mt for spiny dogfish.

In all other respects, the Tribe's requests for treaty groundfish regulations and allocations for 2015 and 2016 remain as described in our November 4, 2013, letter.

Makah representatives will be available to discuss any questions you or your staff may have regarding these matters at the upcoming Council meeting.

Sincerely,

ZIONTZ & CHESTNUT

Marc D. Slonim

cc (via email only):

Donald McIsaac
Frank Lockhart
Kevin Duffy
Russ Svec
Steve Joner

Proposed 2015-2016 Tribal Management Measures

Black Rockfish - The 2015 and 2016 tribal harvest guidelines will be set at 30,000 pounds for the management area between the US/Canada border and Cape Alava, and 10,000 pounds for the management area located between Destruction Island and Leadbetter Point. No tribal harvest restrictions are proposed for the management area between Cape Alava and Destruction Island.

Sablefish - The 2015 and 2016 tribal set asides for sablefish will be set at 10 percent of the Monterey through Vancouver area ACL minus approximately 1.6 percent to account for estimated discard mortality. Allocations among tribes and among gear types, if any, will be determined by the tribes.

Pacific cod - The tribes will be subject to a 500 mt harvest guideline each year for 2015 and 2016.

For all other tribal groundfish fisheries the following trip limits will apply:

Thornyheads - Tribal fisheries will be restricted to 17,000 lbs/2 months for shortspine thornyheads and 22,000 lbs/2 months for longspine thornyheads. Those limits would be accumulated across vessels into a cumulative fleetwide harvest target for the year. The limits available to individual fishermen will then be adjusted inseason to stay within the overall harvest target as well as estimated impacts to overfished species

Canary Rockfish - Tribal fisheries will be restricted to a 300 pound per trip limit.

Other Minor Nearshore, Shelf and Slope Rockfish - Tribal fisheries will be restricted to a 300 pound per trip limit for each species group, except that redstripe rockfish will be restricted to 800 pounds per trip.

Yelloweye Rockfish - The tribes will continue developing depth, area, and time restrictions in their directed Pacific halibut fishery to minimize impacts on yelloweye rockfish. Tribal fisheries will be restricted to 100 pounds per trip.

Lingcod - Tribal fisheries will be subject to a 250 mt harvest guideline each year for 2015 and 2016.

Spiny Dogfish – Tribal fisheries for dogfish in 2015 and 2016 would be restricted to 275 mt each year. Targeting of dogfish by treaty fishermen in 2015 and 2016 would be conducted while staying within current estimates of impacts on overfished species.

Full Retention - The tribes will require full retention of all overfished rockfish species as well as all other marketable rockfishes during treaty fisheries.

Makah Trawl Fisheries for 2015 and 2016

Midwater Trawl Fishery - Treaty midwater trawl fishermen will be restricted to a total catch of yellowtail rockfish for the entire fleet of 1,000 mt. Their landings of widow rockfish must not exceed 10 percent of the cumulative poundage of yellowtail rockfish landed by a given vessel for the year for a total catch of 100 mt. The tribe may adjust cumulative limits for any two-month period to minimize the incidental catch of canary and widow rockfish.

Bottom Trawl Fishery - Treaty fishermen using bottom trawl gear will be subject to trip limits similar to those applied in recent years for shortspine and longspine thornyhead, Dover sole, English sole, rex sole, arrowtooth flounder, and other flatfish. These are 110,000 lbs/2 months for Dover sole, English sole, and Other Flatfish; 150,000 lbs/2 months for arrowtooth flounder; 17,000 lbs/2 months for shortspine thornyhead; and 22,000 lbs/2 months for longspine thornyhead. For all species these bi-monthly limits in place at the beginning of the season will be combined across periods and the fleet to create a cumulative harvest target. The limits available to individual fishermen will then be adjusted inseason to stay within the overall harvest target as well as estimated impacts to overfished species. For petrale sole, fishermen would be restricted to 220 mt for the entire year. Because of the relatively modest expected harvest, all other trip limits for the tribal fishery will be those in place in recent years and will not be adjusted downward, nor will time restrictions or closures be imposed, unless in-season catch statistics demonstrate that the tribe has taken ½ of the harvest in the tribal area. Fishermen will be restricted to small footrope (≤ 8 inches) trawl gear. Exploration of the use of selective flatfish trawl gear may be conducted.

Observer Program - The Makah Tribe has an observer program in place to monitor and enforce the limits proposed above.

WASHINGTON AND OREGON DEPARTMENTS OF FISH AND WILDLIFE REPORT ON 2015-2016 BIENNIAL HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES

The Washington and Oregon Departments of Fish and Wildlife would like to reiterate our understanding regarding the management of stocks in state waters and our concerns with the use of data moderate assessments for nearshore stocks north of 40°10' N. latitude, and describe our preferred management approach for 2015 and 2016 (and, potentially, beyond).

As we noted in March (Agenda Item D.5.b Supplemental WDFW/ODFW/CDFW Report), the Magnuson-Stevens Fishery Conservation and Management Act (MSA) clearly indicates that the states' jurisdiction and authority within its respective boundaries, to include state waters, is not diminished by the MSA. As such, our understanding is that the portions of nearshore rockfish and roundfish stocks (e.g., China, copper, and brown rockfish, cabezon, and kelp greenling) occurring in state waters are under the states' respective jurisdictions and are not subject to federal management.

While the Pacific Fishery Management Council (Council) process provides an opportunity for the states to share information, the states independently manage their nearshore fisheries through separate licensing/permitting requirements, data collection and research programs, and stakeholder communication efforts. The Council recognized this during development of the Groundfish Fishery Strategic Plan (plan), adopted in 2000. The plan envisions that "Council management may be simplified by removing some species from the FMP through delegation or deferral to state management" and there is a management policy recommendation to: "Consider delegating or deferring nearshore rockfish and other groundfish species, such as scorpionfish, greenling, and cabezon, to the States." The plan also discusses the complexity and enforcement challenges inherent in having differing fishery among the states and how the Council and National Marine Fisheries Service (NMFS) are not well suited to assess the biological requirements of many of these local populations, to assess the social and economic issues associated with them, or to monitor localized fisheries. We assert that these issues are perhaps even more relevant today.

Again, as stated previously in March, the states have concerns with the use of the data moderate assessment approach, which uses catch history and—in these cases—recreational fishery-dependent indices of abundance, to determine the status of nearshore stocks as our respective nearshore fisheries are significantly different and have changed over time. It is likely that the catch histories, on which these nearshore assessments were based, were affected by these state-specific regulatory changes, rather than reflective of changes in abundance.

We believe that these concerns could be addressed through the development of reliable full assessments to the extent that data are available, which we think would be the appropriate next step. These full assessments should provide coastwide and state-specific information useful to management. While most, if not all, of these particular stocks occur exclusively in state waters, those assessments could also apportion overfishing limits between state and federal waters for management purposes, as appropriate.

While the states have considered alternatives for non-retention of these stocks, which could be specified preseason, the minor nearshore rockfish species are not targeted and our respective nearshore fisheries are the best (and, in some cases, the only) opportunity to collect biological data (e.g., age structures, maturity information, lengths and weights, etc.) on these stocks. Having non-retention restrictions in place at the start of our seasons would significantly hamper our abilities to have to full assessments in the future.

So, until those full assessments for nearshore stocks are completed and accepted for management, with the understanding that full assessments may not be available in the near future due to the lack of available data in some fisheries and areas, given the abilities of the states to monitor and manage our fisheries, we would propose the following management approach:

1. WDFW and ODFW commit to monitoring the harvest levels of their nearshore fisheries inseason and to coordinating with the other states if inseason action were needed.

2. Each state would manage its fisheries in a manner that would essentially treat "status quo" harvest levels as harvest guidelines.

3. Collectively, the states' "status quo" harvest levels of nearshore rockfish would exceed the nearshore rockfish complex annual catch limits (ACLs) for 2015 and 2016; therefore, WDFW and ODFW commit to consult and coordinate with the other states upon attainment of 75% of our respective "status quo" harvest levels. Table 1 describes what the states' harvest guidelines would be and what 75% of those respective guidelines are. We would conduct a conference call; each state would report its current harvest and projected catch estimate and decide whether any inseason action was needed.

    a. As ODFW and WDFW can take inseason action expeditiously, the harvest guidelines for Oregon and Washington would be state harvest guidelines and would not be specified in federal regulations.

    b. We would ask the California Department of Fish and Wildlife how they would like California's harvest guideline for nearshore rockfish north of 40°10' N. latitude specified and what their proposed management approach is, if different than this.

4. ODFW and WDFW commit to providing inseason updates on our respective nearshore fisheries to the Council at the September and November meetings in 2015 and 2016.

Table 1. Annual state-specific harvest guidelines (HGs) for the nearshore rockfish complex north of 40°10' N. lat. for 2015-2016, and 75% of each HG that would trigger consultation and coordination.

	Harvest Guideline	75% of HG
Washington	10.5	8
Oregon	48.4	36
California	23.7	18
	Total	**62**

Agenda Item F.7.c
Public Comment
June 2014

---------- Forwarded message ----------
From: **rich merc** <2richlol@gmail.com>
Date: Wed, May 14, 2014 at 10:52 PM
Subject: 2015 rockfish season
To: pfmc.comments@noaa.gov

i support rockfishing in 2015 from April 1st through September 30th (40 fathoms) and October 1st to December 31st(50 fathoms). We also support a three bag limit for lingcod.
thanks,
richard mercurio

---------- Forwarded message ----------
From: **Cookiemn58@GMail.com** <cookiemn58@gmail.com>
Date: Wed, May 14, 2014 at 9:52 AM
Subject: Rock Fish 2015
To: pfmc.comments@noaa.gov

Rock fishing in 2015 from April 1st through September 30th (20 fathoms) and October 1st to December 31st (30 fathoms), also support a three bag limit for lingcod.
Thank you..

---------- Forwarded message ----------
From: **Bill James** <Halibutbill@live.com>
Date: Thu, May 22, 2014 at 11:54 PM
Subject: F.7 Fisheries 2015-2016 Harvest Spec and management measures
To: "pfmc." <pfmc.comments@noaa.gov>
Cc: Bill James <Halibutbill@live.com>

Madame Chair members of the Council: For the record my name is Bill James. I am the fishery consultant for Port San Luis Commercial Fishermen's Association in Avila Beach California. For the years of 2015-2016 we request the Council to raise the commercial bi-monthly trip limits for both Shallow Nearshore Species and Deeper Nearshore species to 1000 pounds per two month period for the entire year.

south of 40:10. Equal monthly trip limits in each period makes for a consistent catch and ease of remembering the limit for fishing. In the past years Commercial Nearshore Fishermen have not attained the ACL. Higher trip limits are necessary to take advantage of good weather conditions to make up for some of the rough weather conditions we have been experiencing in the last several years. Our fishing vessels are typically smaller vessels averaging around 24 feet in length.

Also please open lingcod in the months that Nearshore Species can be caught. Also, if possible please raise the monthly limit on lingcod.

Thank you, Bill James

April 28, 2014

RECEIVED

MAY 01 2014

PFMC

Dear Dr. Donald McIsaac,

For over a decade the shelf rockfish quota for non-trawl open access has been the same for me along the south coast of Big Sur (200-300 lbs/2mo.)

I am writing this letter in the hope that you can raise this quota to at least that enjoyed by those south of Pt. Conception, (750-1000 lbs/2mo.) We have an abundance of fish in my area and all the fish I catch goes to local markets.

Also, I hope you can change the fish area from 30 fathoms out to 40 fathoms as it is for sport fishing. At this time, a sport fisherman can catch as much fish in a week for himself as I can in two months for the local people.

Thank you for your consideration.

Sincerely yours,

Brett Gourley

427 Montebello Oaks Dr.
Paso Robles, Ca.
93446

Ph. 805-226-8307

Humboldt Area Saltwater Anglers Inc.

P.O. Box 6191, Eureka, CA 95502
Phone: (707) 444-3918 Cell (707) 834-4100
Email: hasa6191@gmail.com
FEIN #61-1575751

May 13, 2014

Pacific Fishery Management Council
Dorothy Lowman, Chair
7700NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

RE: 2015-2016 rockfish seasons, Agenda Item F.7

Dear Chair Lowman and Council Members:

The Humboldt Area Saltwater Anglers, Inc. (HASA) have discussed the Preferred Preliminary Alternatives set forth by the Council regarding the 2015/2016 rockfish seasons. Our organization and its members prefer to allow recreational fishing opportunity from April 1st through September 30th (20 fathoms) and October 1st to December 31st (30 fathoms). We also support a three bag limit for lingcod.

Part of our mission statement with HASA is to maintain angling opportunities, and a primary effort that HASA has conducted over the years is to educate the public on reducing the yelloweye bycatch allocation for our area by expressing the importance of rockfish descending devices. HASA has provided over 300 of the devices to sportfishers free of charge to help reduce yelloweye mortality, as well as other species. We are currently in the process of purchasing more of these devices to distribute to our sportfishers in the areas of Shelter Cove, CA to Trinidad, CA, and continue our efforts to educate the public and reduce yelloweye bycatch and mortality.

We appreciate the opportunity for providing public input on this matter, and do not hesitate to contact me if you would like any additional information.

Sincerely,

Cliff Hart

Cliff Hart, President
Humboldt Area Saltwater Anglers, Inc.

Mark Seefeldt
62415 HWY 1
Big Sur, CA 93920

831-667-2404

seefeldt@ymail.com

RECEIVED

MAY 15 2014

PFMC

May 10th, 2014

Pacific Fishery Management Council
7700 N.E. Ambassador Place, Suite 101
Portland, OR 97220-1384

Dr. Don McIsaac,

I fish commercially with an open access license along the Big Sur coast in Central California (40°10' N. lat. - 34°27' N. lat.) I launch a 12' aluminum skiff from the beach at Mill Creek (port 516) and Big Creek (port 515). I've been fishing from these ports both sport and commercially for 25 years.

Because of the much needed management of the Minor Shelf rock fish, vermillion, lingcod, and bocaccio populations have increased dramatically. For this reason I write to you in hope that you'll consider modestly increasing the trip limits for vermillion to 400lbs/2mos and bocaccio to 300lbs/2mos through the open season. The lingcod population has improved and the current limits are working well for us and the fish.

Another issue I'd like to address is our depth limit. For over 100 miles from Carmel to Cambria there isn't a pier or harbor and the only method of commercially fishing is to launch a small skiff from shore. As far as I've seen, there are five other fisherman along this coast who are fishing by this method. Because of this, the 30 fathom depth limit is confining and makes my small fishing business nearly unviable because of the conditions (wind, swell, distance) I must travel through to reach the 150 fathom depth limit. Increasing the inner limit to 40 fathoms and decreasing the outer limits to 110 fathoms would help us tremendously as it would enable us to safely fish a more accessible area.

Please feel free to give me a call or email if you'd like to discuss further details about fishing on the Big Sur coast. Thank you for your time and consideration in this matter,

Sincerely,

Mark Seefeldt

Mark Seefeldt

David Seefeldt

62415 HWY 1
Big Sur, CA 93920

831-667-2404

David.Seefeldt@yahoo.com

RECEIVED

MAY 23 2014

PFMC

May 10th, 2014

Pacific Fishery Management Council
7700 N.E. Ambassador Place, Suite 101
Portland, OR 97220-1384

Ms. Kelly Ames

I write you in regard to fishing on the Big Sur coast (40°10' N. lat. - 34°27' N. lat.). I've been fishing sport for 14 years and currently fish commercially with an open access license. I fish a small skiff by myself and sell to our local markets.

On the Big Sur coast I have noticed a large population increase over the past decade in the following species: vermillion, lingcod, and bocaccio. For this reason I'm inquiring into the possibility of larger trip limits such as those south of Pt. Conception (750-1000lbs/2 months) or something more than our current 200-300lbs/2 months and 100-200lbs/ 2 months for bocaccio.

I'd also like to request that a change in our depth limits be considered as well, from the inner 30 fathom limit to 40 fathoms, and from outer 150 fathom limit to 125 fathoms.

Your consideration in this matter is greatly appreciated.

Sincerely,

David Seefeldt

David Seefeldt

Agenda Item F.7.c.
Public Comment
June 2014

Ms. Dorothy Lowman, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

May 22, 2014

RE: RETAIN ROUGHEYE ROCKFISH IN MINOR SLOPE COMPLEX AND ALLOW INDUSTRY TO USE VOLUNTARY MEASURES TO REDUCE CATCHES

Dear Chair Lowman,

Please accept these comments on behalf of Midwater Trawlers Cooperative, United Catcher Boats, Fishermen's Marketing Association, West Coast Seafood Processors Association, Fishing Vessel Owners Association, Pacific Whiting Conservation Cooperative, Oregon Trawl Commission, Point Conception Groundfishermen's Association, and the Coos Bay Trawlers Association. Collectively, we represent the majority of at-sea and shoreside whiting harvesters and processors as well as a major portion of traditional bottom trawlers, shoreside seafood processors, and members of the fixed gear fleet utilizing long line gear.

We submitted a written public comment at the April 2014 PFMC meeting detailing industry-wide efforts to develop and promote a unified position to retain rougheye rockfish in the minor slope complex and to further allow the industry to use voluntary measures to reduce their rougheye catches. Several members of the industry also traveled to Vancouver, Washington to provide compelling oral testimony supporting this recommendation.

The Council voiced support for our efforts and our recommended approach by adopting a Preliminary Preferred Alternative (PPA) to maintain rougheye rockfish within the minor slope complex along with a mandatory scientific sorting requirement for management in 2015-2016. Our coalition fully supports the PPA and has done additional work to notify and educate affected industry members about this important topic.

This comment reiterates and expands upon why retaining rougheye in the minor slope complex while using voluntary measures to reduce catch, is most appropriate. It also summarizes the additional industry-led activities that have taken place since the April PFMC meeting.

Retain Rougheye Rockfish in the Minor Slope Complex

In September 2013, after consideration of several different data sets the Council decided to defer further consideration of reorganizing the minor slope complex until the next management specifications cycle. National Marine Fisheries Service (NMFS) was not fully comfortable with this recommendation and asked the Council to reconsider the issue in 2014 when NMFS offered to provide additional information for Council consideration. In April 2014, after considering additional analysis from NMFS and the Groundfish Management Team, as well as advisory body and stakeholder input, the Council once again had a robust discussion about the issue and determined that retaining rougheye rockfish in the slope complex was the preferred alternative for management. The Council further supported the concept that the industry should be allowed to use voluntary measures to reduce their rougheye catches. The Council will take final action on this issue at the June PFMC meeting.

The affected industry continues to support the Council's PPA and we encourage the Council to review our detailed comment from April 2014 in support of this position. The Council heard through various advisory body and public comments that there is no conservation concern identified and/or demonstrated with rougheye rockfish and that removing rougheye and shortraker from the complex and creating a new complex is both costly and disruptive. There are limited Council, NMFS, and state resources available to conduct the rulemaking that would be necessary to make changes – particularly if there is a need to allocate this species among sectors or individual vessels. At best this will lead to a disincentive for the fleets to work together to voluntarily reduce catch and at worst it will pit the sectors against each other, which benefits no one. With no conservation concern at present it seems most reasonable and wise to follow a path already laid by industry.

The Council and industry have been proactive on this issue. The burden on the Council and NMFS is to ensure that overfishing is not occurring now or will not occur in the near future. This has been done. The Council prioritized a full stock assessment for rougheye rockfish and the results were that the stock is healthy at 47% of its unfished biomass. Further, modeling demonstrates that even at catch levels projected to be higher than the proposed ABC, the stock will continue to grow over the next several years. The SSC approved this assessment for use in management as the best available science.

Allow the Industry to Use Voluntary Measures to Reduce Catches

The industry has made a concerted effort to work collaboratively in developing solutions that reduce impacts on rougheye rockfish -- solutions that did not and will not require an Environmental Impact Statement to implement, solutions that are in use and effective today. A critical first step was to gain an understanding of where, when, and how the industry encounters rougheye. The whiting sectors currently use tools to track catch tow-by-tow and species-by-species; therefore information was readily available to this sector. Because of limitations in how non-whiting landings are reported to the fleet on fish tickets and in PacFIN, non-whiting trawlers and the fixed gear fleet are working with shoreside processors to develop tools to better understand and react to their species-specific impacts, which include requesting information from their observers, port samplers, or processing plants on how much of their catch contains rougheye rockfish. The Council heard about these measures in April when many of us reported on what steps we had already taken to address this issue.

Since the April 2014 Council meeting several industry activities have occurred. We met again as an industry-wide group in May to discuss the April decisions and plan for the June meeting (Attachment 1). In addition, each sector shared more detail on what they had done and are doing to raise awareness about the issue and to document steps being taken to address catch levels. Lastly, on behalf of the industry coalition, MTC reached out to the state of Oregon for assistance in developing an informational flyer that can be used by any sector for outreach and educational purposes. This flyer will also be placed in gear stores and distributed to seafood processors in an attempt to reach industry members who are not represented by formal organizations.

In preparation for the May industry meeting we sought information on what the catch of rougheye rockfish has been so far in 2014. Unfortunately there was not a lot of information available, as some of the states had not provided updated information to the PacFIN database since March. In the future, the Council's recommended scientific sorting requirement and industry-led efforts to better track species-specific catch by coordination amongst processors, harvesters, observers, and port samplers will likely lead to improved data availability to managers and industry.

Below is a summary of the activities each affected sector has taken to address this issue.

Fixed-Gear
The Fishing Vessel Owners Association (FVOA) notified fixed gear-endorsed-limited entry permit holders about the issue, which included outreach to non-FVOA member fishermen. FVOA Manager Bob Alverson sent a letter to all fixed gear endorsed permit holders to inform them about the issue and the need to reduce both direct and incidental catches of rougheye (Attachment 2).

Traditional Bottom Trawl
The Oregon Trawl Commission (OTC) used its newsletter to notify all Oregon-based trawl permit holders. This newsletter is also available on the OTC's website at http://www.ortrawl.org/wp-content/uploads/2014/05/Wheelhouse-Spring-2014.pdf . In addition, the issue was discussed at the May OTC meeting held in Astoria. Many traditional trawlers have been connecting with their observers, port samplers, and processing plants in an effort to determine their past and current catches. Trawl representatives from the Council's Groundfish Advisory Panel have

also been spreading information through word of mouth on the issue and the need to be aware and reduce catches.

Whiting
The whiting sectors have taken a number of steps to address this issue in addition to the information sharing that goes on between organizations and their members.

The *catcher processor cooperative* Board reviewed past rougheye catch information and identified areas of high rougheye catch occurrence. They agreed to several measures, including:

- Carry flexible grate rockfish excluders for use when fishing in known rougheye bycatch areas to minimize rougheye bycatch.
- Collect and record tow-specific rougheye rockfish amounts (numbers and total weight) that are reported to the PWCC Executive Director.
- Establish rougheye rockfish kg/mt of hake rate that triggers action to prevent subsequent tows from exceeding the trigger.
- Establish policy whereby the PWCC Executive Director and Board track daily catches and will consider further actions as warranted.

The *mothership sector* also took action through its cooperative. The mothership bycatch committee as well as the Board met and adopted the following protocols:

- Distribute maps of historic Rougheye bycatch to the members
- Distribute high bycatch tow alerts and VMS tracks for hauls exceeding a specified rate
- Establish a set of "relocation" triggers based on a 3-day rolling average exceeding a certain rate
- Additionally, Mothership operators will incorporate Rougheye information in the daily ship reports.

The *shoreside whiting* sector's risk pool also discussed the issue through its bycatch committee and then through the cooperative's Board of Directors. The group encouraged vessel captains to use Sea State's "Preliminary Fish Ticket Entry" form to report the plant tally of rougheye after each landing, to help provide more real time information on rougheye encounters. Sea State will then use the information to produce alerts and VMS trackline maps. Individual shoreside whiting vessel owners (both risk pool members and non-members) have invested hundreds of thousands of dollars into the development of rockfish excluders to reduce the take of non-target species – this development will continue.

Seafood Processors
The West Coast Seafood Processors Association notified its members of the issue and the likelihood of a mandatory scientific reporting requirement beginning in 2015 (Attachment 3). WCSPA also asked that the plants begin sorting rougheye and shortraker now and further to share that information back with vessel captains.

Conclusion

The undersigned organizations represent a majority of the industry affected by changes to rougheye rockfish management. We take this issue very seriously. We are actively reaching out and educating our respective fleets about the importance of reducing our catch of rougheye rockfish. We have summarized these activities here in this public comment. More detailed oral testimony will be provided by each sector during the June PFMC meeting.

We continue to support retaining rougheye rockfish in the minor slope complex and strongly recommend that the Council adopt the PPA from April as the Final Preferred Alternative in June. Based on the sum of the evidence the stock is healthy and industry collaboration is proving effective. Therefore, the PPA is both reasonable and justified. Finally, we remind the Council that past voluntary efforts to reduce catches on other species have worked. Moreover, we have successfully demonstrated that we have the ability to effectively share information through our existing infrastructures and to work together across sectors and fleets to achieve favorable results.

Thank you for your consideration.

Heather Mann, Midwater Trawlers Cooperative
Brent Paine, United Catcher Boats
Brad Pettinger, Oregon Trawl Commission
Bob Alverson, Fishing Vessel Owners Association
Pete Leipzig, Fishermen's Marketing Association
Steve Bodnar, Coos Bay Trawlers Association
Gerry Richter, Point Conception Groundfishermen's Association
Dan Waldeck, Pacific Whiting Conservation Cooperative
Rod Moore, West Coast Seafood Processors Association

Attachment 1

PFMC / West Coast Rougheye Rockfish Issue

Industry Meeting – Proposed Agenda

Tuesday, May 20th

3pm

In person at United Catcher Boats (Seattle) and Midwater Trawlers Cooperative (Newport) offices or by conference call

1. Welcome and Introductions

2. Review of April PFMC recommendations & scheduled June Decisions
    a. PPA to retain rougheye in the minor slope complex with a mandatory sorting requirement beginning in 2015
    b. Allow industry to use voluntary measures to reduce rougheye catches
    c. Take mandatory use of rockfish excluders off the table
    d. Some discussion about recatagorizing the stock assessment
    e. FPA in June
        i. Additional analysis on removing rougheye and shortraker to own complex with an OFL, ABC and ACL
        ii. NMFS / Council wants to hear more detail on what the fleet is doing to address the problem

3. Review any new landings data that is available

4. Industry response to April decisions / actions
    a. Fixed gear
    b. Bottom trawl
    c. Whiting
        i. Catcher / processors
        ii. Motherships
        iii. Shoreside
    d. Shoreside seafood processors

5. Joint public comment for June

6. Other?

Adjourn

Attachment 2

May 21, 2014

Notice to Fixed-Gear Permit Holders

Dear Fixed-Gear Fishermen:

This notice is directed to those that fish off of Washington, Oregon, and California with fixed-gear, primarily hook-and-line gear. The National Marine Fisheries Service has notified the Pacific Council and the commercial fishing industry that they are concerned about the harvest levels of Rougheye and Shortraker Rockfish from all fishing sectors. Based on a recent (and the first formal) stock assessment, NMFS is concerned that the Over Fishing Level (OFL) prescribed by the assessment would have been exceeded in recent years had it had been in place. NMFS and the Council have asked the industry to voluntarily reduce their catches of rougheye rockfish in order to avoid more draconian mandatory measures such as restrictive trip limits and closed areas.

Even though there has been a bi-monthly trip limit of 4000 lbs. for these fish, NMFS is concerned that the collective harvest by all fleets on the West Coast may be exceeding what is provided for under the Magnuson-Steven's Act. **You are therefore asked that, to the extent that you can, please do not target rougheye rockfish and avoid the incidental catch of Shortraker and Rougheye Rockfish if at all possible. The Council could push the RCA line out to 200 fathoms if longliners don't help out on this.** Please find an historical catch by all gear groups on the back side of this sheet.

There is a coast-wide attempt by the different gear groups to reduce their catch of these two species during 2014. Currently NMFS and the Council have taken preliminary action to allow the industry to voluntarily reduce their catches. If industry can reduce their catches, it will greatly reduce the chances that any extraordinary restrictions from the NMFS or the Pacific Council will be implemented. This letter is being sent out as an industry effort to notify people of the problem and coordinated with efforts with other affected industry members such as the bottom trawl and whiting fleets.

Sincerely,

Robert D. Alverson
Manager

Attachment 3

West Coast Seafood Processors Association

Week in Review

April 11, 2014

IMPORTANT NOTE

The Council summary contains several important items on the last page that all members should read. If you have any questions, please contact Rod.

PACIFIC FISHERY MANAGEMENT COUNCIL SUMMARY

The complete list of Council actions will be available on the Council's web site early next week (http://www.pcouncil.org). Shown below are issues that we believe are especially important to our members.

*****ROUGHEYE ROCKFISH*** – The good news is that the Council did not create a separate stock complex for rougheye / shortraker / blackspotted rockfish, nor is it discussing rougheye excluders. The Council did ask the Groundfish Management Team to analyze two additional seaward RCA lines – 300 fathoms and 350 fathoms – in case some sort of closure is needed. The Council will also look at identifying discrete temporary closure areas north of 40°10' in the event they are needed. However, ALL OF THIS IS CONTINGENT ON THE INDUSTRY FOLLOWING THROUGH ON VOLUNTARY AVOIDANCE PLANS. Industry groups will be getting together in the near future to work through options for keeping rougheye catch low and we will be following up with you. One thing you should begin to do right now is sort out rougheye rockfish at the dock. This will be required starting in 2015 but it will be good to get in practice and train your dock crews how to do it. If one of your boats has large catches of rougheye, warn them about it and ask them to change their strategy or fishing location if possible. This applies to all fishing sectors: whiting, trawl, fixed gear, and open access. Educate your boats on the need to avoid rougheye when fishing for slope rockfish in the north. It is not illegal to catch them but if too many come in we will be facing management actions that will not be pleasant. If you have any questions, please contact Rod.

---------- Forwarded message ----------
From: **Dick Woolsey** <dwoolz@sbcglobal.net>
Date: Thu, Jun 12, 2014 at 4:26 PM
Subject: 2015/2016 groundfish seasons
To: pfmc.comments@noaa.gov

May 13, 2014
Pacific Fishery Management Council
Dorothy Lowman, Chair
7700NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384
RE: 2015-2016 rockfish seasons, Agenda Item F.7
Dear Chair Lowman and Council Members:

My name is Dick Woolsey. I am a recreational sports fisherman that fishes out of Eureka, California. The fish stocks along the Northern California coast have rebounded nicely due to the restrictive measures that have been put into place to protect overfished species. Recent surveys and catch data have shown that our fishery is now quite healthy. We are the most heavily regulated area in the state and take into consideration weather conditions along the north coast, we do not get a lot of opportunity to fish and therefore there is no reason not to expand our season. **My preference for the 2015-2016 sports rockfish season would allow recreational fishing from April 1stthrough September 30th (20 fathoms) and October 1st to December 31st (30 fathoms). I also support a three bag limit for lingcod.**

I appreciate the opportunity to provide public input on this matter, and do not hesitate to contact me if you would like any additional information.

Sincerely,
Dick Woolsey

---------- Forwarded message ----------
From: **Pamlyn** <minnowpaws@suddenlink.net>
Date: Thu, Jun 12, 2014 at 7:40 PM
Subject:
To: pfmc.comments@noaa.gov

Hi,

I am writing this letter in support of increasing our recreational time for fishing through December 31st. Also, I support the 3 bag limit for lingcod.

Thank you so much for considering our request for a longer ground fish season up here on the North Coast. Our area depends on our fishing industry and the increased time will bring more tourist dollars into our community. We are very concerned about fish in general and treasure this resource that we want to see last for generations. We are doing our own research and data gathering in this area. There is an abundance of groundfish and with our ocean conditions limiting our ability to fish, the extra days and depth won't have a negative impact on the fish.
And..... It is not the recreational fisherman who is doing the damage. Last year I saw hundreds of small yellow fish floating out in the ocean that had been dumped by some trawler. I got a photo of the fish, but not the trawler. That dump upset the fleet. The fish were scattered over a one mile area and it was awful. The small time fisher folks use caution and release devices to help save the fish that we are not to keep. None of us want to deplete a fish stock and we respect the limits that are set. We are asking that you review our ocean conditions and days we are able to fish by our own standards.

I am sorry if this isn't the type of letter you were looking for, but it is one I felt compelled to write and send. Please do all you can to give us the longer season. Thank you!

Pamlyn Millsap

---------- Forwarded message ----------
From: **Garibaldi Charters** <norwester@garibaldicharters.com>
Date: Thu, Jun 12, 2014 at 6:04 PM
Subject: June Council meeting-possible Blue Rockfish constraints
To: pfmc.comments@noaa.gov
Cc: Al Barney <avbarney@hotmail.com>, Bob Browning <rbc@pacifier.com>, "Conway, Flaxen" <flaxen.conway@oregonstate.edu>, Craig Wenrick <seaqfish@centurylink.net>, darus peake <dlpeake@outlook.com>, Dave Jordan <riverjordans@charter.net>, David Vandecouvering <dvandeco@embarqmail.com>, Doug Creasy <creasy.kd@gmail.com>, Frank Bohnnon <fbbohannon@charter.net>, Gus Meyer <gusmeyer9@gmail.com>, Jeff folkema <fulk55@live.com>, Jim McIntyre <JimJmci@aol.com>, Joe Ockenfels <captain@siggig.com>, John Forstrom <zandrews@yahoo.com>, John Holloway <RFAoregon@comcast.net>, Jon Brown <kerrilincharters@yahoo.com>, Kelly Barnett <kellybarnett12@hotmail.com>, Kevin Poyser <poyser@embarqmail.com>, Mark Searle <mark_bb62@yahoo.com>, Mick & Linda Buell <norwester@garibaldicharters.com>, Norm Shattuck <budlinda@vanirmail.com>, Paul Hanneman <phanneman@wcn.net>, paul schachner <tillbayman@hotmail.com>, Richard Redman <rdee12@charter.net>, Scott Browning <fvtriton@hotmail.com>, Tim Thomas <steelfin2@gmail.com>, Bill Baertlein <bbaertle@co.tillamook.or.us>, Mark Labhart <mlabhart@co.tillamook.or.us>, Tim Josi <tjosi@co.tillamook.or.us>

Chair Lowman and Council Members,

My husband and I attended the April Council meeting in Vancouver in hopes of testifying against possible closures of both Kelp Greenling and Near Shore Species. Unfortunately, the Council was running so late that we did not get the opportunity to do so. Because of a mistake in the SSC science for the Kelp Greenling the closures will not happen, I assume, unless better scientific data is brought forward. Now, we find ourselves in the same position with the same arguments for the nearshore complex. Reductions in this completely untargeted fishery seem to be imminent, based only on catch data. Charter boats and recreational fishermen will also again be asked to take a hit for the near shore fisheries species that ha ve catch data only and no "real" science to base this important managing decision upon.

Let's visit the real world for a minute. I don't know how it works in other area's, but I would like to explain to you when and why charter boats and recreational fishermen in Garibaldi catch so few Blue Rockfish. Except for two or three weeks in August, there is such an abundance of Black Rockfish that we are unable to get the hooks and weights down through them to catch anything else. By mid-August the Blacks are evidently so full of bait that they couldn't eat another thing if they had to, much less be attracted by anything the fishermen might have to have to offer. Then , we do start to catch a few Blues though we'd rather not as they are too small to satisfy our customers or most recreational fisherman. We are in a "Catch 22" situation here where scientists are saying, with little real science or assessments to back up their "assumptions", that if we catch more fish, the stock is in danger of being overfished and if we catch less, then the stock must be in trouble! To the fishermen , of course, you usually catch more fish because there are more of them down there than usual, and if you catch less of them, it's time to try somewhere else. Catch data alone simply cannot be used to designate a problem with any species. The fishermen have agreed to work with fishery managers using real stock assessments to identify and protect species that are in danger of being overfished, but they did not agree to being managed by assumptions and a lack of data or "data poor" assessments .

We understand that ODFW has several other measurements about the Near Shore species that NMFS isn't using to help determine their stock status and health. The ODFW created a Nearshore Plan several years ago. Many Oregon fishermen support a request by Oregon and Washington Depts. of Fish and Wildlife to remove these small, near shore fisheries from federal management and turn it over to the states. Both states have a proven track record in managing species for the benefit of all, even the fishermen. Turning this responsibility over to the state agencies would benefit the Council and NMFS who appear to not have the time or money to do proper assessments for the smaller fisheries. Oregon and Washington both have the science available and the expertise to manage them. At the very least, NMFS could be instructed to use (and help pay for) the science that has already been done by the states.

Unnecessary reductions in quota for the Nearshore Rockfish Complex, especially when one species at a time is taken out, can do real economic harm. Charter boats in Oregon have approximately six months in which to make a living that must last all year. Many mistakes have been made with the "data poor" and "data moderate" standards, and we would like to request that the Council correct them before any unwarranted actions are taken that can literally destroy so many fishermen's livelihoods. Economic problems would multiply many times over for all our Coastal Communities if our charter and recreational fleets were shut down or seasons shortened. There would be far reacing consequences to our tourism businesses and trades as well if any of our fisheries are shut down or our seasons shortened. This applies to our commercial fisheries as well. While deliberating this issue, we hope the Council takes into account National Standard #8 of the MSA to "Consider fishing communities to provide for their sustained participation and to minimize adverse impacts". We would also like to remind NMFS again that while Oceana and other NGO's often threaten lawsuits for their numerous fishery "crisis" management schemes, NMFS could just as easily be sued for major, unwarranted economic impacts to the fishing fleets and coastal communities.

Thank you,

Mick and Linda Buell
Garibaldi Charters, Garibaldi, Oregon

COLUMBIA PACIFIC ANGLERS
EXCEL FISHING CHARTERS, NEAH BAY
ILWACO CHARTER ASSOCIATION
OLYMPIC ANGLERS / CITY OF FORKS
PUGET SOUND ANGLERS / COASTAL
WESTPORT CHARTERBOAT ASSOCIATION

June 13, 2014

Pacific Fishery Management Council
7700 NE Ambassador Place, STE 101
Portland, OR 97220
Dorothy Lowman, Chair

Re: F.7.c, public comment / Near shore Rockfish management

Dear Ms. Lowman and Council members

The aforementioned Washington ocean recreational fishery groups support the current management system for nearshore Rockfish off the Washington coast for 2015-16.

Washington has a different near shore management approach than Oregon and California. This has led to significant differences in catch histories for all nearshore stocks, including nearshore rockfish, cabezon, and kelp greenling.

When salmon began to decline in the late 1970s Washington charter boats and recreational fishermen diversified their target strategies to other species in order to stay viable. The commercial hook and line fishery was very small and many, if not most, were charter boat operators trying to survive. The primary target was Black Rockfish as it is today.

Over time, working with WDFW, we supported reductions in Rockfish bag limits to avoid localized depletion and maintain a sustainable fishery. WDFW reduced the rockfish bag limit from 15 to 12 in 1992, closed the commercial nearshore fishery in 1995, and reduced the rockfish bag limit again from 12 to 10 in 1996.

Washington closed its commercial fishery almost 20 years ago. It does not make sense to use Oregon's recreational CPUE, which competes with an Oregon commercial fishery, to determine the status of nearshore stocks off Washington. Further, given these proactive, conservative measures and the sustainable level of harvest that has occurred off Washington for the last 60-70 years, it is difficult to comprehend and explain why we should have to do anything at all to constrain our recreational fisheries on these stocks.

Although occasionally encountered, nearshore rockfish, cabezon, and kelp greenling are not targeted species. While “non retention” seems like it wouldn't cause any harm, we question why an angler shouldn't be able to keep those incidentally caught fish when the stock is “healthy” (i.e., above B40%)?

Our industry has been responsible and pro-active with regard to conservation and management measures to assure the sustainable use of our fishery resource.

Once again, we urge you to set allowable harvests and craft management measures for 2015-16 that maintain our current closely monitored fishery.

Respectfully yours,

Mark Cedergreen
Executive Director
Westport Charterboat Association
PO Box 654
Westport, WA 98595
PFMC GAP member

Butch Smith, Ilwaco Charter Association
PFMC SAS member, chair

Steve Watrous, Columbia Pacific Anglers
PFMC SAS member

Gary Grahn, Olympic Anglers
Lapush / City of Forks recreational fishery advisor

Tom Burlingame, Excel Fishing Charters
Neah Bay recreational fishery advisor

Kevin Lanier, Vice President, Puget Sound Anglers
Coastal recreational representative

Dave Seiler
PFMC GAP, Washington recreational advisor

Agenda Item F.8
Situation Summary
June 2014

INITIAL STOCK ASSESSMENT PLANS AND TERMS OF REFERENCE (TOR) FOR GROUNDFISH AND COASTAL PELAGIC SPECIES

This agenda item concerns planning for new groundfish stock assessments that are anticipated to be completed in 2015, which will be used to inform the harvest specifications and management measures decisions for groundfish fisheries in 2017 and beyond.

The decision on which stocks to assess next year entails whether the assessment should be a full assessment that requires peer review by a stock assessment review (STAR) Panel, a data-moderate assessment (all data-moderate assessments are proposed to be reviewed in one STAR Panel), or an update assessment that requires only a review by the Council's SSC. Council policy on this subject has been to schedule no more than ten full assessments in a given year with no more than two full assessments reviewed at each STAR Panel. Given the proposal to dedicate a STAR Panel to data-moderate assessments, only eight full assessments are contemplated to be done next year. A maximum of five STAR Panels should be considered for next year. Dr. Michelle McClure and Dr. Jim Hastie, National Marine Fisheries Service Northwest Fisheries Science Center (NWFSC), will report on proposed stock assessments and a proposed 2015 stock assessment review schedule (Agenda Item F.8.b, NWFSC Report). As a further aid to a decision on potentially doing full assessments for any of the stocks that were assessed in 2013 using data-moderate methods, Agenda Item F.8.a, Attachment 1 documents the available age and length composition data for those stocks. The Oregon Department of Fish and Wildlife (ODFW) also provides a report detailing the data they have collected to inform any assessment of kelp greenling, China rockfish, copper rockfish, or quillback rockfish (Agenda Item F.8.b, ODFW Report).

There are three Terms of Reference (TOR) that guide the stock assessment process; one specifies how the next assessment process should occur and defines the roles and responsibilities of various entities contributing to this process, one guides the development of rebuilding analyses used to develop harvest specifications and rebuilding plans for overfished species, and one that guides how new methods are reviewed and recommended for scientific activities that inform analyses used in management decision-making. These TOR have been reviewed by some members of the SSC and others, and are included as Agenda Item F.8.a, Attachments 2, 3, and 4, respectively. Staff from the Northwest and Southwest Fisheries Science centers have also proposed some modifications to the stock assessment TOR (Attachment 1), which are proposed in a "track changes" format, to bolster the TOR with respect to new National Standard 2 guidelines. Additionally, Council staff has proposed changes to the stock assessment TOR from the perspective of the Coastal Pelagic Species management and assessment process in Attachment 5. The Council may want to modify these TOR for the upcoming assessment cycle.

The Council will consider the input from NMFS, the advisory bodies, and the public before providing a preliminary decision on 2015-2016 stock assessment priorities by species, type of assessment (full, data-moderate, or update), and language for the three draft TOR. The Council is scheduled to make final decisions on stock assessment planning at their September meeting.

Council Action:

1. **Adopt for Public Review the List of Stocks to be Assessed in 2015;**
2. **Adopt for Public Review the Preliminary TOR for the Groundfish and Coastal Pelagic Species Stock Assessment and Review Process for 2015-2016;**
3. **Adopt for Public Review the Preliminary SSC Terms of Reference for Groundfish Rebuilding Analysis;**
4. **Adopt for Public Review the Preliminary TOR for the Methodology Review Process for Groundfish and Coastal Pelagic Species; and**
5. **Adopt for Public Review the 2015 Groundfish Stock Assessment Review Schedule.**

Reference Materials:

1. Agenda Item F.8.a, Attachment 1: Available Age and Length Composition Data for the Nine Data-Moderate Stocks Assessed in 2013.
2. Agenda Item F.8.a, Attachment 2: Draft Terms of Reference for the Groundfish and Coastal Pelagic Species Stock Assessment and Review Process for 2015-2016.
3. Agenda Item F.8.a, Attachment 3: Draft Terms of Reference for the Groundfish Rebuilding Analysis for 2015-2016.
4. Agenda Item F.8.a, Attachment 4: Draft Terms of Reference for the Methodology Review Process for Groundfish and Coastal Pelagic Species.
5. Agenda Item F.8.a, Attachment 5: Recommended Changes to the Groundfish/CPS Stock Assessment Terms of Reference, Reflecting Coastal Pelagic Species Management and Assessment Schedules.
6. Agenda Item F.8.b, NWFSC Report: Initial Stock Assessment Plans and TOR, Northwest Fisheries Science Center Report.
7. Agenda Item F.8.b, ODFW Report: Stock Assessment Data Available for Kelp Greenling, and China, Copper and Quillback Rockfishes for the 2015-16 Stock Assessment Cycle.

Agenda Order:

a. Agenda Item Overview — John DeVore
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action:** Adopt for Public Review a Preliminary List and Schedule of Stocks for Assessment in 2015, the Stock Assessment and Methodology Review TOR for Groundfish and Coastal Pelagic Species, and the Rebuilding TOR for Groundfish

PFMC
05/28/14

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Available Age and Length Composition Data for the Nine Data-Moderate Stocks Assessed in 2013

Brown Rockfish

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1974		2	1987			2000		
1975		14	1988			2001	23	
1976		3	1989			2002	47	
1977	114	508	1990			2003		
1978		458	1991			2004	4	
1979		60	1992			2005		
1980	25	398	1993			2006		
1981	1	132	1994			2007	19	
1982		223	1995			2008	1	
1983	7	137	1996			2009	16	
1984	2	350	1997			TOTAL	293	2439
1985	34	154	1998					
1986			1999					

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**
1978								1		3	2	8	9	4	5	5	5		
1980													2	2	2	3	5	5	1
1981													1		2	1	5	1	
1982										2	3	2	1	4	3	2			
1983										1	1	1		3					
1984							1	1	3	4	3	1		2					
1985								1	1	2			1	1	2	2	1		
1986												1		1					
1988							1												
1990							1												
1991				1	1	3	8	3	7	14	3	5	3	1		1	1		
1992			16	115	214	280	288	247	253	163	115	86	36	14	12	7	5	1	
1993			6	26	55	77	70	67	69	54	33	6	10	13	9	8	5	5	2
1994		3	31	110	81	76	57	63	51	48	54	30	10	5	3		1		
1995	1		5	17	44	77	74	35	39	35	38	20	15	3	3				
1996	1	1	4	42	85	143	141	132	135	85	38	23	10	5	4				
1997		19	53	59	125	179	159	132	107	104	72	40	29	23	9	4	1		
1998			1	2	8	32	24	21	13	13	9	3	3	3	1				
1999			1	8	37	67	119	178	146	146	143	82	40	33	17	16	2	1	
2000				2	11	59	80	90	93	97	79	47	27	8	5	2	1		
2001				2	7	48	65	108	150	169	136	99	63	31	7	4	1	1	
2002						15	28	42	51	52	50	49	37	23	7	3	1		
2003						5	13	9	12	17	13	5	5	2					
2004						6	4	5	11	18	15	9	1	3	2	1			
2005						1	3	4	10	7	12	9	7	4	3				
2006						2	2			1	1	1							
2007					2	1	4	12	9	7	7	2	4	1					
2008				1			2	3	5	6	2	4	1			2		1	
2009						6	6	20	16	29	30	13	12	14	6	1	1		1
2010					2	15	53	74	77	73	70	48	30	18	4	1			
2011					1	1	11	46	48	43	41	15	14	14	5	2	3		
2012						5	7	26	28	37	43	31	18	6	2				

Recreational

Year	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
1978										1	4	8	20	20	28	20	29	42	26	28	11	3	3	4	
1979									1	1	5	13	15	20	23	27	30	22	9	6	5	3		1	
1980									1	3	3	3	11	15	25	25	44	21	28	17	6	6	2		
1981										2	1	4	3	9	13	4	11	12	6	6	5	2			
1982											3	1	18	21	14	21	17	17	9	8	5	4	1	1	
1983								1			3	6	17	20	20	22	20	5	11	5	4	1	1		
1984										1	2	3	10	26	39	27	25	29	22	19	8	4		2	
1993			1	3	12	12	24	26	27	30	38	48	55	62	41	23	17	14	9	3					
1994						2	3	11	12	15	20	24	24	18	16	10	3	7	3	1	1			1	
1995					1	1	5	6	9	25	32	32	30	31	20	15	13	2	3	1	1				
1996					2	5	7	22	46	40	64	56	72	55	51	27	13	9		1	1				
1997					1	1	5	8	21	19	19	27	30	18	20	8	6	1							
1998					2		2	5	11	12	29	42	56	44	21	14	9	6	1						
1999							4	5	17	51	67	126	161	192	108	60	20	5	4	2		1			
2000			1			1	2	5	12	12	32	29	51	63	65	55	24	7	7	3					
2001							4	25	16	32	34	45	75	67	88	83	47	24	4	6	3				
2002								11	24	34	67	85	81	69	77	70	31	22	9	5	6				
2003		1	1	1	2	1	6	14	27	56	82	90	137	180	246	269	161	112	48	25	10				
2004				2	6	6	8	14	39	92	123	160	219	207	221	218	193	130	66	26	13	5		1	
2005	1	1		1	2	19	29	89	135	170	228	342	421	393	427	507	458	246	155	50	22	5	2	1	
2006					2	6	27	105	219	290	415	520	661	686	589	442	332	189	99	49	25	17	2	2	1
2007						3	11	47	107	219	351	536	649	591	542	411	277	154	85	45	22	7	1	4	
2008					1	11	32	71	141	216	302	419	532	652	624	471	277	127	71	45	27	11	7	2	1
2009				2	5	25	43	76	103	148	249	403	634	715	717	565	393	226	116	34	21	4	1	4	
2010		2	4	18	18	26	53	154	153	215	327	435	537	646	688	602	384	196	70	36	16	5	5		1
2011		2	5	20	14	17	29	99	177	268	411	537	600	539	515	422	316	162	87	34	13	11	2	3	3
2012			4	18	8	15	27	91	151	293	479	565	564	389	325	259	222	144	54	39	19	8	4	1	2

Compositional data for brown rockfish

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, northern and central California (Fort Bragg to Morro Bay) data.

Year	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	Total
1987							2	1		1				1						5
1988			2	16	39	70	90	83	103	86	70	49	42	10	10	4	4			678
1989			1	3	12	33	66	94	124	118	99	75	57	46	22	18	3	3	3	777
1990				2	3	8	22	40	39	36	26	20	14	7	4	1	1			223
1991		2	2	10	31	48	62	81	99	55	67	45	31	22	13	3		2		573
1992			2	5	16	30	42	73	58	60	41	35	14	8	5	2				391
1993			2	11	15	24	29	46	53	54	43	18	9	5	1					310
1994			4	11	19	32	49	55	42	39	32	28	17	14	7	4		2		355
1995		1	3	17	22	46	67	108	83	112	109	115	69	46	31	9	6	2		846
1996	1	3	8	12	18	36	60	92	95	77	84	51	31	14	6	2	1			591
1997			10	19	50	63	99	102	91	81	51	24	13	4	3					610
1998				8	21	45	103	134	158	161	112	72	27	20	3	3	1			868
Total	1	6	34	114	246	435	691	909	945	880	734	532	324	197	105	46	16	9	3	6227

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, southern California data.

Year	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	Total
1975		1	5	13	17	41	45	40	37	30	37	25	22	54	60	56	36	27	11	11			569
1976			1	14	23	46	52	82	90	88	62	43	43	43	30	33	24	18	3	4	1		700
1977		5	5	23	44	50	84	82	87	96	109	69	63	52	44	20	19	10	2	1	1	1	867
1978	1	2	13	20	13	25	21	19	23	32	35	13	10	10	10	3	3	6	1				260
1986				5	10	21	19	22	28	20	15	8	9	1	2			1					161
1987			1		1	19	36	42	15	18	25	15	14	4	1			1	1				193
1988				1	10	27	35	43	35	28	29	20	8	7	7	1	4	3	2				260
1989				3	5	17	37	53	71	69	38	18	9	2	2	1	1						326
Total	1	8	25	79	123	246	329	383	386	381	350	211	178	173	156	114	87	66	20	16	2	1	3335

Oregon Data

Nearshore research otoliths by year and 2-cm length bins (none aged).

Year	Aged?	No length	18	20	22	24	26
2001	no		1				1

Recreational otoliths by year and 2-cm length bins (some aged), 2011 and 2012 data are preliminary.

Year	Aged?	24	26	28	30	32	34	36	38	40	42	44	46	48	50
2005	no							1							1
2006	yes				90										
2007	no	1													
2007	yes		5												
2008	no		7								1	2			
2009	no											1			
2010	no									1					
2011	no		1											1	2
2012	no		1										1		
2012	yes			41											

Recreational length frequencies by 2-cm length bins.

Year	36	40	42	44	46	48	50
2005	1						1
2008			1	2			1
2009				1			
2010		1					
2011						1	
2012					1		

Washington Data

Commercial otoliths (none aged).

Year	20	22	24	26	28	30
1976	11	27	58	63	16	2

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**
1976	11	27	58	63	16	2											
1982				2	4	7	13	15	11	12	4	4	2	1		1	
1983	3	10	27	42	35	14	23	30	28	30	16	17	7	4	3	3	2
1988					2			2				1					
1989					2			2				1					
1991			1	1	3		1										

Recreational

Year	**16**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**
1993	1		2	2		1	2					
1994					2	7	4	5	1	1	5	1
1995				1	1							
2011												1
2012												1

NWFSC Hook-&-Line Survey Data

Lengths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
28-29						1				1
30-31	1			1	1	1				4
32-33									1	1
34-35									1	1
36-37								1		1
38-39		1					1	1		3
40-41				1				1	1	3
42-43										0
44-45		2								2
Totals	1	3	0	2	1	2	1	3	3	16

Otoliths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
28-29						1				1
30-31	1			1		1				3
32-33									1	1
34-35									1	1
36-37								1		1
38-39		1					1	1		3
40-41				1				1	1	3
42-43										0
44-45		2								2
Totals	1	3	0	2	0	2	1	3	3	15

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	**Lengths**	**Weights**	**Age structures**	**Age reads**	**Stomachs**	**Ovaries**	**Maturities**
5	22	13	13				

AFSC Triennial Survey, 1980-2004 (average 1980-2004 numbers: total divided by nine years).

Tows > 0	Lengths	Weights	Age Structures	Age reads
4	6			

China Rockfish

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1977		28	1995		
1978		26	1996		
1979		1	1997		
1980	5	28	1998		
1981	3	9	1999		
1982		15	2000		
1983	9	2	2001		
1984	2	7	2002		
1985	1	3	2003		
1986		2	2004		
1987			2005		
1988			2006		
1989			2007		
1990			2008		
1991			2009	1	
1992			2010	1	
1993			TOTAL	22	121
1994					

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	66
1985															2			
1991							1		1									
1992			1	9	13	41	40	86	69	26	23	4	1					1
1993				2	12	25	28	30	25	21	16	11	14	1				
1994	1		4	7	30	50	73	73	47	28	14	9	3	1			1	
1995				3	10	24	32	17	24	13	6	5	4	3	1			
1996			1	6	18	28	31	31	17	13	12	7	5	4				
1997				2	5	19	48	48	28	14	11	2	4					
1998		1		3	10	9	8	6	7	2	1							
1999						3	18	49	77	71	62	30	11	3				
2000							1	31	45	33	26	10	4	1		1		
2001							3	39	43	35	24	13	6		1			
2002							1	23	26	26	15	3	1		2			
2003								1	10	10	5							
2004						1		10	12	28	34	9	1					
2005						1	4	17	38	32	7	4						
2006						1	2	9	16	16	17	8	4					
2007							3	34	60	67	54	23	5	1				
2008							2	8	37	61	56	18	4			1		
2009							5	24	54	72	32	21	1					
2010							1	10	32	39	28	15	4					
2011								13	4	1								
2012								8	4		1							

Recreational

Year	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1978									3	2	3	8	5	3			1
1979								2	1		6	6	4	1		2	1
1980									2	2	6	11	10	8	4		1
1981										1	5	2	2	1			
1982								1	1		1	4	1	4	3	2	
1983											3	5	3	3	1	1	
1984									1	3		3	3		1		1
1993						2	5	7	23	38	26	13	19	4	5		
1994							4	7	29	41	34	24	17	8	5		
1995							2	6	11	22	21	11	11	5	1		
1996						3	6	9	29	56	58	28	15	8	5		
1997							2		1	4	4	6					
1998								4	6	12	10	6	2	3	1	3	3
1999						4	2	6	14	29	36	30	20	16	4	4	2
2000							3	6	10	16	16	18	29	5	1	5	1
2001							2	12	11	24	19	14	6	2		2	
2002						1	2	13	30	44	49	25	4	7	2	1	
2003							7	16	55	76	75	49	13	7		1	
2004						6	8	25	60	91	132	83	31	13	10	3	1
2005						6	11	36	72	155	209	144	60	17	16	3	3
2006					1	2	6	42	104	187	252	195	81	46	17	5	1
2007						1	25	38	107	204	250	228	122	47	30	10	
2008						6	15	62	157	275	364	260	153	73	38	11	3
2009	1					4	26	84	192	364	379	292	135	73	26	13	
2010					2	7	23	69	182	310	338	201	89	29	25	8	5
2011					1	20	32	96	180	323	381	172	120	45	19	2	2
2012						4	12	58	121	248	269	149	77	64	43	20	2

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, northern and central California (Fort Bragg to Morro Bay) data.

Year	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**Total**
1987				4	1	2	3	3	2						15
1988	1	1	11	7	43	74	106	109	49	25	10	7	6		449
1989		1	5	17	35	70	66	73	43	20	18	9	3		360
1990				7	6	27	33	24	6	6	6	3	1		119
1991		1		1	4	24	55	32	13	5	3				138
1992			1	2	16	40	35	22	14	5	1	1			137
1993			2	9	27	44	50	37	28	12		1		1	211
1994			2	8	24	60	49	51	27	5	8	2			236
1995			5	7	26	50	58	30	18	14	2	2			212
1996			6	10	21	64	86	72	41	10	3	1			314
1997			3	7	21	40	65	45	29	8	6	3			227
1998			1	1	16	24	33	19	7	1	1	1	1	1	106
Total	1	3	36	80	240	519	639	517	277	111	58	30	11	2	2524

Oregon Data

Commercial otoliths by year and 2-cm length bins (some aged), 2011 and 2012 data are preliminary.

Year	Aged?	No length	< 30	30	32	34	36	38	40+
1995	no		9	30	20	23	14	5	1
1996	no		11	23	34	25	15	8	2
1998	no		4	19	44	39	20	9	3
1999	no		10	36	40	16	15	9	4
2000	no		20	236	287	323	219	110	37
2001	no		5	360	566	549	338	133	40
2001	yes		1	12	11	17	12	6	4
2002	no		5	216	394	392	302	124	40
2002	yes	2		13	38	30	24	11	3
2003	no		1	139	234	206	144	65	24
2003	yes		2	20	48	48	39	17	7
2004	no		3	109	196	181	114	28	15
2004	yes			9	13	17	9	6	1
2005	no			28	47	55	44	20	9
2005	yes			2	2	3	1	4	2
2006	no		3	39	75	118	94	55	25
2006	yes			1	8	10	6	4	
2007	no		4	48	149	193	198	108	24
2008	no			28	64	118	83	56	27
2009	no		2	37	99	131	89	51	21
2010	no		3	48	104	175	130	49	20
2011	no		4	64	199	283	279	123	45

Recreational otoliths by year and 2-cm length bins (some aged), 2011 and 2012 data are preliminary.

Year	Aged?	No length	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
2005	no					161	1	53											
2005	yes	1				23	355	380	315	105	30	7	2		1			1	1
2007	no		1																
2008	no		1																
2009	no	1		1															
2010	no	1		1															
2011	no		1	5															
2012	no			1															

Recreational length frequencies by 2-cm length bins.

Year	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
2005					5	15	20	12	2	2								
2006		1	5	13	19	41	60	34	12	5							1	
2007	1	4	5	15	31	59	92	36	16	4		1						
2008		4	10	13	25	68	75	51	16	5	1			1				
2009		3	9	19	21	36	43	35	13	3								
2010			2	8	14	36	41	47	19	4	3							
2011		1	7	14	36	51	69	43	9	3	2	1						1
2012		1	3	8	33	50	52	57	18	4	1							

Nearshore research otoliths by year and 2-cm length bins, 2011 and 2012 data are preliminary.

Year	Aged?	24	26	28	30	32	34	36	38	40	42	44	46
1998	yes					1							
1999	yes				1	1	6	2	2				
2000	yes	1				1		3				1	
2001	yes	1		1	1	2	3	1		2			2

Washington Data

Recreational otoliths by year and 2-cm length bins (some aged).

Year	Aged?	<14	20	22	24	26	28	30	32	34	36	38	40	42
1998	yes						5	6	19	13	7			
1999	no				1		8	26	39	33	13	2		
1999	yes					2	2	10	25	11	4	1		
2000	yes					2	5	10	13	20	3	2		
2001	no							3	5	3			1	
2001	yes				1	1	2	7	6	6	1	1	1	
2002	yes						1	2	8					
2004	no							4		1	1			
2004	yes			1		3	5	30	48	46	20	14	2	
2005	no								1	2				
2005	yes			2		1	12	31	60	60	22	15	3	
2006	yes	1					5	12	33	25	8	4	1	
2007	yes					2	3	10	33	46	15	9	1	
2008	yes				1	2	3	7	24	28	7		1	
2009	yes						1	6	10	4				1
2010	yes		1					2	8	7	3		1	
2011	yes							4	16	19	7	4		
2012	no								1					
2012	yes							2	8	7	5	2		

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	38	40
1980	2	1

Recreational

Year	**<14**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**52**	**>54**
1993							2	2	4									
1998						5	6	19	13	7								
1999				1	2	10	36	64	44	17	3							
2000					2	5	10	13	20	3	2							
2001				1	1	2	10	11	9	1	1	2						
2002						3	6	24	5	12	9	8	2					
2003						3	11	13	9	6	8	8	1		1			
2004			1	1	4	9	38	58	63	27	18	4						
2005			2	1	1	16	50	110	107	44	27	5						
2006	1			1	1	11	39	87	85	32	15	4						2
2007					2	5	23	49	61	38	23	6	3	1	2	2		
2008				3	3	8	19	39	47	15	4	3	1					
2009		1			1	8	15	30	23	17	7	4	4	3	3	2		
2010		2				1	6	14	18	12	13	10			1	1		
2011				1	1	2	12	36	48	43	26	11	2					
2012					2		3	16	14	14	15	9	2				1	

Copper Rockfish

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1975		88	1992		
1976		273	1993		
1977		380	1994		
1978		345	1995		
1979		42	1996		
1980	14	192	1997		
1981		76	1998		
1982	7	133	1999		
1983	12	75	2000		
1984	28	66	2001		
1985	23	13	2002		
1986	2	5	2003	1	
1987	1		2004	6	
1988			2005		
1989			2006		
1990			2007	5	
1991			TOTAL	99	1688

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	62
1978										2												
1979														6	9	5	5	1				
1980						1	1	1	3		3	3	6	5	2	3	4	2				
1981											1		1		1	1						
1982											1				1	1		2	1			
1983										3	1	2		1	5		2	1				
1984								1	1	1	2	4	6	4	2	9	8	4	1			
1985						1	1	1	1	3	2	3	5	1	5	3	2					
1986							1				7	4	4	6	3	7	2	1	1			
1987					1		1		2	3	3	1	4	3		4						
1988							1	1	1		2	4	2	5	4	3	3		1			
1989								2	2	1	1	3	4	3	5	3						
1990													2									
1991					1		1	8	12	10	16	19	14	13	12	15	4	1				
1992			1	4	6	17	39	53	64	65	90	70	71	34	38	32	43	26	7	2	1	1
1993	1	6	19	17	34	29	45	61	61	69	79	91	80	55	62	52	25	16	6			
1994		1	6	17	16	21	25	20	16	17	27	35	38	26	32	29	19	4	5			
1995	1		4	12	14	19	39	42	41	42	44	41	24	35	38	24	13	9	7	1		
1996			4	7	17	21	26	41	52	48	53	48	54	41	21	22	13	5	6			
1997		1		3	7	14	40	42	66	62	72	67	49	44	23	23	7	4	1			
1998				2	12	24	32	65	73	78	94	75	68	20	22	10	3	1				
1999			1	4	12	20	36	35	46	52	66	41	70	47	55	35	25	10	3	6	3	
2000					4	9	6	8	5	8	8	7	14	3	6	5	7		1			
2001				1	6	2	9	20	17	24	31	26	16	21	24	27	15	4	2			
2002				1	1	2	4	6	11	5	11	16	8	3	6		1		1			
2003				1			4	8	17	12	13	8	2	14	5	4	2					
2004								1	3		3		5		6	11	3	4				
2005												6	3	2	4	2	1	1				
2006							2	1	1	5	3	3	1	1	1		1					
2007				1	2		2	1	3	5	6	7	6	17	14	6	4					
2008					1	3	3	5	1		5	8	9	6	14	5	4	3	4	1		
2009					2	2	5	5	7	7	3	9	6	2	1	3						
2010					2	8	10	8	8	12	9	8	9	4	3		1	1				
2011				2	10	16	10	10	5	4	4	1		1	3				1			
2012				3	8	15	17	10	6	3	2	3	2	2	1			1				

Recreational

Year	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**54**	**56**	**58**
1978									1	1	2	4	12	10	19	24	35	48	62	45	37	29	8	5		1	1
1979											3	1	7	3	19	27	13	21	35	35	33	21	9	4	2		1
1980											1		7	14	9	11	21	16	23	37	34	11	10	3	1	1	
1981									1	1	1	2		7	4	4	4	4	8	18	10	18	8	2			
1982											1	1	2	7	10	10	12	21	14	27	21	15	5	2			
1983									1					4	4	9	9	11	16	9	21	8	3	2	1		
1984									1				4	2	2	8	6	4	15	17	10	18	11	3		1	
1993					6	7	7	22	35	43	54	56	38	32	21	25	19	25	11	7	12	4	8	1	1		
1994							1	3	6	27	41	34	33	23	18	19	26	16	10	15	10	2	2	1			
1995								3	8	15	27	26	28	20	17	12	15	4	11	6		1					
1996							3	7	24	22	28	44	49	44	29	40	28	25	21	20	8	3	2	4	1		
1997						1			2	1	10	10	9	2	1		4	2	2	3							
1998							2	8	14	13	18	21	27	29	25	22	21	17	8	5	1	2					
1999						2	1	5	10	41	53	68	90	80	58	59	57	41	39	17	12	4	3				
2000										6	14	25	31	40	29	28	43	33	20	9	3	1					
2001							3	1	6	2	8	9	13	19	23	27	16	15	4	7	2						
2002								3	10	25	14	24	28	28	17	27	14	12	13	6	3	1			1		
2003							1	2	8	13	31	61	67	60	54	50	43	38	17	14	11	1	2	3			
2004							1	4	10	22	50	106	119	123	105	87	94	69	59	38	35	17	8	3		1	
2005						5	22	33	31	84	99	150	171	201	213	203	246	173	146	111	49	28	12	4	6		
2006					1	2	6	54	110	178	228	265	229	284	276	292	289	233	192	139	77	39	13	9	8	1	
2007						1	5	37	84	187	293	342	349	317	318	385	373	345	273	190	101	56	24	10	2	1	
2008				1	2	1	7	27	75	130	279	382	437	385	329	266	268	240	170	111	76	47	23	8	5		
2009						2	10	29	54	75	143	224	306	337	311	276	256	247	176	115	96	53	16	7	4	1	
2010					1	1	2	25	76	125	152	164	167	243	229	190	221	186	142	101	51	23	14	4	3	2	
2011				1		3	8	46	89	178	237	325	331	295	302	234	250	181	135	89	57	30	10	7	3	1	1
2012	1		1	1		5	16	63	132	241	366	531	555	444	311	267	233	223	165	109	62	41	25	5	2	2	

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, northern and central California (Fort Bragg to Morro Bay) data.

Year	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	Total
1987					1		1	2	1	2	3	4	4	1	4	1	2						26
1988				14	43	25	43	26	27	60	64	46	54	45	42	23	21	12	3	1	1	1	551
1989			4	6	29	39	59	75	76	88	86	82	67	47	53	44	37	23	8	1			824
1990		1	2	5	4	8	25	29	49	46	40	39	37	29	26	21	9	5	2	1			378
1991				2	8	17	13	25	22	38	29	32	31	20	14	13	4	2	1		1		272
1992			3	4	7	13	29	56	64	104	100	99	91	72	46	25	11	8	2	1			735
1993		1	2	5	11	23	34	67	82	113	158	141	123	69	54	40	25	17	8	3	1		977
1994		1		9	14	16	39	41	42	53	61	70	59	43	46	13	11	9	2		1		530
1995		1		7	13	34	76	47	121	100	90	73	87	44	15	12	4	2	2				728
1996	1	3	3	6	15	30	43	55	58	56	61	61	65	28	21	7	1	3	3				520
1997			4	10	24	33	43	48	51	62	77	74	44	38	21	17	4	2	1	1			554
1998				7	15	20	26	22	27	29	29	33	22	7	9	4	2						252
Total	1	7	18	75	184	258	431	493	620	751	798	754	684	443	351	220	131	83	32	8	4	1	6347

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, southern California data.

Year	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	Total
1975					2	3	1	4	2	4	2	4	2		3		1								28
1977					1	1	1	1				1													5
1978	1		4	2	9	19	34	25	26	37	34	70	110	142	105	80	37	9	8	3					755
1986			4	14	16	26	29	20	24	18	31	29	27	36	21	16	10	11	1	4	2	2		1	342
1987		2	15	52	62	65	70	50	45	35	62	59	53	87	80	60	52	35	17	6					907
1988			4	18	26	50	69	74	60	39	26	21	24	29	26	11	9	8	7	4	5				510
1989	1	1	1	11	17	52	104	142	131	105	77	68	63	57	43	37	23	12	6	7	2				960
Total	2	3	28	97	133	216	308	316	288	238	232	252	279	351	278	204	132	75	39	24	9	2	0	1	3507

Oregon Data

Commercial otoliths by year and 2-cm length bins (none aged)

Year	< 36	36	38	40	42	44	46	48	50	52+
1999	2			2			2	2	2	
2000	11	11	10	10	5	5	6	8	11	8
2001	27	9	6	10	5	7	11	6	10	1
2002	5	4	3	1	4	3	2	1	2	3
2003	4	4	2	4	4	4	9	3	4	2
2004	4	3	4	6	3	9	5	4	11	4
2005	1		2	2	2	1	2	1		
2006		1	1	7	6	13	7	3	2	1
2007	4	2	2	2	3	7	6	3	1	2
2008		1		5	2	6	5			
2009	2	1	1	2	1	2	3	3		
2010	2	4	4	4	8	8	6	2	2	2
2011	8	6	8	6	10	10	15	8	7	2

Recreational otoliths by year and 2-cm length bins (some aged), 2011 and 2012 data are preliminary.

Year	Aged?	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
2005	no		1														
2006	no	1															
2006	yes		31	56	70	97	146	174	213	230	249	166	67	33	6	4	2
2007	no	1															
2007	yes	1															
2010	no		2	8	10	18	1										
2010	yes		2	2	2	13	56										
2011	no	1															
2012	no	1															
2012	yes		1														

Recreational length frequencies by 2-cm length bins.

Year	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
2005			1	1	3	3	6	8	17	8	7	3			1		
2006			2	3	3	4	10	13	29	29	28	20	5	1	2	1	
2007	2	2	3	9	1	6	14	24	30	34	31	21	5	5	1		1
2008	1	3	7	15	12	10	10	21	22	40	42	18	9	6		1	
2009		2	4	9	15	20	18	9	13	21	24	14	6		1		
2010		1	7	8	11	19	34	39	32	29	44	30	12	6		1	1
2011	1		3	9	15	16	26	24	33	31	32	27	13	4	1	1	
2012		1	5	2	10	19	28	36	37	38	41	33	17	11			

Nearshore research otoliths by year and 2-cm length bins (none aged), 2011 and 2012 data are preliminary.

Year	Aged?	No Length	26	28	30	32	34	36	38	40	42	44
1998	no	1										
1999	no		1			1	2	1				
2000	no				1		1	1				1

<u>Washington Data</u>

Recreational otoliths by year and 2-cm length bins (some aged).

Year	**Aged?**	**22**	**24**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**>54**
1998	yes				2	5	6	8	9	9	2	2	3				
1999	yes	1	1	9	11	14	20	18	16	16	14	10	6				
2000	yes			1	5	6	7	2	2	2	1						
2001	no																1
2001	yes					2	5	6	8	1	3	3	3	1			
2002	yes			1	1	1	4	5	4	1	2						
2004	yes			2	12	21	20	17	34	24	29	17	9	3			
2005	no			1	3	3	5	7	8	4	15	8	5	1			
2005	yes			2	4	8	18	22	38	25	17	17	8	4	1	1	1
2006	yes			2	1	3	10	11	12	9	6	6	3	1			1
2007	yes				5	10	4	11	20	16	10	6	3	1			
2008	yes		1		2	5	9	7	15	5	9	7	5				
2009	yes			1		2	5	6	6	5	3	5	1		1		
2010	yes					1	1	1	2	5	5	5	1	3			
2011	yes					1	3	5		5	1	6	5	1			
2012	yes				1		1	4	5	5	5	5	7	1		1	

Raw length frequency distributions by fishery, year, and 2-cm length bin
Commercial

Year	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1979	2	1	5	5	6	4	4	2													
1982									5	4	3	2	3	8	2	5	4	3		1	
1983					2		4	2	3	1		1	1	1							
1988							1			1											
1989						2	8	14	25	23	26	18	13	7	1	5					
1990								1	1	3	7	11	7	13	15	16	10	6	5	4	1
1991									3	1	2	6	2	2	2	3	2				
2004												1									
2006														1	1	1					1

Recreational

Year	**<14**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**>54**
1993			2	4	8	16	17	21	16	10	16	11	5	2		1			
1994								1	1	2	4	5			1				
1995				3	4	5	2	5	5	7	5	1	1						
1998							2	5	6	8	9	9	2	2	3				
1999			1	1		9	11	14	20	18	16	16	14	10	6				
2000						1	5	6	7	2	2	2	1						
2001								2	5	6	8	1	3	3	3	1			1
2002						1	4	6	10	15	19	15	6	2	1	3		1	
2003				1		1	1	5	3	13	11	4	2	2	3				
2004						2	13	23	31	25	41	31	31	23	14	8	1	1	
2005						4	7	18	49	55	80	63	76	51	22	11	3	3	1
2006					1	4	2	7	20	24	28	22	24	24	11	1			1
2007		1				1	8	13	8	14	26	26	20	18	11	5	1		
2008				1			5	8	10	8	17	11	13	11	7				
2009						1		4	12	14	13	10	4	8	2	1	1	1	
2010								1	1	2	7	11	9	9	8	7	2		
2011	1					1	1	1	8	13	11	13	13	16	23	12	8	5	2
2012							2	1	2	6	9	12	14	12	12	4	3	1	1

NWFSC Hook-&-Line Survey Data

Lengths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
20-21						1	1			2
22-23					1			2		3
24-25								2	1	3
26-27			2		1	2	1	2	1	9
28-29	1		1	2	4	2		2	3	15
30-31		2	2	4	2	1	2		6	19
32-33		5	4	2	5	6	1	3	6	32
34-35	3	5	7	7	6	5	1	4	7	45
36-37	4	7	11	11	9	19	6	11	7	85
38-39	4	10	8	12	5	23	4	9	4	79
40-41	5	7	10	14	18	17	3	7	9	90
42-43	7	10	8	10	10	8	2	8	10	73
44-45	6	17	4	9	4	9	2	3	5	59
46-47	2	2		3	2	10	1	2	2	24
48-49	1	4	2	2	1	1			2	13
50-51		1						1		2
52-53				1						1
Totals	33	70	59	77	68	104	24	56	63	554

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

Tows > 0	Lengths	Weights	Age structures	Age reads	Stomachs	Ovaries	Maturities
8	48	32	32				

AFSC Triennial Survey, 1980-2004 (average 1980-2004 numbers: total divided by nine years).

Tows > 0	Lengths	Weights	Age Structures	Age reads
4	12			

Otoliths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
20-21						1	1			2
22-23					1			1		2
24-25								1		1
26-27			2		1	2		2	1	8
28-29	1		1	2	4	2		2	3	15
30-31		2	2	4	2	1	2		6	19
32-33		5	4	2	5	4	1	3	6	30
34-35	3	5	7	7	6	5	1	4	7	45
36-37	4	6	11	11	9	18	6	11	7	83
38-39	4	10	8	11	5	23	4	8	4	77
40-41	5	7	10	14	18	17	3	7	9	90
42-43	7	10	8	10	10	8	2	8	10	73
44-45	6	17	4	9	4	9	2	3	5	59
46-47	2	2		3	2	10	1	2	2	24
48-49	1	4	2	2	1	1			2	13
50-51		1						1		2
52-53				1						1
Totals	33	69	59	76	68	101	23	53	62	544

English Sole

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1966	3911		1978	2102		2001		
1967	5848		1979	900		2002		
1968	7267		1980	4065		2003	74	
1969			1981	2510		2004	56	
1970	4522		1982	2446		2005	280	
1971			1983	1047		2006	60	
1972	2428		1984	1100		2007		
1973	2598		1985	1975		2008	187	
1974	500		1986	775		2009	35	
1975	644		1987	899		2010	10	
1976	625		1988	125		2011	8	
1977	3586		1989	25		TOTAL	50608	0

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**
1978									2									
1979						1		1										
1980										1								
1982									1									
1991						1	6	17	11	9	7	7	3	1				
2001	12	24	12	15	2	4	14	39	46	32	22	8	3	1				
2002							3	18	26	24	25	12	7		1			
2003			1	11	11	10	40	132	198	147	55	13	7	5				
2004				2	3	7	35	142	279	273	161	64	18	8				
2005						2	28	147	334	324	232	90	29	4	2	2	1	2
2006				2	5	10	44	130	354	495	465	282	103	28	3	1		
2007				7		4	37	169	409	569	379	193	72	18	4			
2008				2	1	9	45	238	492	466	376	196	76	24	2			
2009					2	10	60	202	350	351	268	164	78	17	3	2		
2010		1	2	2	7	23	82	157	258	187	120	61	32	7	3	2		
2011			1		3	4	51	60	70	44	30	22	9	7	1			
2012					5	24	105	159	211	192	104	49	25	3				

Recreational

None.

Oregon Data

Commercial otoliths by year and 2-cm length bins (some aged)

Year	Aged?	No length	< 30	30	32	34	36	38	40	42+
1966	no			14	40	48	51	28	14	9
1966	yes		13	71	288	419	293	180	82	52
1967	no		6	19	16	19	11	15	7	8
1967	yes		25	98	250	461	513	389	178	85
1968	no			1	4	20	14	10	2	1
1968	yes		18	88	330	523	515	406	214	137
1969	no			1		1	4			
1969	yes		49	199	423	512	497	333	207	124
1970	no			4	4	9	16	5	9	6
1970	yes		55	293	498	559	479	309	191	127
1971	no	1						1		
1971	yes	1201	11	27	50	119	89	51	28	24
1972	no		1	4	9	5	1	1		1
1972	yes	1	27	139	337	412	294	167	88	92
1973	no	1		1			2			
1973	yes		18	122	357	329	260	121	59	30
1974	no		4	5	33	39	14	7	3	2
1974	yes		36	57	162	204	208	112	53	48
1975	no			5	52	54	45	37	6	2
1975	yes		54	97	246	275	199	117	74	35
1977	no		7	38	100	118	95	38	19	11
1977	yes		114	202	376	397	335	230	116	72
1978	no		5	21	37	42	15	7	3	3
1978	yes		90	290	476	446	370	245	113	54
1979	no	9	5	34	113	113	83	45	12	11
1979	yes		23	145	251	275	191	120	51	29
1980	yes		107	465	623	590	385	216	124	103
1981	no		45	69	42	31	29	15	14	35
1981	yes		208	698	888	831	574	318	147	62
1982	no		93	79	24	9		1		70
1982	yes		263	682	901	798	459	247	92	62
1983	no		20	47	29	11	3			
1983	yes		96	273	378	304	208	90	47	23
1984	no		22	20	6	1				
1984	yes		58	137	189	126	76	44	24	7
1985	no		40	16	5	1				
1985	yes		139	247	276	194	129	40	14	12
1986	no		78	209	196	118	69	25	10	1

Year	Aged?	No length	< 30	30	32	34	36	38	40	42+
1986	yes		54	126	111	66	33	12	1	1
1987	no		77	72	79	59	36	26	9	6
1987	yes		241	287	298	232	90	31	12	3
1988	no		19	82	87	52	27	13	6	
1988	yes		63	156	206	126	70	28	11	8
1989	no		18	14	39	37	20	4	4	
1989	yes		63	292	370	233	137	50	16	4
1990	no		1			1				
1990	yes		71	230	326	252	130	28	10	
1991	no			1	1		1			
1991	yes		39	173	335	245	101	34	12	7
1992	yes		70	220	274	160	53	19	7	
1993	no		31	133	231	182	75	26	11	7
1993	yes		9	43	51	29	12	4	1	
1994	yes		72	228	253	158	82	34	3	8
1995	no		1		2					
1995	yes		90	165	138	103	47	21	12	8
1996	no		3	43	65	32	8	2	1	
1996	yes		120	210	193	130	44	5	5	2
1997	no		52	103	125	102	44	14	5	3
1997	yes		259	557	515	251	95	29	11	5
1998	no		215	418	383	186	67	16	6	4
1998	yes		55	142	138	68	38	12	4	4
1999	no		295	451	472	293	168	67	20	9
2000	no		188	402	457	247	115	39	11	10
2001	no		214	481	718	469	213	78	25	14
2001	yes		16	50	63	42	21	7	1	
2002	no		316	490	651	498	222	96	38	21
2002	yes		11	47	65	46	25	5	2	
2003	no		97	272	415	360	155	59	20	3
2003	yes		6	44	79	45	26	2	1	5
2004	no		67	218	395	333	191	62	21	6
2004	yes		2	27	69	48	40	13	4	
2005	no		105	365	526	407	215	89	31	13
2005	yes		15	44	54	47	29	12	1	1
2006	no		270	434	610	522	273	112	29	11
2007	no		54	118	237	281	203	129	47	10
2008	no		19	92	153	242	210	87	30	7
2009	no		62	136	242	255	202	98	42	8
2010	no	1	74	165	284	334	312	137	52	21

Year	Aged?	No length	< 30	30	32	34	36	38	40	42+
2011	no		98	147	204	190	167	77	41	66

Washington Data

Commercial otoliths by year and 2-cm length bins (some aged).

Year	Aged?	<14	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1961	no										9	21	15	14	11	9	7	5	3	5	1		
1962	no				3	12	5	1							1								
1963	no								2	28	64	115	71	66	43	44	15	15	15	12	4	1	3
1964	no								1	17	34	26	14	4	2	2							
1969	no								2	41	197	221	141	100	55	39	21	7	4				
1970	no	1	1		7	32	109	120	169	199	233	268	257	274	187	113	47	22	4	1			
1974	no			2	9	31	50	89	86	79	39	41	37	11	9	5							
1978	no					1	4	5	11	13	21	16	11	12	3	1		1					
1979	no		1	2	12	22	53	77	131	225	295	282	201	121	82	37	20	5	5	2	1	1	
1980	no			1	5	7	12	38	58	150	439	627	704	543	336	198	115	55	22	4	1	1	
1981	no			1	5	12	18	34	90	240	376	451	427	384	200	143	61	17	11				
1982	no	1		2	8	20	38	63	100	247	558	627	550	590	411	245	120	61	20	4	2		1
1983	no			3	8	17	32	50	95	201	464	399	350	207	123	86	43	15	6				
1984	no				1	4	6	26	85	209	442	535	435	320	193	113	47	20	5		1		
1985	no								13	98	478	602	519	335	190	104	44	25	14	4	2		
1986	no								3	31	117	142	124	108	120	83	39	13	3				
1987	no								1	40	229	321	236	131	91	48	22	6	1				
1988	no							1		26	135	259	248	205	131	73	23	17	2		1		
1989	no									10	117	233	242	169	71	42	19	5	2	2			1
1990	no									5	73	269	254	126	50	24	4	4					
1991	no							3	5	34	169	385	312	211	87	66	20	6					
1992	no								7	54	209	342	320	182	79	28	15	4	2				
1993	no							1	5	38	157	276	159	82	52	24	14	3					
1993	yes									9	48	67	54	24	15	6	3	1					
1994	no	1						1		31	117	223	171	86	52	20	5	3	2				
1995	no	2							6	46	199	271	270	163	125	75	37	15	2	1			

Year	**Aged?**	**<14**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**>54**
1996	no	1						1	4	26	89	194	187	143	80	48	17	5	3				
1997	no								3	23	67	178	254	259	252	152	69	26	6				1
1997	yes														1		1						
1998	no								16	58	99	196	205	212	187	182	105	32	2	1			
1999	no	2							1	11	133	266	236	132	96	65	44	9	4			1	
2000	no									1			1	2	1								
2000	yes								5	45	101	196	203	133	119	109	62	15	4	3			
2001	no									1		2	1	2	3			1					
2001	yes									5	66	211	244	201	131	77	37	16	1				
2002	no											2			1			1					
2002	yes									1	23	81	133	79	49	17	6	6	1				
2003	no										1	9	19	12	8	3	1						
2003	yes									11	89	163	180	155	97	57	37	7	1				
2004	no									2	7	12	23	24	11	9	2			1			
2004	yes									3	20	75	159	149	94	52	27	19	3	2			
2005	no										5	10	12	10	10	3	1	1					
2005	yes							1	3	3	51	169	190	161	77	71	32	9	3	1			
2006	no										3	2	7	2	6	2	1						
2006	yes									3	43	139	264	193	100	44	24	4					
2007	no											5						1					
2007	yes							1	2	17	88	217	344	270	132	58	11	4					
2008	no														1								
2008	yes								1	4	73	165	203	154	81	45	13	3	4				1
2009	no										1	2	2	1	2								
2009	yes								2	16	73	151	183	177	83	37	12	5	3				
2010	no											1	1										
2010	yes								1	9	44	128	120	55	23	13	5						
2011	no											1											
2011	yes									2	33	152	240	149	83	33	7		1				

Compositional data for English sole

Year	Aged?	<14	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
2012	yes										8	31	87	97	67	38	14	7	1				

Raw length frequency distributions by fishery, year, and 2-cm length bin
Commercial

Year	<14	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1961					1	1			2	49	150	168	130	89	58	49	34	14	15	9	2	1
1962			1	15	37	59	96	95	84	51	31	36	12	9	13	4	2	2				
1963			2	5	9	31	47	179	615	962	903	639	474	279	198	107	58	38	26	8	8	4
1964			2	14	33	74	156	320	649	968	997	757	493	337	225	120	76	34	14	6	7	
1965								6	133	507	710	690	515	336	144	74	22	11	2	3		
1966							1		30	181	332	366	431	346	221	108	70	61	15	18	2	1
1967									6	82	214	244	242	246	163	115	40	21	17	8	7	
1968					5	48	150	260	446	734	1051	1148	966	712	432	207	74	36	6	1		
1969	3	6	13	34	46	76	154	415	937	1992	2659	2327	1873	1348	948	476	228	77	27	8	2	1
1970	1	1	1	8	64	161	214	301	462	861	1086	989	752	590	330	214	105	50	10	3	2	
1971				1	1	9	24	62	129	195	246	228	187	135	104	69	30	13				
1972							5	28	180	424	409	346	292	200	119	59	33	10		1	1	
1974	1	4	12	23	59	129	199	194	152	92	77	78	46	29	11	4	1					
1975							2	2	94	457	556	492	426	328	198	126	38	6	2			
1976					1	3	34	122	233	310	326	348	309	279	146	56	18	13	2	1		
1977									4	28	48	52	31	33	22	8	3	1				
1978	2	1	9	4	23	42	62	72	132	171	135	113	74	57	40	20	7	4	2			
1979		1	3	18	32	67	105	177	297	380	365	272	160	110	57	37	10	10	3	1	1	
1980		1	2	12	22	33	64	100	204	580	856	980	795	492	316	183	78	31	4	1	1	1
1981			1	5	12	18	34	90	250	468	591	544	455	241	166	71	25	20	3	1		
1982	3		2	8	22	43	90	145	301	657	752	629	640	457	264	129	62	21	5	2		1
1983			3	13	28	39	73	144	298	671	614	563	379	240	155	80	25	10	2			
1984				1	4	6	26	85	209	457	551	449	325	193	113	47	20	5		1		

Year	**<14**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**>54**
1985								14	114	539	673	573	362	203	113	46	25	14	4	2		
1986								3	31	117	142	124	108	120	83	39	13	3				
1987								1	42	241	354	267	141	97	51	25	6	1				
1988							1		26	135	259	248	205	131	73	23	17	2		1		
1989			5	11	18	24	28	38	73	256	399	412	308	138	93	49	19	10	4			1
1990							1	2	38	331	576	533	337	188	102	28	28	21				
1991				2	1	2	7	10	75	561	781	650	434	219	127	59	16	4			1	1
1992								7	94	524	619	498	289	129	51	19	7	4	1			
1993							2	7	70	341	500	323	184	114	65	22	8	1	1			
1994	1						1		37	143	299	249	141	91	33	10	4	3				
1995	2							6	46	199	271	270	163	125	75	37	15	2	1			
1996	1						1	4	26	89	194	187	143	80	48	17	5	3				
1997								3	23	67	178	254	259	253	152	70	26	6				1
1998								16	58	99	196	205	212	187	182	105	32	2	1			
1999	2							1	11	133	266	236	132	96	65	44	9	4			1	
2000								5	46	101	196	204	135	120	109	62	15	4	3			
2001									6	66	213	245	203	134	77	37	17	1				
2002									1	23	83	133	79	50	17	6	7	1				
2003									11	90	172	199	167	105	60	38	7	1				
2004									8	43	106	186	178	108	61	29	19	3	3			
2005							1	3	3	56	179	202	171	87	74	33	10	3	1			
2006									4	78	259	439	339	190	83	38	6	1				
2007							1	5	25	123	328	477	382	197	89	17	6					
2008								2	18	156	314	384	286	134	76	19	4	4				1
2009								4	31	148	313	364	349	187	74	21	6	3				
2010								1	12	98	257	240	113	48	23	7	1					
2011			1					1	5	62	316	448	286	153	60	13	2	3				
2012										14	70	164	200	127	59	29	15	2	1			

Compositional data for English sole

Recreational

Year	38
2010	1

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	Lengths	Weights	Age structures	Age reads	Stomachs	Ovaries	Maturities
257	5,267	1,066	1,078	90			

NWFSC Slope Survey, 1998-2002.

NWFSC Slope Survey (1998-2002)				
Average 1998-2002 numbers of: (Total divided by 5 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
35	2			

AFSC Slope Survey, 1996-2001.

Average 1996-2001 numbers of: (Total divided by 5 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
22	606			

AFSC Triennial Survey, 1980-2004.

Average 1980-2004 numbers: (Total divided by 9 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
306	10,090	52		

Compositional data for English sole

Rex Sole

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1975	50		1994		
1976			1995		
1977			1996		
1978			1997		
1979	25		1998		
1980			1999		
1981			2000		
1982			2001		
1983	25		2002	26	
1984			2003	162	
1985			2004	52	
1986			2005	63	
1987			2006	94	
1988			2007	76	
1989			2008	151	
1990			2009	59	
1991			2010	1	
1992			2011	77	
1993			TOTAL	861	0

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46
1978									1	1							
1982												1					
2001							2	4	6	13	24	17	3				
2002				1	3	4	25	36	43	64	47	17	9	1			
2003		2		20	28	19	64	125	277	325	218	100	18	4			
2004						1	19	84	111	155	91	35	11	2			
2005			1	5	13	19	73	199	309	319	212	83	14	5			
2006			2	5	23	69	220	513	919	1095	689	347	107	30	5	1	
2007	1			2	9	41	159	368	743	688	435	179	48	14	1		
2008			1	1	5	53	212	498	799	781	485	193	52	17	7	2	
2009				3	4	11	35	165	348	474	282	134	58	38	10	1	1
2010				1	2	45	90	181	292	380	317	146	49	25	11	3	
2011				2	13	30	89	322	635	714	379	116	35	21	5		
2012		1		5	13	24	83	156	434	589	461	185	68	17	8	2	

Recreational – None.

<u>Oregon Data</u>

Commercial otoliths by year and 2-cm length bins (none aged)

Year	No Length	<26	26	28	30	32	34	36	38	40+
2006		2	23	39	63	55	18	11	6	1
2007		17	77	226	346	433	323	145	41	12
2008		13	58	206	322	354	280	142	50	14
2009		15	58	229	459	524	344	132	39	10
2010	1	14	52	221	614	698	419	194	50	19
2011		29	67	193	470	637	420	159	46	16

<u>Washington Data</u>

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	<14	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1969	1	8	15	6	1	2	1	2	1	1		1				
1970		8	40	35	12	8	4	2								
1975									14	63	62	42	15	1	2	1
1980							1									

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	**Lengths**	**Weights**	**Age structures**	**Age reads**	**Stomachs**	**Ovaries**	**Maturities**
402	9,059	493	493		172		

NWFSC Slope Survey, 1998-2002.

NWFSC Slope Survey (1998-2002)				
Average 1998-2002 numbers of: (Total divided by 5 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
175	328			

AFSC Slope Survey, 1996-2001.

Average 1996-2001 numbers of: (Total divided by 5 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
82	5,776			

AFSC Triennial Survey, 1980-2004.

Average 1980-2004 numbers: (Total divided by 9 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
447	21,635	55		

Sharpchin Rockfish

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1977	14		1993		
1978		1	1994		
1979	3	1	1995		
1980			1996		
1981			1997		
1982	13		1998		
1983	135		1999		
1984	90		2000		
1985	224		2001	1	
1986	26		2002	2	
1987			2003		
1988			2004		
1989			2005	27	
1990			2006		
1991	1		2007	2	
1992			TOTAL	538	2

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	56	82
1979							1		1		1								
1982					1	3		2	7										
1983					2	23	10	24	64	16	3	2							
1984					4	16	11	19	29	10	1								
1985				1	9	34	14	31	54	58	5	2	1	4					
1986					4	25	25	22	36	17	4	1							
1987				3	13	44	46	41	83	49	6		1	2	2	1			
1988				1	13	19	35	45	146	88	9								
1989				2	2	6	10	21	22	33	3	2							
1990				1	18	49	46	66	59	28	7	2	4						
1991			1		2	13	26	46	56	41	4			2			1		
1992				1	4	11	33	50	29	12	1	1		2	2				1
1993			1	2	6	16	19	42	30	9									
1994			1	9	79	156	103	93	74	34	8	3	2						
1995				6	23	71	116	63	57	31	9	2	3						
1996	1		2	15	22	53	141	104	67	25	5	11	5	4	3				
1997		1		2	9	38	130	120	64	12		1							
1998				1	17	23	77	61	25	6	1	1	2	1					
1999		1		2	38	52	34	21	10	3	1								
2000					2	8	6	14	5										
2001				3	13	16	3	3	1	1	1								
2002					9	14	13	5	2				1					1	
2005							7	17	2	1									
2007						1	2	1											

Recreational

Year	26	30
1978		1
1979	3	

Oregon Data

Commercial otoliths by year and 2-cm length bins (none aged)

Year	<24	24	26	28	30	32	34	36+
1995				2	8	6	6	4
1996	16	31	55	41	51	40	25	24
1997	21	94	144	105	69	48	32	13
1999	11	8	28	28	20	17	12	3
2001		2	4	20	3			
2003			4	5	3	1	2	
2004	1	4	14	11	11	44	45	16
2005				5	5	17	15	4
2007					4	7	10	1
2008				6	14	7	3	
2009			1		3	8	16	2
2010				1	13	18	12	2
2011	2	1	5	5	3	7	8	1

Washington Data

Commercial otoliths by year and 2-cm length bins (none aged).

Year	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46
2003	2	4	4	2	2	5	1	1								
2010						1						1	1			
2011					1	1	5	5	13	7						
2012			1	1				1	1		1					

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	<14	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	>54
1996				3	4	11	42	65	170	160	109	39	8			1			
1997				1	8	3	15	73	215	196	126	42	6						
1998		1		1	3	6	17	49	92	165	94	27	14	2	3			1	
1999					3	8	13	16	30	32	20	6		1					
2000			1		1	4	8	24	22	26	9	2							
2001				1	2	3	11	37	48	42	19	5			1				
2002	1		2	8	16	56	85	105	141	141	73	21		1		1			
2003		2	4	5	9	50	39	32	101	77	16								
2004						1	4	1											
2005							1				1								
2006							2	1		4	2								
2007									3	1	5	1	1						
2008					1						1								
2009							1					1							
2010							1					1			1		1		
2011						1	1	5	5	13	7			1					
2012		1	8	10	8	13	29	86	80	52	64	21	3	1					

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	Lengths	Weights	Age structures	Age reads	Stomachs	Ovaries	Maturities
40	1,140	384	395		136		

NWFSC Slope Survey, 1998-2002.

NWFSC Slope Survey (1998-2002)				
Average 1998-2002 numbers of: (Total divided by 5 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
17	2			

AFSC Slope Survey, 1996-2001.

Average 1996-2001 numbers of: (Total divided by 5 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
22	510	6	6	

AFSC Triennial Survey, 1980-2004.

Average 1980-2004 numbers: (Total divided by 9 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
76	1,756	142	120	

Stripetail Rockfish

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1976		40	1995		
1977	130	40	1996		
1978	137	24	1997		
1979	48	6	1998		
1980	41	4	1999		
1981	12	2	2000		
1982	142	6	2001	29	
1983	247	3	2002	3	
1984	294		2003		
1985	339		2004	10	
1986	9		2005	9	
1987	1		2006	7	
1988			2007		
1989			2008		
1990			2009	13	
1991			2010		
1992			2011	1	
1993			TOTAL	1472	125
1994					

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1978			3	4	2		2	9	13	46	39	11			2	
1979		1	4	7	12	5	2	7	34	41	24	2				
1980			1	2	3	2	1	7	19	14	2	1	1			
1981							1	1	5	2	2					
1982	1			1	2	3	5	13	30	52	43	1				
1983					1		1	9	47	116	71	9		1		
1984			2	4	6	5	4	8	45	127	85	7		1		
1985				4	5	6	22	39	74	120	93	9	1			
1986				1	3	4	15	24	58	89	52	1				
1987				5	1	9	13	29	37	66	45	1	1			1
1988						4	5	6	23	19	10	4				
1989					1	3	17	18	26	30	11	1				
1990		1	1	2	1	7	4	21	31	19	8	3				
1991			3	2	1	2	8	22	27	10	7			1		
1992			2		1			7	15	8	3					
1993		1		1	3	7	19	34	32	13	2					
1994			3	3	5	26	61	88	60	27	8	3	1			
1995				1	5	9	26	40	43	23	5					
1996		1		1	1	2	16	30	31	22	7					
1997		1	5	2	1	3	31	35	28	11	1					
1998		1	1	2	11	31	30	68	59	29	8	1				
1999			1	5	3	23	46	55	26	12	1					
2000					1	2	6	5		2						
2001		1		2		8	41	24	11	1						
2002				1		3	8	5	5	1						
2003								1								
2004		3	3	2	1	1										
2005				1		7	5	3	4	1						
2006								3	2	2						
2007						1		3	4	4	1					
2008							2		1							
2009					1	2	7	7								
2010									2							
2011							1									
2012		1	2	2	3	1	7	8	1		1					

Recreational

Year	20	22	24	26	28	30	36
1978	1	3	3	2	6	1	1
1979				4	4	4	
1980			1				
1981					1		
1982			1				

Oregon Data

Commercial otoliths by year and 2-cm length bins (none aged)

Year	20	22	24	26	28	30	32
2001				4	11	2	
2005				5	13	4	
2006		1	1	8	9	2	
2007				1			
2008	3		2	11	12	3	
2009				24	9	1	
2011		38	19	24	12	15	3

Nearshore research otoliths by year and 2-cm length bins (none aged), 2011 and 2012 data are preliminary.

Year	Aged?	20	22	24	26	28	30	32	34	36	38
1998	no	1						1	1		1

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	**Lengths**	**Weights**	**Age structures**	**Age reads**	**Stomachs**	**Ovaries**	**Maturities**
139	3,117	559	560		124		

NWFSC Slope Survey, 1998-2002.

NWFSC Slope Survey (1998-2002)				
Average 1998-2002 numbers of: (Total divided by 5 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
38	20			

AFSC Slope Survey, 1996-2001.

Average 1996-2001 numbers of: (Total divided by 5 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
18	1,246			

AFSC Triennial Survey, 1980-2004.

Average 1980-2004 numbers: (Total divided by 9 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
111	4,483	28	7	

Vermilion Rockfish Complex

NOTE: The data for vermilion rockfish represent a complex of at least two species in southern California, vermilion rockfish (*Sebastes miniatus*) and sunset rockfish (*S. crocotulus*).

California Data

Otoliths (none aged)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1975	428		1994		
1976	553		1995		
1977	230	53	1996		
1978	17	39	1997		
1979	20	34	1998		
1980	15	58	1999		
1981	13	14	2000		
1982	53	56	2001	21	
1983	119	20	2002	1	
1984	129	25	2003	9	
1985	66	18	2004	2	
1986	19	4	2005	1	
1987			2006	8	
1988			2007	12	
1989			2008	2	
1990			2009	4	
1991			2010	4	
1992			TOTAL	1726	321
1993					

a/ Data not in RecFIN.

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	80
1978											1		1	2	5	7	5	6	2	1	1					1					
1979										1	1	5	27	32	39	49	58	94	82	48	29	31	11	5	1	2	2	1			
1980											3	18	44	82	112	105	111	106	86	59	39	33	8	6							
1981									4	7	29	72	109	127	122	97	118	92	49	43	32	5	2	1							
1982									2	1	3	9	33	71	65	56	47	50	28	30	17	7	3	1			1				
1983							1	3	2	2	4	4	11	11	23	27	27	22	30	15	13	9	5	8	7	13	10	4	5		
1984			1			7	4	12	10	6	3	10	26	22	30	26	22	27	27	27	8	7	7	4	1	2					
1985					2	3	2	3	2	4	5	14	13	39	44	66	63	52	52	45	37	19	7	7	2						
1986						4		5	7	11	10	18	30	56	68	80	65	66	54	43	24	14	7	2	3	4	1	2	1	1	1
1987							5	4	2	5	6	6	17	31	24	31	37	20	24	17	10	7	1	1							
1988					1			2	7	12	15	15	20	19	15	18	16	14	6	4	2	3	2	1							
1989					3	5	9	25	23	29	32	23	40	23	50	45	47	35	12	13	6	2	1	1							
1990					1	1	3	7	5	14	23	50	33	14	11	4	8	3	2	7	2	1	1	2							
1991					2	1	3	5	4	15	12	15	27	14	9	4	4	2	1	2	2		2	2	1	1					
1992			1	3	16	44	39	23	30	42	76	80	83	45	38	35	25	26	18	15	13	5	3		1						
1993			7	6	11	31	49	51	81	117	211	260	213	166	95	70	57	41	16	7	12	4	3								
1994	1	2	6	6	14	24	19	33	25	47	78	96	98	97	65	56	38	22	22	14	13	6	5	2							
1995			3	4	7	10	23	38	50	72	120	172	176	139	89	50	57	34	14	3	12	3	3	2							
1996			6	7	9	12	25	33	42	64	76	117	155	173	143	97	85	43	31	9	7	3	3	2							
1997		1	1	12	13	27	33	46	62	80	121	130	128	151	150	103	65	45	26	12	9	4	5	2							
1998				8	9	19	40	60	76	87	144	146	154	122	108	109	76	50	22	12	2	4	4								
1999		1	1	2	7	14	34	59	71	85	81	78	67	62	71	46	39	25	16	3	1										
2000	1				1		1	14	14	30	33	27	27	11	15	5	7	8	4												
2001			1			1	2	9	9	18	17	27	20	16	13	16	7	7		3		1									
2002					10	30	22	20	16	17	22	19	9	8	5	4		2	2	1			1								
2003								2	1	1	7	10	1	5	4	6	4	4	3	1				1							

Year	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	80
2004							1		1	1	3	11	9	11	10	13	5	5	5	2											
2005					1	1			1	1	5	3	5	10	14	9	8	7	1	4		1		1							
2006								2	6	18	24	28	14	18	18	9	11	5	1	2					1						
2007						2	5	2	7	14	22	33	33	41	43	22	19	7	3	2	1										
2008				2	1	6	4	7	7	11	19	18	22	28	13	17	13	6	4	1	1			1							
2009				1	6	14	13	8	4	14	15	16	27	36	41	26	20	8	5	2	1										
2010				3	4	11	5	15	22	13	11	7	8	18	12	8	5	2	1		2										
2011	1	3	10	16	14	35	43	28	24	13	4	10	6	11	4	8	4	3	1												
2012	1		2	6	12	8	20	23	26	20	15	12	3	3	4	4	4	4	1	2											

Recreational

Year	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	96
1978				1		2		1		2	4	1	8	2	3	4			2	1	
1979			1					7	4	2	8	8	4	10	12	12	11	3	1		1
1980			1			1	3	5	6	2	4	8	3	3	2	3					
1981							4	1	2	2	2	3	5	3	1	1					
1982	1	2		4				2	4		4	4	3	7	4	1			2		
1983		1	1	2	1		2	1	2		5	1	3	1	1						
1984		1	3	1	1	2	1	3	1	1	3	1	2	1	3						

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, northern and central California (Fort Bragg to Morro Bay) data.

Year	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	Total
1987						5	1	1	4	3		2	3	11	4	8	6	4	7	2	2	1								64
1988			1	19	59	81	116	99	53	47	41	24	32	13	14	17	14	12	4	13	6	6	1		1	1				674
1989			1	4	25	90	216	246	191	131	82	57	37	28	22	26	27	23	19	23	11	2	5		5	2			1	1274
1990				3	2	7	40	71	124	114	57	49	35	25	15	9	5	9	11	4	3									583
1991			2	4	5	5	8	12	14	31	42	68	65	33	24	19	17	11	4	7	6	5	6							388
1992			1	2	8	14	16	21	21	42	110	195	256	183	92	60	34	35	33	20	14	7	4	4		1				1173
1993			3	9	16	31	38	40	62	57	88	94	173	152	97	69	35	41	26	25	5	10	4	3	1					1079
1994	1		1	3	7	18	29	57	41	68	52	74	63	96	77	65	45	25	10	12	3	5			1					753
1995	1	1	6	6	15	14	38	48	76	89	106	99	82	98	96	60	49	24	31	16	9	2		1	1					968
1996		2	2	9	16	29	31	42	43	44	53	55	53	61	42	39	25	21	23	19	12	6	2	1						630
1997		3	4	21	75	90	106	95	103	89	107	131	119	98	79	58	30	26	18	10	10	4	1				1			1278
1998			4	5	13	27	64	97	75	66	52	53	52	40	31	27	19	14	8	9	2	2	2							662
Total	2	6	25	85	241	411	703	829	807	781	790	901	970	838	593	457	306	245	194	160	83	50	25	9	9	4	1	0	1	9526

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, southern California data.

Year	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	Total
1975		9	41	96	110	88	103	161	151	165	78	49	48	37	53	40	36	34	10	9	15	4	1	1	1	1			1341
1976	1	4	16	46	80	123	141	145	175	156	140	89	85	58	54	48	44	37	25	10	10	12	8	6	5	1	1		1520
1977		1	14	34	45	91	140	217	196	170	145	97	62	68	58	58	66	80	92	110	84	75	44	36	40	18	17	5	2063
1978	1		1	8	22	40	78	106	163	187	192	182	143	126	117	122	105	95	63	68	64	83	64	37	20	8	4		2099
1986	3	8	37	78	164	192	130	95	85	39	45	34	31	32	24	27	29	29	13	15	15	9	5	4	2	1			1146
1987		2	16	39	74	201	355	334	308	256	159	95	43	42	32	42	30	26	10	11	6	5	4	3	3	2			2098
1988	1		9	23	33	79	147	285	434	459	313	263	159	70	49	58	38	33	17	12	6	7	5	5	2	2			2509
1989	4	4	15	44	28	23	51	107	161	254	327	303	214	137	90	47	39	33	27	20	9	5	5	2		1			1950
Total	10	28	149	368	556	837	1145	1450	1673	1686	1399	1112	785	570	477	442	387	367	257	255	209	200	136	94	73	34	22	5	14726

Oregon Data

Commercial otoliths by year and 2-cm length bins (some aged)

Year	Aged?	No Length	<38	38	40	42	44	46	48	50	52	54	56+
1999	no		6	2	4			1	2	1		2	1
2000	no		10	9	16	9	4	3	5	5	3	2	2
2001	no		3	11	19	18	20	3	6	4		2	7
2001	yes		1	1	2	5	3	1	1				
2002	no		1	5	2	2	6	6	1	1		1	1
2002	yes		3	3		2		2		1	1		
2003	no				4	3	1	2	2				1
2003	yes		1	3	3	9	8	8	9	3	2	2	2
2004	no		1	6	2	2	3	2	1	2			
2004	yes		5	6	7	10	12	12	7	2	3		
2005	no		1	1	1	3	1	1	1		1		
2005	yes		1	1	5	6	6	5	8	6	3	3	3
2006	no				1	7	4	2		2	1		
2006	yes		1		1	3	5	5	9	10	1	1	3
2007	no			1	2	4	13	9	9	9	9	2	2
2008	no		2		1	2	2	9	3	8	5	1	5
2009	no		2	2	4	8	11	21	23	23	10	7	7
2010	no	1	1	1	3	3	6	8	10	25	12	10	8
2011	no		12	15	12	7	13	9	29	30	33	20	22

Recreational otoliths by year and 2-cm length bins, 2011 and 2012 data are preliminary.

Year	Aged?	No Length	40	42	44	46	48	50	52	54	56	58	60	62	64	66
2005	yes		92	120	158	261	277	242	142	91	37	9				
2008	yes	1											10	1	3	5
2009	yes											12	5			

Recreational length frequencies by 2-cm length bins.

Year	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
2005				3	2	4	9	12	12	15	20	18	4	3	1	2	2	1		1
2006	1	1	2		3	13	19	23	15	29	30	22	10	7	5	4	1		1	
2007	2			1	4	6	18	30	25	51	35	15	7	7	3	1	2			2
2008			2	4	7	7	10	28	43	68	53	49	23	16	11	2	9		2	2
2009					4	5	3	13	24	33	32	33	24	11	3	4				
2010		4	4		4	2	5	5	13	27	24	35	25	8	1	2				
2011	1		1	3	5	10	5	4	12	21	38	34	24	21	7	4	1			
2012	1		1	1	2	10	23	5	14	17	45	36	25	18	6	2				

Nearshore research otoliths by year and 2-cm length bins (none aged), 2011 and 2012 data are preliminary.

Year	Aged?	No Length	34	36	38	40	42	44	46	48	50	52
1998	no	1										
1999	no		1	2	2	3	3		2			
2000	no	1										
2001	no		1					1				1

Washington Data

Recreational otoliths by year and 2-cm length bins (some aged).

Year	Aged?	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1998	yes			1	1		3			1		2		3	2
1999	yes					1	2	3	3	5	2	5	2	10	6
2000	yes					1		3	1		1	1	3	2	
2001	no														2
2001	yes		1	1						2					2
2002	yes					1						1		1	
2004	no					1	1	2	1	1	1		1	2	5
2005	no		2		2		3	1	3	2	1		4	4	4
2006	no			1	1	1	1	4	5	2	4		3	2	3
2007	no	1	1		3	1	2	2	4	2	5	2	6	3	4
2008	no		1	2	3	2	2	1	3	2	1	2	4	2	3
2009	no				1	1		1	2	3					1
2010	no							2					1		
2011	no				1	1	1	2	2	2		1		1	
2012	no				1			1	3	4	2	2	2		2

Raw length frequency distributions by fishery, year, and 2-cm length bin

Recreational

Year	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1993						2			1					
1998			1	1		3			1		2		3	2
1999					1	2	3	3	5	2	5	2	10	6
2000					1		3	1		1	1	3	2	
2001		1	1						2					4
2002				1	2				1	1	1		2	
2003				1		1							1	1
2004					1	1	2	1	1	1		1	2	5
2005		4		5	3	4	1	7	4	3	1	7	6	10
2006			1	3	2	3	4	10	6	6	2	5	6	8
2007	3	1		5	4	8	4	4	6	5	5	11	5	8
2008		1	2	4	5	3	1	3	3	2	4	6	3	6
2009				1	2	2	2	4	3					1
2010			1				5	1				2		
2011				1	2	1	2	7	10	2	3	2	4	1
2012			1	1		1	3	6	9	10	4	4	1	12

NWFSC Hook-&-Line Survey Data

Lengths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
16-17								1		1
18-19	1						3	1	4	9
20-21	1					4	2	15	5	27
22-23	2			2	1	3	6	24	11	49
24-25	2	1	5	7	3	5	13	19	13	68
26-27	4	8	6	10	10	6	14	28	28	114
28-29	13	17	11	13	15	10	28	62	44	213
30-31	19	23	16	20	13	31	19	49	46	236
32-33	38	29	36	30	32	29	16	53	57	320
34-35	36	48	38	56	37	54	28	63	59	419
36-37	54	69	70	58	65	49	32	61	49	507
38-39	88	61	59	103	106	55	63	65	65	665
40-41	103	104	77	116	127	116	90	88	79	900
42-43	65	102	90	128	120	147	141	170	106	1069
44-45	91	78	64	98	106	155	176	194	172	1134
46-47	99	65	31	96	94	165	219	153	121	1043
48-49	70	62	23	68	68	111	149	121	130	802
50-51	30	73	24	33	26	56	87	77	88	494
52-53	26	53	19	23	27	37	32	31	66	314
54-55	5	40	14	25	10	25	17	23	30	189
56-57	4	29	2	17	4	9	17	11	8	101
58-59	3	4	2	9	1	3	9	8	10	49
60-61		4		1			3	2	1	11
62-63	1	1			1		1	2		6
64-65					1					1
Totals	755	871	587	913	867	1070	1165	1321	1192	8741

All Otoliths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
16-17								1		1
18-19	1						3	1	4	9
20-21						4	2	13	5	24
22-23	2			2	1	3	6	23	11	48
24-25	2	1	5	7	3	5	13	17	13	66
26-27	3	8	6	10	10	6	14	26	28	111
28-29	11	17	11	13	15	10	26	62	42	207
30-31	14	23	16	20	13	31	19	48	46	230
32-33	33	29	36	30	32	29	16	53	57	315
34-35	31	48	37	56	37	54	28	63	59	413
36-37	44	69	70	56	64	49	32	61	49	494
38-39	79	61	59	103	106	55	63	65	65	656
40-41	84	99	77	116	127	116	90	88	79	876
42-43	54	99	89	128	120	147	140	170	106	1053
44-45	73	71	62	98	106	155	176	192	172	1105
46-47	84	60	31	96	94	164	218	153	119	1019
48-49	62	58	23	68	68	111	149	121	130	790
50-51	29	63	24	33	26	56	87	77	88	483
52-53	24	48	19	23	27	37	32	31	66	307
54-55	4	39	14	25	10	25	17	23	30	187
56-57	4	21	2	17	4	9	17	11	8	93
58-59	3	3	2	9	1	3	9	8	10	48
60-61		4		1			3	2	1	11
62-63	1	1			1		1	2		6
64-65					1					1
Totals	642	822	583	911	866	1069	1161	1311	1188	8553

Aged Otoliths

Age (years)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
1	1									1
2	5	1			2	6	7	2		23
3	1	8	14	13	6	11	28	10		91
4	6	5	10	8	14	19	4	29		95
5	9	8	5	13	7	22	6	25		95
6	7	11	3	10	3	6	12	6		58
7		8	4	6	3	8	9	4		42
8		5	6	5	6	7	9	3		41
9	3	3	6	6	4	21	9	4		56
10	1	6	2	5	4	21	28	4		71
11	5	12	2	5	3	15	17	3		62
12	3	8	2	2	1	10	21	4		51
13	5	7		9	2	6	13	4		46
14	5	5	7	5	6	12	8	1		49
15	6	10	3	10	5	11	8	6		59
16	7	22	3	5	7	10	12			66
17	3	11	4	8	3	4	11	2		46
18	2		3	10	6	7	4	2		34
19	2	3		4		5	3	1		18
20		2	2	3	1	6	3	1		18
21		6		3	1	4	4			18
22			3	4	2	1	3			13
23	2	1	2	1	3	2	4			15
24						2	1			3
25	1			2		4	3			10
26		1			2		3			6
27		2			1	1	4			8
28				1						1
29					1		1			2
30				2		3				5
31				1	1		1			3
32							1			1
33	1	1					1			3
35		1			1					2
39							1			1
42	1		1							2
44		1								1
45		1								1
46							1			1

Age (years)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
49	1									1
51		1								1
52							1			1
54		2								2
58							1			1
61							1			1
63	1									1
Totals	78	152	82	141	95	224	243	111	0	1126

Maturity

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
18-19							3		1	4
20-21							1		2	3
22-23							3	2	4	9
24-25							5	2	3	10
26-27						1	7	6	4	18
28-29							12	19	8	39
30-31						2	7	16	18	43
32-33						2	2	13	13	30
34-35						9	10	11	13	43
36-37						5	14	11	11	41
38-39						3	17	10	19	49
40-41						9	21	7	7	44
42-43						4	32	8	13	57
44-45						8	26	8	5	47
46-47						15	22		10	47
48-49						12	24		5	41
50-51						6	15		4	25
52-53						3	3		4	10
54-55						7	7		1	15
56-57						3	8			11
58-59						1	4			5
60-61							1			1
Totals	0	0	0	0	0	90	244	113	145	592

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	**Lengths**	**Weights**	**Age structures**	**Age reads**	**Stomachs**	**Ovaries**	**Maturities**
9	117	76	76			7	

AFSC Triennial Survey, 1980-2004.

Average 1980-2004 numbers: (Total divided by 9 years)				
Tows > 0	**Lengths**	**Weights**	**Age Structures**	**Age reads**
3	52			

Yellowtail Rockfish

California Data

Otoliths (some aged – see table on next page)

Year	Comm.	Rec. a/	Year	Comm.	Rec. a/
1973	89		1993	233	
1974			1994	441	
1975			1995	2	
1976			1996		
1977	80	1943	1997		
1978	135	877	1998		
1979	25	164	1999		
1980	105	436	2000	33	
1981	199	240	2001	180	
1982	265	560	2002	91	
1983	1033	370	2003	59	
1984	1517		2004	64	
1985	883	358	2005	79	
1986	624	7	2006	93	
1987	781		2007	81	
1988	302		2008	74	
1989	698		2009	6	
1990	346		2010	4	
1991	515		2011	29	
1992	537		TOTAL	9603	4955

a/ Data not in RecFIN.

Yellowtail rockfish, number of aged otoliths from commercial fishery, by year and age.

Year	Age (years)																					
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
1980			3	3	4	9	8	11	14	21	6	16	10	8	7	5	1			1			
1981			2	3	8	11	8	8	23	15	16	22	18	12	10	11	1	2	2	1			1
1982		1	1	21	10	21	26	7	14	28	23	18	15	16	18	8	12	13	10	5	1	3	2
1983			10	14	50	40	41	31	21	29	25	15	24	12	20	18	14	17	11	17	14	10	7
1984	1	4	19	37	63	141	123	98	38	31	34	17	22	36	19	14	22	10	19	14	11	19	15
1985		1	22	23	44	39	50	49	34	25	26	26	30	32	48	22	33	23	18	18	23	14	13
1986		1	12	32	17	22	42	47	42	43	28	26	17	30	39	29	16	27	31	21	21	14	17
1987		1	7	21	27	22	6	12	11	7	4	4	2	4	3	2	2	3	6	2	3		3
1988	1	3	3	10	22	27	14	14	10	14	6	7	5	7	3	4	4	2	2	4	1	2	3
1989	2	31	71	38	48	89	68	55	39	32	30	26	26	9	9	15	10	10	8	13	10	11	6
1990			29	47	31	24	53	47	29	26	20	20	15	11	7	6	2	2	3		5	3	4
1991		4	26	64	125	34	19	56	39	18	16	22	13	15	8	9	3	1	9	5	7	6	5
1992	2	3	12	20	61	127	13	30	55	30	16	17	15	3	15	14	7	8	5	10	2	6	7
1993		1	4	9	9	18	24	3	10	10	7	5	8	6	5	4		1	1	2	2	1	1
1994			3	25	30	21	59	66	2	13	38	22	8	11	16	2	1	7	2	1	1	6	1
1995			4	11	13	15	13	20	29	8	10	11	8	5	4	1	1	1			2	3	3
1996	1	3	52	79	63	56	51	52	44	49	23	22	15	10	11	7	4	5	2	6	2	2	1
1997			2	9	14	22	25	30	21	28	18	13	12	10	9	3	4	7	2	5	4	1	1
1998				1	8	12	13	16	19	15	25	13	12	4	7	3	1	2	3	2	2	1	2
1999			3	26	12	34	28	21	17	17	7	22	20	5	7	3	9	4	2		3		1
2000			1		9	6	7		4	4		2		1				1					
2001		1	3	5	14	27	12	4	40	18	13	7	3	1	7	9	2	3	2		1	1	
2002	12	24	8	2	5	4	9	3		1		1		1		1							

Yellowtail rockfish, number of aged otoliths from commercial fishery, by year and age, continued.

Year	Age (years)																						
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	45	46	48	49	TOTAL
1980																							127
1981																							174
1982	2						1																276
1983	4	7	5	3	2	2	3	3	1	2		1		1									474
1984	4	1	2	3	4	1	3	1	2	1	2	1	4	1	2		2	1	1	2	1		846
1985	5	3	2	2	3	2	4	2			1		1			1	1	1	1				642
1986	21	11	4	4	4	7	7	5	7	5	6	2	2	2	1	1	1						664
1987	1	2	1	2	1		2					1											162
1988	2	1	2					2	1								1						177
1989	7	8	2	5	1	3		1	1		1	1						1					687
1990	4	2		2	2	2	1			1	1				1								400
1991	3	2	4	6	3	1		2	1						1							1	528
1992	9	4	5	4	6	4	7		4	2	2	1			1		1					1	529
1993		1	2		1		2	2	1			1											141
1994	1	1	3	1	7		3	3	1														355
1995	1	1		1		1	1																167
1996	1	6	1	2	1	2					1			1								1	576
1997	2		1	1				1															245
1998			2	3		1	1			1													169
1999		1			1	3		1				1	1		1	1							251
2000																							35
2001	2			1	1						1				1								179
2002																							71

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	64
1978					1		1		6	22	26	42	49	38	23	31	16	13	9	7		
1979						1	4	3	6	8	18	31	28	24	17	17	4	4	1	1		
1980								3	4	2	7	25	25	24	16	17	11	6	3			
1981						2		7	6	18	34	55	61	45	55	22	9	5	2			
1982					1	2	1	4	12	21	31	57	65	54	37	26	13	6				
1983						6	11	15	16	43	75	113	113	87	49	27	13	2	5	1		
1984					2	10	21	31	40	76	128	190	181	118	78	48	19	6	2			
1985					1	3	16	35	37	79	110	195	244	177	131	64	42	9	2			1
1986		1			3	12	10	22	41	51	99	136	157	114	70	51	17	3	1			
1987				1	2	3	5	16	35	57	52	45	45	36	20	8	3	1				
1988				1	2	4	6	20	57	44	36	53	39	20	21	14	3	1				
1989				1	4	34	32	51	111	132	126	133	100	89	48	24	13	3				
1990					3	18	35	47	80	76	87	74	71	50	26	18	6	1				
1991		1		1	8	25	67	99	131	158	150	110	79	76	38	18	7	1			1	
1992		8	42	71	99	128	245	319	375	475	470	411	284	192	141	57	14	6	1	1		
1993		9	37	82	136	191	193	220	272	277	199	201	103	81	40	11	9	1		1		
1994	3	23	17	31	60	171	288	339	418	435	460	365	275	156	65	37	14					
1995			4	12	22	67	103	135	167	187	166	150	95	45	38	20	5	1	2			
1996			4	25	58	95	129	144	199	201	207	159	129	70	50	9	8	2				
1997	1	1	8	9	29	41	85	112	137	172	164	127	126	72	38	14	6	1				
1998					6	43	76	129	170	225	203	184	158	80	35	25	7	2		1		
1999		3	4	15	15	29	64	85	83	94	108	75	46	24	11	2						
2000					1	9	18	18	44	68	64	38	27	13	3							
2001						8	7	7	27	53	87	62	48	30	17	6	1					
2002			12	1	14	11	9	6	16	14	7	14	2	3								
2003						2	3	1	4	6	13	16	9	11	6	2	1	1				
2004						2	5	6	3	4	15	13	24	9	10	4						

Year	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	64
2005					1	2	2	5	8	16	13	19	15	14	5	5	2		1			
2006		1		3	5	5	11	14	14	13	27	30	19	15	21	3	2					
2007							5	17	25	23	22	19	39	25	12	5	4					
2008				5	3	5	2	5	11	10	12	18	13	15	10	8	1		1			
2009				2	1	2	1	2	1	14	21	34	17	18	5	7	1	1				
2010								1		1	3		1	1								
2011					2	6	13	15	20	7	7	1	1	2								
2012		1		1	19	31	29	24	14	15	16	6	2	2	1	1						

Recreational

Year	10	16	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	98
1978			3	8	17	42	52	54	42	47	87	156	292	354	311	179	74	29	2	5	1	1	1	13
1979	1			7	27	37	79	93	103	91	86	153	251	304	248	216	100	46	13					4
1980				3	22	40	63	115	85	106	80	100	130	177	152	87	57	14	7	4				
1981			3	5	13	15	24	45	52	85	63	55	108	117	117	62	63	17	4	2				
1982				3	7	34	71	104	90	91	103	117	148	173	185	126	83	30	10	6				
1983		1	2	3	6	29	42	72	61	72	83	118	206	209	137	83	48	19	6		1			
1984				10	24	27	26	33	30	27	33	52	60	109	103	67	36	14	5	2				

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, northern and central California (Fort Bragg to Morro Bay) data.

Year	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**54**	**56**	**58**	**Total**
1987	4			2	9	72	120	88	52	79	204	226	183	61	34	22	27	20	19	6	1	1			1230
1988			1	19	67	198	312	552	681	640	367	315	306	218	130	105	86	57	34	22	16	3			4129
1989				9	35	206	533	851	934	1315	1186	661	511	494	372	232	168	160	104	56	31	10	1		7869
1990			2	2	14	41	167	340	438	355	312	209	164	152	98	62	41	33	6	12	3				2451
1991				1	32	113	187	270	374	442	362	305	278	286	280	196	151	94	75	40	14	5	1		3506
1992		1		7	25	144	490	760	892	940	740	648	619	578	439	377	256	140	90	39	18	5	1	1	7210
1993			5	23	49	177	397	732	893	869	653	468	382	372	351	261	175	110	63	26	14	2			6022
1994				11	69	251	453	662	787	716	612	392	330	268	210	195	116	74	25	5	1				5177
1995			1	27	135	364	824	1422	1337	1105	875	750	584	531	452	310	198	100	45	14	3				9077
1996		1		5	58	210	419	617	805	913	861	567	433	443	353	303	214	118	60	11	2	1		1	6395
1997		1	3	13	48	161	433	747	893	869	1103	1229	1299	1210	977	657	440	236	75	33	6				10433
1998				2	18	43	134	319	447	487	409	566	761	781	569	308	160	88	25	8	1	1			5127
Total	4	3	12	121	559	1980	4469	7360	8533	8730	7684	6336	5850	5394	4265	3028	2032	1230	621	272	110	28	3	2	68626

Length frequencies by 2-cm length bins from the CDFW recreational on-board observer program, southern California data.

Year	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**42**	**44**	**46**	**48**	**50**	**52**	**Total**
1975	1	6	4	12	15	38	18	5	1		2		3			2			107
1976		3	20	36	22	9	5	4	1	1	1								102
1977		3	10	19	21	16	23	4	3	5	14	15	15	22	23	6	5	5	209
1978	2	3	9	14	16	8	10	1	1	1									65
1986		1	8	24	8		2	6	8	2	5	10	19	14	15	2	1	1	126
1987			2	2	1	4	2	1	8	7	11	10	9	2	3	4	3		69
1988			1	1	1				1	2	1								7
1989			3	4	9	4	8	7	4	1	1	1	1	2	1		1		47
Total	3	16	57	112	93	79	68	28	27	19	35	36	47	40	42	14	10	6	732

Oregon Data

Commercial otoliths by year and 2-cm length bins (some aged)

Year	Aged?	No length	< 36	36	38	40	42	44	46	48	50	52	54+
1972	no				1	5	8	21	15	4	7	6	
1972	yes		3	7	26	85	185	226	182	118	83	55	20
1973	no						1	7	10	22	10	4	3
1973	yes			1	4	18	44	65	71	60	34	20	1
1974	no			1			1	1			1		1
1974	yes		6	4	5	21	55	75	55	17	7	13	
1976	no		4	21	52	44	58	60	49	54	36	14	9
1976	yes		2	6	18	27	11	14	9	7	3	2	
1977	no					1	5	3	3	2	1	2	2
1977	yes		2	4	9	48	118	193	242	174	122	82	36
1978	no		4	2	13	9	12	18	17	16	12	7	1
1978	yes		8	5	10	27	46	59	84	64	42	15	13
1979	no		6	13	21	24	40	80	60	36	16	9	8
1979	yes		10	20	46	53	98	163	162	112	65	29	29
1980	no								1	1	3		
1980	yes		14	21	23	29	60	125	168	174	93	55	31
1981	no			1	1	1	4	4	1	1	4	2	
1981	yes		42	52	79	113	120	179	158	118	74	33	13
1982	no		78	73	47	42	47	55	67	52	31	18	11
1982	yes		91	105	143	191	210	223	260	171	94	66	26
1983	no				1	2			1			1	
1983	yes		10	12	31	45	46	43	42	35	12	11	7
1984	no		3	6	21	23	22	14	11	5		1	1
1984	yes	1	100	103	136	226	216	177	122	55	30	22	4
1985	no		4	2	21	68	93	106	80	51	25	12	3
1985	yes		6	48	117	314	402	499	393	231	88	45	44
1986	no		2	2	5	30	72	66	95	60	21	11	3
1986	yes	1	18	14	54	155	248	264	263	180	106	50	28
1987	yes		92	85	118	224	352	413	383	213	96	45	20
1988	yes		88	55	119	179	323	298	245	196	103	45	19
1989	no						1	1					
1989	yes		93	85	101	183	313	386	324	300	207	87	24
1990	no		1		3		1	1	1	1	1		1
1990	yes		90	107	152	181	305	340	243	189	123	45	17
1991	no				1		2	2	1				1
1991	yes		22	83	111	144	191	242	184	130	113	54	15
1992	no			2	4	5	13	17	4	2	15	4	
1992	yes		54	99	225	383	480	447	298	220	145	57	16

Year	Aged?	No length	< 36	36	38	40	42	44	46	48	50	52	54+
1993	no				4	11	7	9	5	3	2		
1993	yes		63	93	189	360	401	355	232	152	84	39	13
1994	no					2		1		1			
1994	yes		63	123	302	436	534	452	331	230	95	57	14
1995	no		1	3		5	5	7	5	8	2		3
1995	yes		98	159	285	401	426	380	249	146	85	23	11
1996	no		14	11	13	16	9	4	1				
1996	yes		217	197	251	383	420	357	221	105	60	28	12
1997	no		84	48	50	51	27	25	29	19	16	7	3
1997	yes	2	332	317	401	532	631	552	415	283	194	73	32
1998	no	15	26	24	50	38	48	41	33	12	11		1
1998	yes		198	282	422	511	534	445	271	153	71	23	7
1999	no		35	26	28	32	35	25	10	3	1		
1999	yes		158	314	600	658	662	474	304	145	63	27	8
2000	no		18	21	25	26	24	14	10	7		2	
2000	yes	2	147	207	373	621	614	429	250	141	63	10	6
2001	no		4	16	17	13	16	13	3		1		
2001	yes		38	136	319	491	590	519	393	205	95	41	16
2002	no		1	2	2		4	1	7	10	6		
2002	yes		68	101	214	290	278	219	156	107	41	21	10
2003	no		6	6	20	28	19	13	10	9	4	2	
2003	yes		7	5	22	55	105	119	99	99	50	20	3
2004	no		1	1		5	9	9	14	10	8	6	
2004	yes		104	94	108	134	158	187	169	147	106	43	28
2005	no		1	2	2	17	14	14	11	13	9	4	1
2005	yes		18	40	65	113	147	151	134	92	75	37	20
2006	no		5	9	2	4	2	4		1	2		
2006	yes		59	83	100	134	215	157	175	139	101	47	12
2007	no		17	27	52	71	76	118	96	104	91	52	17
2007	yes		32	16	21	28	50	87	66	60	62	37	16
2008	no		5	3				1				1	
2008	yes		19	17	29	41	53	112	100	86	56	37	14
2009	no		6	3	7	24	23	48	52	21	19	12	2
2009	yes		9	7	17	52	68	111	127	92	77	51	27
2010	no		4	4	10	12	45	114	119	83	81	56	30
2010	yes		14	9	27	68	153	209	187	163	130	81	39
2011	no		8	9	14	21	67	112	142	129	155	105	49
2011	yes		50	8	21	56	102	178	165	165	142	92	26

Recreational otoliths by year and 2-cm length bins (none aged), 2011 and 2012 data are preliminary.

Year	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
1999		2	15	25	24	29	37	54	49	36	28	11	7	5	2	2
2000	1	4	12	22	17	26	25	21	13	18	12	10	6	5		
2001								1	4	3	2	1	1			

Recreational length frequencies by 2-cm length bins.

Year	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
1999		2	15	25	24	29	37	54	49	36	28	11	7	5	2	2
2000	1	4	12	22	17	26	25	21	13	18	12	10	6	5		
2001								1	4	3	2	1	1			

Nearshore research otoliths by year and 2-cm length bins (none aged).

Year	Aged?	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
1998	no	1			4	5	25	31	32	78	44	13	5	2	2		1	1
1999	no	1				5		3		7	5	1	2				1	
2000	no			1	2		11	2	3	3	5	2	2	3	1			
2001	no			11	23	4	13	60	36	6	2		1	1				

Washington Data

Commercial otoliths by year and 2-cm length bins (some aged).

Year	Aged?	<14	18	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1974	no							2	5	15	24	18	18	8	14	37	31	16	1	
1975	no							5	16	43	35	18	36	18	24	17	13	16	19	8
1976	no					3	2	7	23	28	43	76	237	314	469	663	466	219	176	50
1977	no								1		2	8	30	83	157	243	146	57	48	3
1978	no					1	1	14	32	47	66	73	110	159	229	263	107	74	44	9
1979	no				2	1		1	4	8	36	94	166	265	304	371	248	115	70	14
1980	no						2	8	12	51	115	174	337	499	772	866	595	321	173	30
1981	no						1	7	17	63	121	263	426	539	737	758	484	236	126	22
1982	no						2	18	26	66	179	374	460	523	572	563	380	178	129	26
1983	no						1	11	33	106	204	331	415	396	331	262	137	84	47	8
1984	no						2	4	29	69	165	277	476	597	538	465	311	187	57	23
1985	no					1	2	23	65	137	335	501	605	615	556	369	182	69	36	4
1986	no						3	1	11	23	53	166	362	544	638	565	376	172	67	11
1987	no						2	6	8	22	52	108	232	325	398	372	272	169	68	12
1988	no								9	18	42	79	137	252	351	319	240	120	74	9
1989	no							35	76	115	148	243	426	502	604	530	410	291	298	9
1990	no			1	1	6	8	5	7	19	59	94	178	311	419	318	238	141	58	12
1991	no								3	19	46	113	220	324	391	315	188	150	73	8
1992	no						1		6	30	66	152	223	300	321	256	181	119	85	10
1993	no						4	5	12	36	89	163	222	230	254	164	114	53	28	6
1993	yes							3	5	10	24	47	56	91	70	54	31	20	9	
1994	no							2	11	39	84	189	220	247	230	142	109	39	18	
1994	yes								3	17	29	49	77	99	68	37	27	14	2	
1995	no	1			1	1		7	21	60	130	187	218	251	251	177	106	76	30	8
1995	yes						1	4	6	16	30	53	72	86	79	65	35	21	11	2
1996	no	1						3	11	32	49	118	220	262	234	157	76	42	10	3

Year	Aged?	<14	18	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1996	yes							2	7	10	31	53	75	81	82	46	27	15	2	1
1997	no							2	10	29	58	115	153	236	256	196	114	52	27	16
1997	yes								1	9	27	30	53	73	77	55	24	11	16	2
1998	no							1	4	39	98	210	300	358	322	251	131	82	26	3
1998	yes								2	11	16	40	48	44	41	40	19	9	5	
1999	no	1					5		11	46	125	281	417	435	339	272	165	75	41	19
2000	no	1							1		4	5	25	35	30	17	9	7	5	1
2000	yes							5	17	35	95	194	442	485	426	232	148	72	36	6
2001	no											1	5	5	8	12	6	3	6	1
2001	yes					1	1		2	9	32	90	235	427	462	344	247	97	45	6
2002	no													4	1	2	1	2		
2002	yes								1	5	23	74	142	337	347	325	221	135	73	13
2003	no												1	3		2	4	1	1	1
2003	yes						2	7	11	19	36	72	154	245	307	263	249	149	83	19
2004	no													1	1	2				
2004	yes	1					1	3	9	14	34	47	93	210	387	313	309	188	127	18
2005	no											1			1	1		1		
2005	yes							1	1	8	24	44	91	157	194	209	181	134	98	27
2006	no												1	3	6	1	4	1	2	
2006	yes							6	16	26	31	37	52	78	142	101	113	90	47	10
2007	no										1				2	1		1		
2007	yes						1	3	16	21	57	68	115	206	217	232	186	158	101	16
2008	no										1	2	5	4	5	9	11	10	8	2
2008	yes						3	13	6	17	48	74	77	135	213	186	116	101	47	4
2009	no													1	1					
2009	yes		1							1	8	26	84	158	208	194	131	89	36	5
2010	no													3	9	10	14	9	6	
2010	yes									2	3	9	55	127	216	154	152	108	45	9
2011	no														2		1	1		

Compositional data for yellowtail rockfish

Year	Aged?	<14	18	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
2011	yes								2		3	8	31	87	195	181	121	108	66	8
2012	no													1						
2012	yes								1	3	2	17	50	124	325	343	203	136	68	7

Recreational otoliths by year and 2-cm length bins (some aged).

Year	Aged?	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1997	no						1	2	3	28	20	20	12	10	3	1
2006	no		1	3	6	4	2	1	1							
2009	no		1													
2009	yes					1		1	2	1		1				
2010	yes	1	3	3	3	1	1	3		1		1				
2011	yes			1	1	4	3	2	3			1				

Raw length frequency distributions by fishery, year, and 2-cm length bin

Commercial

Year	< 14	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1968					3	23	86	112	147	182	154	131	157	189	82	36	27	18
1969						1	1	15	56	73	110	151	352	511	376	133	67	6
1970					1		5	4	17	22	40	70	182	277	222	92	45	4
1971				1	1	16	28	68	82	54	48	76	272	406	299	153	78	20
1972					2		3	4	3	20	46	93	196	315	228	66	25	4
1973								1	2	3	17	36	161	237	142	55	35	8
1974						2	5	15	24	20	23	26	52	81	65	25	12	
1975						5	16	43	35	18	36	18	24	17	13	16	19	8
1976				3	2	7	23	28	43	76	237	314	469	663	466	219	176	50
1977							1		2	8	30	83	157	243	146	57	48	3
1978				1	1	15	35	57	80	90	155	239	350	357	155	91	51	10

Year	< 14	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
1979			2	1		1	4	8	36	94	166	265	304	371	248	115	70	14
1980					3	8	14	53	129	183	362	526	803	909	617	337	183	33
1981					1	7	17	63	122	279	457	553	756	767	486	241	129	22
1982					2	18	26	66	179	374	460	523	573	565	380	178	130	26
1983					1	11	33	106	204	331	415	397	331	262	137	84	47	8
1984					2	4	29	69	165	277	476	597	538	465	311	187	57	23
1985				1	2	23	65	137	335	501	605	615	556	369	182	69	36	4
1986					3	1	11	23	53	166	362	544	638	565	376	172	67	11
1987					2	6	8	22	52	108	232	325	398	372	272	169	68	12
1988							9	18	42	79	137	252	351	319	240	120	74	9
1989						35	76	115	148	243	426	502	604	530	410	291	298	9
1990		1	1	6	8	5	7	19	59	94	180	315	421	328	247	152	67	15
1991							3	19	49	114	245	373	451	347	202	158	79	10
1992					1		6	30	66	152	223	300	321	256	181	119	85	10
1993					4	8	17	46	113	210	278	321	324	218	145	73	37	6
1994						4	18	76	174	328	496	660	666	518	348	159	101	14
1995	1		1	2	2	22	59	148	267	407	544	603	565	448	259	168	94	16
1996	1					12	42	100	149	289	515	643	563	422	232	133	44	10
1997						3	22	74	140	215	311	421	439	338	200	110	60	18
1998						1	6	50	114	252	349	402	364	291	150	91	31	4
1999	1				5		11	47	125	281	417	435	339	272	166	75	41	19
2000	1					5	18	36	99	199	467	520	456	249	157	79	41	7
2001				1	1		2	9	32	91	240	432	470	356	253	100	51	7
2002							1	5	23	74	142	341	348	327	222	137	73	13
2003					2	7	11	19	36	72	155	248	307	265	253	150	84	20
2004	1				1	3	9	14	36	49	99	213	392	317	310	188	132	20
2005						1	1	8	24	45	91	157	195	210	181	135	98	27
2006						6	16	28	35	43	64	99	188	141	148	116	73	11
2007				2	3	9	26	48	110	134	226	358	378	395	333	282	182	29

Compositional data for yellowtail rockfish

Year	< 14	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	>54
2008					3	14	6	28	89	153	142	221	357	321	212	183	102	10
2009						1		1	14	40	130	254	362	285	181	125	50	7
2010								4	10	16	96	230	403	317	261	181	83	12
2011							2	1	6	18	60	179	339	302	212	178	109	9
2012							1	4	6	31	87	243	549	561	371	232	134	12

Recreational

Year	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	> 54
1993							1	1	1									
1997					1				2	6	10	30	25	26	13	17	5	1
2002					4	4	13	27	37	30	28	25	12	5	5	2	2	
2003		1		1	3	25	63	85	127	134	105	81	65	41	28	24	14	3
2004		1	4	13	27	54	72	93	84	89	70	66	35	26	12	9	14	6
2005	2	1		3	4	54	107	188	136	126	86	60	34	21	14	16	7	10
2006				1	12	34	94	68	44	22	19	15	14	14	9	6	7	3
2007		1	1	6	9	10	11	27	45	45	28	38	42	21	17	7	3	2
2008	2		2	10	15	24	24	17	29	26	13	10	7	4	1	4		1
2009				1	12	31	82	50	38	33	39	41	32	29	27	20	22	6
2010				3	6	13	29	29	29	19	7	19	12	15	14	10	12	1
2011				1		13	22	18	32	31	38	65	52	50	25	18	17	9
2012				1	3	11	16	20	27	32	24	24	27	24	12	4	3	

NWFSC Hook-&-Line Survey Data

Lengths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
18-19									1	1
20-21	3								1	4
22-23	5							1		6
24-25	2	7	1	1	1		1	12	1	26
26-27	2	7	8	1	2			33		53
28-29	1	4	9	2	4		1	13	7	41
30-31	8	2	8	5	9	3		2	19	56
32-33	17	11	2		9	3	3	1	33	79
34-35	21	9	6	4	10	6	10	1	1	68
36-37	9	23	5	8	12	8	5	2	1	73
38-39	5	20	11	9	14	8	11	9	1	88
40-41	5	4	17	11	18	14	12	18	5	104
42-43	10	6	7	27	30	10	5	10	14	119
44-45	16	7	6	29	11	10	6	12	13	110
46-47	18	8	3	12	11	6	6	7	4	75
48-49	3	9	3	6	5	7	1	3	2	39
50-51	1	4	2	4	3	5		1	3	23
52-53		1						1		2
Totals	126	122	88	119	139	80	61	126	106	967

All Otoliths

Fork Length (cm)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
18-19									1	1
20-21	2								1	3
22-23	4									4
24-25	3	7	1	1	1				1	14
26-27	3	7	8	1	2					21
28-29		4	9	2	4				7	26
30-31	6	2	8	5	9	3			19	52
32-33	17	11	2		9	3			32	74
34-35	21	9	6	4	10	6			1	57
36-37	7	23	5	8	12	8			1	64
38-39	7	20	11	9	14	8			1	70
40-41	5	4	17	11	18	14			5	74
42-43	9	6	7	27	30	10			14	103
44-45	15	7	6	29	11	10			13	91
46-47	17	8	3	12	11	6			4	61
48-49	7	9	3	6	5	7		1	2	40
50-51	1	4	2	4	3	5			3	22
52-53		1								1
Totals	124	122	88	119	139	80	0	1	105	778

Aged Otoliths

Age (years)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
2	4									4
3	7									7
4	4									4
5	37									37
6	16									16
7	2									2
8	1									1
9	1									1
10	1									1
11	12									12
12	6									6
13	5									5
14	10									10
15	6									6
16	5									5
17	1									1
18	2									2
20	2									2
21	1									1
28	1									1
Totals	124	0	0	0	0	0	0	0	0	124

NWFSC Shelf/Slope Bottom Trawl Survey, 2003-2012.

2003-2012 Total Numbers divided by 10 of:					2005-2012 Total numbers of:		
Tows > 0	Lengths	Weights	Age structures	Age reads	Stomachs	Ovaries	Maturities
41	784	357	369	46	116		

NWFSC Slope Survey, 1998-2002.

NWFSC Slope Survey (1998-2002)				
Average 1998-2002 numbers of: (Total divided by 5 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
1				

AFSC Slope Survey, 1996-2001.

Average 1996-2001 numbers of: (Total divided by 5 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
2	38			

AFSC Triennial Survey, 1980-2004.

Average 1980-2004 numbers: (Total divided by 9 years)				
Tows > 0	Lengths	Weights	Age Structures	Age reads
101	2,232	565	782	779

Compositional data for yellowtail rockfish

TERMS OF REFERENCE

FOR THE

GROUNDFISH AND COASTAL PELAGIC SPECIES STOCK ASSESSMENT AND REVIEW PROCESS FOR ~~2013~~2015-~~2014~~2016

DRAFT

~~NOVEMBER~~MAY, ~~2012~~2014

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TABLE OF CONTENTS

1. INTRODUCTION

The purpose of this document is to outline the guidelines and procedures for the Pacific Fishery Management Council's (Council) groundfish and coastal pelagic species (CPS) stock assessment review (STAR) process and to clarify expectations and responsibilities of the various participants. This document applies to assessments of species managed under the Pacific Coast Groundfish Fishery Management Plan and Management Plan for the CPS. The STAR process has been designed to provide for peer review as referenced in the 2006 Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (RMSA), which states that "the Secretary and each Regional Fishery Management Council may establish a peer review process for that Regional Fishery Management Council for scientific information used to advise the Regional Fishery Management Council about the conservation and management of the fishery (see Magnuson-Stevens Act section 302(g)(1)(E))." National Standard 2 (NS2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (published July 19, 2013) provides guidance and standards to be followed when establishing a peer review process pursuant to MSA section 302(g)(1)(E) including guidance on the timing, scope of work, peer reviewer selection and transparency. The STAR process follows these standards and is fully compliant with NS2.

The STAR~~is~~ ~~peer review~~ process is designed to investigate the technical merits of stock assessments and other scientific information used by the Council's Scientific and Statistical Committee (SSC). The process outlined here is not a substitute for the SSC, but should work in conjunction with the SSC. This document is included in the Council's Statement of Organization, Practices and Procedures as documentation of the review process that underpins scientific advice from the SSC.

The review of stock assessments requires a routine, dedicated effort that simultaneously meets the needs of NMFS, the Council, and others. Program reviews, in-depth external reviews, and peer-reviewed scientific publications are used by federal and state agencies to provide quality assurance for the basic scientific methods employed to produce stock assessments. The extended time frame required for such reviews is not suited to the routine examination of assessments that are, generally, the primary basis for harvest recommendations. The SSC has developed a separate terms of reference for reviewing new methods that might be used in stock assessments, including methods and tools to incorporate ecosystem processes.

The STAR process is a key element in an overall procedure designed to review the technical merits of stock assessments and other relevant scientific information. This process allows the Council to make timely use of new fishery and survey data, analyze and understand these data as thoroughly as possible, provide opportunity for public comment, assure that the results are as accurate and error-free as possible, and identify the best available science for management decisions. Parties involved in implementing the STAR process are Council members, Council staff, members of Council Advisory Bodies, including the SSC, the Groundfish and CPS Management Teams (GMT and CPSMT), the Groundfish Advisory SubPanel (GAP) and CPS Advisory Subpanel (CPSAS), the National Marine Fisheries Service (NMFS), state agencies, and interested persons.

This current version of the STAR terms of reference (TOR) reflects recommendations from previous participants in the STAR process, including STAR panel members, SSC members, stock assessment teams (STATs), Council staff, and Council advisory groups. Nevertheless, no set of guidelines can be expected to deal with every contingency, and all participants should anticipate the need to be flexible and address new issues as they arise.

Stock assessments are conducted to assess the abundance and trends of fish stocks, and provide the fundamental basis for management decisions regarding appropriate harvest levels. Assessments use statistical population models to integrate and simultaneously analyze survey, fishery, and biological data. Environmental and ecosystem data may also be integrated in stock assessments. Hilborn and Walters (1992)[1] define stock assessments as “the use of various statistical and mathematical calculations to make quantitative predictions about the reactions of fish populations to alternative management choices.” In this document, the term “stock assessment” includes activities, analyses and reports, beginning with data collection and continuing through to scientific recommendations presented to the Council and its advisors. To best serve their purpose, stock assessments should attempt to identify and quantify major uncertainties, balance realism and parsimony, and make best use of the available data.

There are four distinct types of assessments, which are subject to different review procedures. A “full assessment” is a new assessment or an assessment that may be substantially different from the previously conducted assessment. A full assessment involves a re-examination of the underlying assumptions, data, and model parameters previously used to assess the stock. Full assessments are reviewed via the full STAR process. There is a limit on the number of full assessments that can be conducted and reviewed during an assessment cycle. Some assessment models have relatively few modeling or data issues and provide relatively stable results as new data are added, such that it is not necessary to develop a completely new assessment every time the species is assessed. In these cases, an “update assessment” may be preferable. An “update assessment” is defined as an assessment that maintains the model structure of the previous full assessment and is generally restricted to the addition of new data to previously evaluated time series that have become available since the last assessment. Update assessments are reviewed by the relevant subcommittee of the SSC (Groundfish or CPS) rather than by a STAR panel. A “data-moderate assessment” is a third type of assessment that incorporates historical catch data and one or more indices of abundance (e.g., trawl survey or fishery CPUE indices). Data-moderate assessments are limited in that compositional data (i.e., length or age data) are restricted from the assessment to make such assessments less complicated and enable more expeditious review. Conceptually, data-moderate assessments are designed for groundfish stocks to be reviewed by the SSC Groundfish Subcommittee. However, in 2013, data-moderate assessments will be reviewed by a full STAR panel since these assessment methodologies will be used for the first time in the Council process. A “catch report” is a fourth type of assessment product that applies when only limited new information is available to inform the assessment. Catch reports are reviewed by the relevant subcommittee of the SSC (Groundfish or CPS).

The RMSA recently changed the terminology and process for determining harvest levels. The previous Allowable/Acceptable Biological Catch (ABC) has been replaced by the Overfishing Limit (OFL). However, the largest allowable harvest level is still the ABC (now “Acceptable Biological Catch”), which is buffered from the OFL based on the risk of overfishing adopted by the Council (which must be less than 50%). The P* (overfishing probability) approach uses a probability of overfishing (which the Council has set to be less than or equal to 45% or 0.45) and a measure of uncertainty in the assessment of current stock status (σ, the standard error of the

[1] Hilborn, R., and C. J. Walters. 1992. Quantitative fisheries stock assessment: Choice, dynamics and uncertainty. Chapman and Hall.

biomass estimate in log space) to determine the appropriate buffer with which to reduce the harvest level from the OFL to the ABC (Ralston et al. 2011[2]). The Annual Catch Limit (ACL) is equivalent to what the Council previously called the Optimum Yield (OY). For groundfish species, the upper limit for the ACL is calculated using the 40-10 harvest control rule (and 25-5 rule for flatfish species) while for CPS, each species has a specific control rule to calculate the Harvest Guideline (HG), which is the upper limit for the ACL for CPS. The Annual Catch Target (ACT) is the targeted catch level, representing a further reduction from the ACL to account for management/implementation uncertainty. The OFL must be given in the stock assessment (along with, in some cases, σ). The ABC is determined from the OFL given σ and P*. For CPS, the assessment reports the application of the HG control rule. The OFL, ABC, ACL, any ACTs, and (for CPS) the HGs are reported in the Council's Stock Assessment and Fishery Evaluation (SAFE) report or the relevant National Environmental Policy Act (NEPA) analysis of alternative harvest specifications.

2. Stock Assessment Prioritization

Stock assessments for Pacific sardine and Pacific mackerel are conducted annually, with full assessments occurring every third year, and update assessments during interim years. Assessments for groundfish species are conducted every other year as part of the biennial harvest specification cycle. A relatively small number of the more than 90 species in Council's Groundfish Fishery Management Plan are selected each cycle for full or update assessments. To implement the RMSA requirements to establish ABCs and OFLs for all species in fishery management plans, simple assessment methods such as Depletion-Corrected Average Catch (DCAC)[3] and Depletion-Based Stock Reduction Analysis (DB-SRA)[4] have now been applied to the majority of groundfish species. It is the goal of the Council to substantially increase the number of groundfish stocks with full assessments.

In April 2006, the SSC recommended, and the Council adopted, a new approach to prioritize groundfish species for full and update stock assessments based on: 1) economic or social importance of the species, 2) vulnerability and resilience of the species, 3) time elapsed since the last assessment (NMFS advises assessments to be updated at least every five years), 4) amount of data available for the assessment, 5) potential risk to the stock from the current or foreseeable management regime, and 6) qualitative trends from surveys (when available). It was also recommended that overfished groundfish stocks that are under rebuilding plans be evaluated each assessment cycle to ensure adequate progress towards achieving stock recovery.

The proposed stocks for full, update, and data-moderate assessments should be discussed and finalized by the Council at least a year in advance of a new assessment cycle to allow sufficient time to assemble relevant data and arrange STAR panels. The 2015~~3~~ stock assessment plan for groundfish and CPS stocks is provided in Appendix A.

3. STAR Goals and Objectives

The goals and objectives of the groundfish and CPS STAR process are to:

[2] Ralston, S., Punt, A.E., Hamel, O.S., DeVore, J. and R.J. Conser. 2011. An approach to quantifying scientific uncertainty in stock assessment. *Fishery Bulletin* 109: 217-231.
[3] MacCall, A. D. 2009. Depletion-corrected average catch: a simple formula for estimating sustainable yields in data-poor situations. *ICES Journal of Marine Science* 66: 2267-2271.
[4] Dick, E. J. and A. D. MacCall. 2011. Depletion-Based Stock Reduction Analysis: A catch-based method for determining sustainable yields for data-poor stocks. *Fisheries Research* 110: 331-341.

1) ensure that stock assessments represent the best scientific information available~~scientific information~~ and facilitate the use of this information by the Council to adopt OFLs, ABCs, ACLs, (HGs), and ACTs;
2) meet the mandates of the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) and other legal requirements;
3) follow a detailed calendar and fulfill explicit responsibilities for all participants to produce required reports and outcomes;
4) provide an independent external review of stock assessments;
5) increase understanding and acceptance of stock assessments and peer reviews by all members of the Council family;
6) identify research needed to improve assessments, reviews, and fishery management in the future; and
7) use assessment and review resources effectively and efficiently.

4. Roles and Responsibilities of STAR participants

4.1. Shared Responsibilities

All parties have a stake in assuring adequate technical review of stock assessments. NMFS, as the designee of the Secretary of Commerce, must determine that the best scientific advice has been used when it approves fishery management recommendations made by the Council. The Council uses advice from the SSC to determine that the information on which it bases its recommendations represents the best available science. Scientists and fishery managers providing technical documents to the Council for use in management need to assure that their work is technically correct.

The Council, NMFS and the Secretary of Commerce share primary responsibility to create and foster a successful STAR process. The Council oversees the process and involves its standing advisory bodies, especially the SSC. For groundfish, NMFS provides a stock assessment coordinator (SAC) to facilitate and assist in overseeing the process, while for CPS a designated SWFSC staff member performs this role. Together NMFS and the Council consult with all interested parties to plan and prepare TOR, and develop a calendar of events with a list of deliverables for final approval by the Council. NMFS and the Council share fiscal and logistical responsibilities and both should ensure that there are no conflicts of interest in the process[5].

The STAR process is sponsored by the Council, because the Federal Advisory Committee Act

[5] The ~~proposed~~ final NS2 guidelines state: ~~"Peer reviewers who are federal employees must comply with all applicable federal ethics requirements. Peer reviewers who are not federal employees~~ a~~must comply with the following provisions. Peer reviewers must not have any real or perceived conflicts of interest with the scientific information, subject matter, or work product under review, or any aspect of the statement of work for the peer review. For purposes of this section, a~~ "[A] conflict of interest is any financial or other interest which conflicts with the service of the individual on a review panel because it: (A) Could significantly impair the reviewer's objectivity; or (B) Could create an unfair competitive advantage for a person or organization; (C) Except for those situations in which a conflict of interest is unavoidable, and the conflict is promptly and publicly disclosed, no individual can be appointed to a review panel if that individual has a conflict of interest that is relevant to the functions to be performed. Conflicts of interest include, but are not limited to, the personal financial interests and investments, employer affiliations, and consulting arrangements, grants, or contracts of the individual and of others with whom the individual has substantial common financial interests, if these interests are relevant to the functions to be performed". ~~Potential reviewers must be screened for conflicts of interest in accordance with the procedures set forth in the NOAA Policy on Conflicts of Interest for Peer Review subject to OMB's Peer Review Bulletin."~~

(FACA) limits the ability of NMFS to establish advisory committees. FACA specifies a procedure for convening advisory committees that provide consensus recommendations to the federal government. The intent of FACA was three-fold: to limit the number of advisory committees; to ensure that advisory committees fairly represent affected parties; and to ensure that advisory committee meetings, discussions, and reports are carried out and prepared in full public view. Under FACA, advisory committees must be chartered by the Department of Commerce through a rather cumbersome process. However, the Sustainable Fisheries Act exempts the Council from FACA per se, but requires public notice and open meetings similar to those under FACA.

4.2. STAR Panel Responsibilities

The role of the STAR panel is to conduct a detailed technical evaluation of a full stock assessment to advance the best available scientific information to the Council. The specific responsibilities of the STAR panel are to:

1) review draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g., previous assessments and STAR panel reports, when available);
2) discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting, work with the STATs to correct deficiencies, and, when possible, suggest new tools or analyses to improve future assessments; and
3) develop STAR panel reports for all reviewed species to document meeting discussion and recommendations.

The STAR panel chair has, in addition, the responsibility to: 1) develop a STAR panel meeting agenda; 2) ensure that STAR panel participants follow the TOR; 3) guide the STAR panel and the STAT to mutually agreeable solutions; and 4) coordinate review of revised stock assessment documents before they are forwarded to the SSC.

Groundfish and CPS STAR panels include a chair appointed from the relevant SSC subcommittee (Groundfish or CPS), and three other experienced stock assessment analysts knowledgeable of the specific modeling approaches being reviewed. Of these three other members, at least one should be appointed from the Center for Independent Experts (CIE) and at least one should be familiar with west coast stock assessment practices. Selection of STAR panelists should be based on expertise, independence ~~aim for~~a balance between outside expertise and in-depth knowledge of west coast fisheries, data sets available for those fisheries, and modeling approaches applied to west coast groundfish and CPS, and be free of conflicts of interest. Expertise in ecosystem models or processes, and knowledge of the role of groundfish and CPS in the ecosystem is also desirable, particularly if the assessment includes ecosystem models or environmental processes. For groundfish, an attempt should be made to identify one reviewer who can consistently attend all STAR panel meetings in an assessment cycle. The pool of qualified technical reviewers is limited; therefore, staffing of STAR panels is subject to constraints that can make it difficult to meet the conditions above.

Selected ~~R~~reviewers should not have financial or personal conflicts of interest with the scientific information, subject matter, or work product under review, either current to the meeting, within the previous year (at minimum), or anticipated. ~~–~~STAR panel reviewers who are federal employees should comply with all applicable federal ethics requirements. Reviewers who are not federal employees will be screened for conflicts of interest either through existing financial disclosure processes used by the SSC and CIE, or under the NOAA Policy on Conflicts of Interest for Peer Review Subjects.

Reviewers should not have contributed or participated in the development of the work product or scientific information under review and reviewer responsibilities should rotate across the available pool of qualified reviewers, when possible.

STAR panel meetings should also include representatives of the relevant management team (MT) and advisory panel (AP), with responsibilities as laid out in these TOR, and a Council staff member to help advise the STAR panel and assist in recording meeting discussions and results. The STAR panel, STATs, the MT and AP representatives, and the public are all legitimate meeting participants who should be accommodated in discussions. It is the STAR panel chair's responsibility to coordinate discussion and public comment so that the assessment review is completed on time.

The STAR process is by design a transparent process. STAR panel meetings are open to the public and are announced on the Council's website, through Council meeting notices and in the Federal Register at least 14 days prior to the panel meeting. The Council posts b~~B~~ackground materials ~~are posted on the Council's~~son its ftp site prior to the panel meeting and makes hard copies ~~can be made~~ available upon request. A STAR panel normally meets for one week. The number of assessments reviewed per panel should not exceed two, except in extraordinary circumstances if the SSC and NMFS agree that it is advisable, feasible, and/or necessary. When separate assessments are conducted at the sub-stock level (i.e., black rockfish), each assessment is considered an independent full assessment for review purposes. Contested assessments, in which alternative assessments are brought forward by competing STATs using different modeling approaches, would typically require additional time (and/or panel members) to review adequately, and should be scheduled accordingly. While contested assessments are likely to be rare, they can be accommodated within the STAR process. The STAR panel should thoroughly evaluate each analytical approach, comment on the relative merits of each, and, when conflicting results are obtained, identify the reasons for the differences. The STAR panel is also charged with selecting a preferred base model.

STAR Panel Requests for Additional Analyses

STAR panel meetings are not workshops. In the course of a meeting, the panel may ask the STAT for a reasonable number of sensitivity runs, request additional details on the proposed base model presented, or ask for further analyses of alternative runs. It is not unusual for the review to result in a change to the initial base model (given that both the STAR panel and the STAT agree). However, the STAR panel is not authorized to conduct an alternative assessment representing its own views that are distinct from those of the STAT, nor can it impose an alternative assessment on the STAT. Similarly, the panel should not impose their preferred methodologies when this is a matter of professional opinion. Rather, if the panel finds an assessment to be inadequate, it should document its opinion and suggest potential remedial measures for the STAT to take to rectify perceived shortcomings of the assessment. For groundfish species, the SSC reviews the STAR panel report and recommends whether an assessment should be further reviewed at the so-called "mop-up" panel meeting, a meeting of the SSC's Groundfish subcommittee that occurs after all of the STAR panels, primarily to review rebuilding analyses for overfished stocks. If a recommendation on whether to send the assessment to the mop-up panel meeting is needed before the full SSC is able to review the STAR panel report, the SSC Chair, Vice Chair, and Groundfish Subcommittee Chair will make a preliminary decision. This recommendation is subject to confirmation by the full SSC at its next scheduled meeting. For CPS, if an assessment is found not to be acceptable for use in management, a full assessment would be conducted the following year.

The STAR panels are expected to be judicious in their requests of the STATs. Large changes in data (such as wholesale removal of large data sets) or in analytical methods often result in such great changes to the assessment that they cannot be adequately reviewed during the course of the STAR panel meeting. Therefore, caution should be exercised in making such changes, and in many cases such changes should be relegated to future research recommendations and/or methodology review. If a groundfish STAR panel agrees that significant changes are necessary, and the assessment is not otherwise acceptable, a recommendation for further review at the mop-up panel is warranted. Similarly, if the STAR panel agrees that the assessment results strongly indicate that current F_{MSY} value or management target and threshold are inappropriate, it should identify this in its report and recommend further analysis to support a change to more appropriate values.

STAR panel requests to the STAT for additional model runs or data analyses must be clear, explicit, and in writing. They should reflect the consensus opinion of the entire panel and not the minority view of a single individual or individuals. The STAR panel requests and recommendations should be listed within the STAR panel's report along with rationale and the STAT response to each request.

To the extent possible, analyses requested by the STAR panel should be completed by the STAT during the STAR panel meeting. It is the obligation of the STAR panel chair, in consultation with other panel members, to prioritize requests for additional analyses. In situations where a STAT arrives with a well-constructed, thoroughly investigated assessment, it may be that the panel finishes its review earlier than scheduled (i.e., early dismissal of a STAT). If follow-up work by the STAT is required after the review meeting (such as MCMC integration of an alternative model created during the STAR panel meeting), this should be completed before the briefing book deadline for the Council meeting at which the assessment is scheduled for review. It is the STAR panel chair's responsibility to track STAT progress. In particular, the chair is responsible for communicating with the STAT to determine if the revised stock assessment document is complete. Any post-STAR drafts of the stock assessment must be reviewed by the STAR panel chair. The assessment document can only be given to Council staff for distribution after it has been endorsed by the STAR panel chair, and when it is accompanied by a complete and approved STAR panel report. Likewise, the final draft that is published in the Council's SAFE document must also be approved by the STAR panel chair prior to being accepted by Council staff.

For some stocks selected for full assessments, the available data may prove to be insufficient to support a category 1 assessment. In such cases, the STAT should consider whether simpler approaches appropriate for a category 2 assessment can be applied. Simpler approaches usually make stronger assumptions and estimate fewer parameters, but are less demanding of data. It is the responsibility of the STAR panel, in consultation with the STAT, to consider the strength of inferences that can be drawn from analyses presented, and identify major uncertainties. If useful results have been produced, the STAR panel should review the appropriateness and reliability of the methods used to draw conclusions about stock status and/or exploitation rates, and either recommend or reject the analysis on the basis of its ability to provide useful information into the management process. If the STAR panel agrees that important results have been generated, it should forward its findings and conclusions to the SSC and the Council for consideration in setting of OFLs, ABCs, and ACLs (for groundfish) and HGs (for CPS). A key section of the assessment is that on research needed to improve the assessment. Highlighting research priorities should increase the likelihood that future stocks assessments can be raised to category 1.

Uncertainty and Decision Tables in Groundfish Stock Assessments

The STAR panel review focuses on technical aspects of the stock assessment. It is recognized that no model or data set is perfect or issue free. Therefore, outputs of a broad range of model runs should be evaluated to better define the scope of the accepted model results. The panel should strive for a risk-neutral perspective in its deliberations, and discuss the degree to which the accepted base model describes and quantifies the major sources of uncertainty in the assessment. Confidence intervals for model outputs, as well as other measures of uncertainty that could affect management decisions, should be provided in completed stock assessments and the reports prepared by STAR panels. The STAR panel may also provide qualitative comments on the probability of results from various model runs, especially if the panel does not consider the probability distributions calculated by the STAT capture all major sources of uncertainty. However, as a scientific peer review body, the STAR panel should avoid matters of policy. Assessment results from model runs that are technically flawed or questionable on other grounds should be identified by the panel and excluded from the alternatives upon which management advice is to be developed.

During the review meeting, the STAR panel and the STAT should strive to reach a consensus on a single base model. Once a base model is agreed upon, it is essential that uncertainty around the base model be captured and communicated to managers. One way to accomplish this objective is to bracket the base model with what is agreed to be the major axis of uncertainty (e.g., spawner-recruit steepness, the virgin level of recruitment, the natural mortality rate, survey catchability, etc.; and, less often, recent year-class strength, weights on conflicting CPUE series, etc.). Alternative models should show contrast in their management implications, which, in practical terms, means that that they should result in different estimates of current stock size and status, and the OFL. Markov chain Monte Carlo (MCMC) integration, where possible, is an acceptable method for reporting uncertainty about the base model. However, point estimates from the Maximum Likelihood Estimation (MLE) method should be used for status determinations even when MCMC outputs are available.

Once alternative models, which capture the overall degree of uncertainty in the assessment, are formulated, a 2-way decision table (alternative models versus management actions) should be developed to illustrate the repercussions of uncertainty to managers. The ratio of probabilities of alternative models should be 25:50:25, with the base model being twice as likely as the low and high stock size alternatives. Potential methods for assigning probabilities to alternative models include using the statistical variance of the model estimates of stock size, posterior Monte Carlo simulation, or expert judgment, but other approaches are acceptable as long as they are fully documented. An ideal bracketing of the base model is one for which the geometric mean of the high and low stock size alternative model final biomass levels approximates the base model biomass level. This is because the distribution of possible stock sizes is necessarily bounded at the low end, while the right tail can extend much further from the point estimate, and thus the probability density should look more log-normal than normal. If the bracketing models are far from this ideal (e.g., if the base model is closer to the upper bracketing model in absolute terms than to the lower bracketing model), the three levels should be reconsidered and either one or more of them adjusted (such that, in certain cases, if there is a great deal of confidence in the bracketing models, the base model could be reconsidered), or a justification for the severely non-lognormal structure of alternatives be given. Similarly, if more than one dimension is used to characterize uncertainty, resulting in, for example, a 3-by-3 decision table, careful consideration of how the complete table brackets the uncertainty should be undertaken.

Areas of Disagreement

STATs and STAR panels are required to make an honest attempt to resolve any areas of disagreement during the meeting. Occasionally, fundamental differences of opinions may remain between the STAR panel and STAT that cannot be resolved during the STAR panel meeting. In such cases, the STAR panel must document the areas of disagreement in its report. While identifying areas of disagreement, the following questions should be discussed at the meeting:

1) Are there any differences in opinion about the use or exclusion of data?
2) Are there any differences in opinion about the choice of the base model?
3) Are there any differences in opinion about the characterization of uncertainty?

The STAT may choose to submit a supplemental report supporting its view, but in that case, an opportunity must be given to the STAR panel to prepare a rebuttal. These documents would then be appended to the STAR panel report as part of the record of the review meeting. In some cases STAR panel members may have fundamental disagreements among themselves that cannot be resolved during the review meeting. In such cases, STAR panel members may prepare a minority report that would also become part of the record of the review meeting. The SSC would then review all information pertaining to STAR panel and STAR panel/STAT disputes, and issue its recommendation.

STAR Panel Report

The STAR panel report should be developed and approved by the full panel shortly after the STAR panel meeting. The STAR panel chair appoints members of the panel to act as rapporteurs and draft the report (or specific sections thereof) according to the STAR panel chair guidance on format and level of detail. The STAR panel chair is responsible for preparing the final draft of the panel report, obtaining panel approval, providing a copy for STAT review and comment, and submitting it to the Council in a timely fashion (i.e., by briefing book deadline).

The STAR panel report should include:

- Summary of the STAR Panel meeting:
    - Names and affiliations of STAR panel members, STAT and STAR panel advisors;
    - Brief overview of the meeting (where the meeting took place, what species was assessed, what was the STAR panel recommendation, etc.);
    - Brief summary of the assessment model and the data used;
    - List of analyses requested by the STAR panel, the rationale for each request, and a brief summary of the STAT response to the request;

- Description of the base model and, for groundfish species, the alternative models used to bracket uncertainty;
- Comments on the technical merits and/or deficiencies in the assessment and recommendations for remedies;
- Areas of disagreement regarding STAR panel recommendations:
    - Between the STAR panel and STAT(s).
    - Among STAR panel members (including concerns raised by MT and AP representatives);
- Unresolved problems and major uncertainties, e.g., any special issues that complicate the assessment and/or interpretation of results;
- Management, data, or fishery issues raised by the MT or AP representatives during the STAR panel; and
- Prioritized recommendations for future research and data collection, including methodology and ecosystem considerations for the subsequent assessment.

For groundfish species, the STAR panel also makes a recommendation on whether the next assessment of the same species should be full or update, and explain reasons for its recommendation.

The STAR panel report should be made available for review by the STAT with adequate time prior to the briefing book deadline (i.e., a week in most circumstances, but at minimum a full 24 hours, in cases when the time between the STAR panel and the deadline is particularly compressed) so that the STAT can comment on issues of fact or differences in interpretation. If differences of opinion come up during review of the STAR panel report, the STAR panel and STAT should attempt to resolve them. Otherwise, the areas of disagreement must be documented in the STAR panel report.

The chair will also solicit comment on the draft report from the MT and AP representatives. The purpose of this is limited to ensuring that the report is technically accurate and reflects the discussion that occurred at meeting, and should not be viewed as an opportunity to reopen debate on issues. The STAR panel chair is the final arbiter on wording changes suggested by STAT and the MT and AP representatives as the report is the panel's report of the meeting. Any detailed commentary by MT and AP representatives should be drafted separately, reviewed by the full advisory body, and included in the briefing book.

The STAR panel chair is responsible for providing the Council staff with the final version of the STAR panel report. The STAR panel chair is also expected to attend the SSC meeting and, if requested, MT meetings and the relevant portions of the Council meetings, where stock assessments and harvest projections are discussed, explain the reviews, and provide technical information and advice. The final STAR panel reports ~~is~~are posted on the Council's website at http://www.pcouncil.org/groundfish/stock-assessments/ and http://www.pcouncil.org/coastal-pelagic-species/stock-assessment-and-fishery-evaluation-safe-documents/. [COMMENT: The CPS STAR panel reports are not posted here as of now; they are posted in the respective briefing books. Can they be posted here for parity and to make them easy to find?]

4.3. Stock Assessment Team Responsibilities

The STAT is responsible for conducting a complete and technically sound stock assessment that conforms to accepted standards of quality, and in accordance with these TOR. The STAT is responsible for preparing three versions of the stock assessment document:

1) a "draft" for discussion during the STAR panel meeting;
~~2)~~ a "revised draft" for presentation to the SSC, the Council, and relevant MT and AP;
2) and
3) a "final version" to be published in the Council's SAFE document or posted on the Council's web site.

The draft assessment document should follow the outline in Appendix B with an executive summary as in the template in Appendix C. In the draft document, the STAT should identify a candidate base model, fully-developed and well-documented, for the STAR panel to review. For CPS, the STAT should submit a draft assessment document to the STAR panel chair and Council staff two weeks prior to the STAR panel meeting. For groundfish, a draft assessment document should be submitted by the STAT to the STAR panel chair, Council staff, and the NMFS Stock Assessment Coordinator (SAC) three full weeks prior to the STAR panel meeting, to determine whether the document is sufficiently complete to undergo review. If the draft assessment is judged complete, the draft assessment and supporting materials would be distributed to the STAR panel and relevant MT and AP representatives two weeks prior to the STAR panel meeting. If the assessment document does not meet minimum criteria of the TOR, the review would be postponed to a subsequent assessment cycle or to the mop-up panel. The mop-up panel generally is not able to review more than two assessments. Therefore, the review options are limited for assessments not completed on time. The STAT is also responsible for bringing model files and data (in digital format) to the STAR panel meeting so that they can be analyzed on site.

In most cases, the STAT should produce a revised draft of the assessment document within three weeks of the end of the STAR panel meeting. The revised draft must include a point-by-point response of the STAT to each of the STAR panel's recommendations. The revised draft must be finalized before the briefing book deadline for the Council meeting at which the assessment is scheduled for review. Post-STAR drafts must be reviewed and approved by the STAR panel chair prior to being submitted to Council staff. This review is limited to editorial issues, verifying that all required elements are included, and confirming that the document reflects the discussion and decisions made during the STAR panel.

The final version of the assessment document is produced after the assessment has been reviewed by the SSC. Other than changes recommended by the SSC, only editorial and other minor alterations should be made to the revised draft for the final version. Electronic versions of the final assessment document, model files, and key output files should be submitted by the STATs to Council staff (for CPS) and to Council staff and the SAC (for groundfish) for inclusion in a stock assessment archive. Any tabular data that are inserted into the final documents in an object format should also be submitted in alternative forms (e.g., spreadsheets), which allow selection of individual data elements.

A STAT for which no base model was endorsed by a STAR panel should, in most cases, provide the pre-STAR draft assessment (or corrected/ updated version thereof, as agreed upon with the STAR panel) to the Council by the briefing book deadline. If the STAR panel, nonetheless, recommends using outputs of certain sensitivity runs to bracket uncertainty in the assessment, the results of those runs should be appended to the draft assessment and provided to the Council and its advisory bodies.

STATs are strongly encouraged to develop assessments in a collaborative environment by forming working groups, holding pre-assessment workshops, and consulting with other stock assessment and ecosystem assessment scientists. STAT meetings with Integrated Ecosystem Assessment (IEA) teams are strongly encouraged to evaluate alternative models and analyses that incorporate ecosystem considerations and cross-FMP interactions that may affect stock dynamics. When new data sources or methods, which could be used in many assessments or are likely contentious, are planned for inclusion in the assessment, they should ideally be reviewed by a methodology panel. STATs should identify whether such new data sources or methods will be proposed for inclusion in assessments as early as feasible so that it is possible to hold a methodology review panel if one is needed. Irrespective of whether a methodology review panel takes place, the STAR panel should be provided with model runs with and without the new data sources so that it can evaluate the sensitivity of model outputs to these data sources.

STATs should coordinate early in the process with state representatives and other data stewards to ensure timely availability of data. STATs are also encouraged to organize independent meetings with industry and interested parties to discuss data and issues. The STAT should initiate contact with the AP representative early in the assessment process, keep the AP informed of the data being used and respond to any concerns that are raised. The STAT should also contact the MT representative for information about changes in fishing regulations that may influence model structure and the way data are used in the assessment. The STAT should be well represented at the STAR panel meeting to ensure timely completion of the STAR panel requests. Barring exceptional circumstances, STAT members who are not attending the STAR panel meeting, should be available remotely to assist with responses when needed. Each STAT conducting a full assessment should appoint a representative to attend the Council meeting where the assessment is scheduled to be reviewed and give presentations of the assessment to the SSC and other Council advisory bodies. In addition, the STAT should be prepared to respond to MT requests for model projections for the MT's to develop ACL alternatives.

For stocks that are estimated to be below overfished thresholds (or those previously declared overfished and not yet rebuilt), the STAT must complete a rebuilding analysis according to the SSC's TOR for Rebuilding Analyses and prepare a document that summarizes the analysis results. For groundfish, it is recommended that this rebuilding analysis be conducted using the software developed by Dr. André Punt (University of Washington). Groundfish rebuilding analyses are reviewed at the mop-up panel.

4.4. National Marine Fisheries Service Responsibilities

The NMFS Northwest Fisheries Science Center (NWFSC) and the Southwest Fisheries Science Center (SWFSC) assist in organizing stock assessment reviews of groundfish and CPS, respectively. For groundfish, the NMFS provides a stock assessment coordinator (SAC) to facilitate and assist in overseeing the STAR process.

The NMFS (through the SAC for groundfish and a designated SWFSC staff member for CPS) works with the STATs and other STAR process participants to develop a proposed list of stocks to be assessed for the consideration by the Council. NMFS also develops a draft STAR panel schedule for the Council review. NMFS identifies STAR panel members based on criteria for reviewer qualifications, and, for groundfish, makes every effort to designate one independent reviewer who can attend all STAR panel meetings to provide consistency among reviews. The costs associated with these reviewers are borne by the NMFS. The NMFS also helps organize STAR panel meetings and develops meeting schedules.

The NMFS (along with the Council staff and the STAR panel chair) coordinates with the STATs to facilitate delivery of required materials by scheduled deadlines and in compliance with the TOR. The NMFS also assists Council staff and the STAR panel chair in a pre-review of assessment documents, to assure they are received on time and complete, and in a post-STAR review of the revised assessment document for consistency with the TOR.

4.5. Council Staff Responsibilities

The role of Council staff is to coordinate, monitor, and document the STAR process to ensure compliance with these TOR.

Council staff coordinates with the STAR panel chair and the NMFS (the SAC in the case of groundfish; a designated SWFSC staff member for CPS) in a pre-review of assessment documents, to assure they are complete and received on time. If an assessment document is not in compliance with the TOR, Council staff returns the assessment document to the STAT with a list of deficiencies, a notice that the deadline has expired, or both. Council staff also coordinates with the STAR panel chair, STAT, and the NMFS in a post-STAR review of the revised assessment document for consistency with the TOR. When inconsistencies are identified, the STAT is requested to make appropriate revisions in time for briefing book deadlines.

Council staff attends and monitors all STAR panel meetings to ensure continuity and adherence to the TOR and the independent review requirements of Council Operating Procedure 4. If inconsistencies with the TOR occur during STAR panel meetings, Council staff coordinates with the STAR panel chair to develop solutions to correct the inconsistencies. Council staff also attends and monitors the SSC review of stock assessments to ensure compliance with the TOR.

Council staff is responsible for timely issuance of meeting notices and distribution of stock assessments and other appropriate documents to relevant groups. Council staff also collects and maintains electronic copies of assessment documents, STAR panel, SSC, MT and AP reports, as well as letters from the public and any other relevant documents. These documents are typically published in the Council's SAFE document or posted on the Council's web site.

4.6. Management Team Responsibilities

The MT is responsible for identifying and evaluating potential management actions based on the best available scientific information. Particularly, the MT uses stock assessment results and other information to make ACL and ACT recommendations to the Council.

A MT representative, usually appointed by the MT chair, is responsible to attend the STAR panel meeting and serve as advisor to the STAT and STAR panel on changes in fishing regulations that may influence data used in the assessment and the nature of the fishery in the future. The MT representative does not serve as a member of the STAR panel.

Successful separation of science (e.g., STAT and STAR panels) from management (e.g., MT) depends on assessment reviews being completed by the time the MT meets to discuss preliminary ACL and ACT recommendations. The MT should not seek revision or additional review of the stock assessments after they have been endorsed by the STAR panel. The MT chair should communicate any unresolved issues to the SSC for consideration. The MT, however, can request additional model projections from the STAT, to fully evaluate potential management actions.

4.7. Advisory Panel Responsibilities

An AP representative, usually appointed by the AP chair, is responsible to attend the STAR panel meeting and serve as advisor to the STAT and STAR panel. The AP representative should review the data sources being used in the assessment prior to development of the stock assessment model and insure that industry concerns regarding the adequacy of data used by the STAT are communicated and addressed early in the assessment process. The AP representative does not serve as a member of the STAR panel, but, as a legitimate meeting participant, may provide appropriate information and advice to the STAT and STAR panel during the meeting.

The AP representative (along with STAT and STAR panel chair, if requested) is expected to attend the MT meeting at which preliminary ACL and ACT recommendations are developed. The AP representative is also expected to attend subsequent MT and Council meetings where the relevant harvest recommendations are discussed.

4.8. Scientific and Statistical Committee Responsibilities

The Council's SSC plays multiple roles within the STAR process and provides the Council and its advisory bodies with technical advice related to the stock assessments and the STAR process. The SSC assigns a member of its relevant subcommittee (Groundfish or CPS) to act as the STAR panel chair. The STAR panel chair attends the assigned STAR panel meeting and fulfills responsibilities described in the section "STAR Panel Responsibilities".

The STAR panel chair presents the STAR panel report at the SSC and Council meetings at which stock assessments are reviewed. If requested, the STAR panel chair also attends the MT meeting, at which preliminary ACL and ACT recommendations are developed, to discuss the STAR panel report and assist with interpreting the assessment results.

The full SSC conducts a final review of the stock assessment. This review should not repeat the detailed technical review conducted by the STAR panel. The SSC also reviews the STAR panel recommendations and serves as arbitrator to resolve disagreements between the STAT and the STAR panel if such disagreements occurred during the review meeting. The SSC is responsible for reviewing and endorsing any additional analytical work requested from the STAT by the MT after the stock assessment has been reviewed by the STAR panel. To insure independence in the SSC review, the SSC members who served on the STAT or STAR panel for the stock assessment being reviewed are required to recuse themselves; their involvement in the review being limited to providing factual information and answering questions.

The SSC is responsible for making OFL recommendations to the Council. The SSC is also responsible for assigning groundfish species managed by the Council to a specific category (or tier) based on definitions of species categories in Appendix E. It is also the SSC's responsibility to determine when it is appropriate to make changes to proxies or the use of estimated values of F_{MSY} and B_{MSY}.

5. DATA-MODERATE ASSESSMENTS FOR GROUNDFISH SPECIES

Data-moderate assessments for groundfish species are a refinement over the adopted data-poor methods (i.e., Depletion-Corrected Average Catch (DCAC) and Depletion-Based Stock Reduction Analysis (DB-SRA)) that use catch data to inform harvest specifications for category

3 stocks. Data-moderate assessments are used for category 2 stocks; the defining distinction between category 2 and category 3 stocks is that abundance trend information is incorporated in a category 2 assessment (Appendix E).

Two data-moderate assessment methods have been endorsed for the 2013-14 assessment cycle: 1) extended DB-SRA (XDB-SRA) and 2) extended Simple Stock Synthesis (exSSS). In both cases, abundance trend information (e.g., survey or fishery CPUE indices) is included in the assessment.

ExSSS assumes that recruitment is related deterministically to the stock-recruitment relationship and allows index data to be used for maximum likelihood status and parameter estimation. The Markov chain Monte Carlo (MCMC) or Sample Importance Resample (SIR) algorithm (perhaps implemented using Adaptive Importance Sampling) can be used to quantify uncertainty for exSSS-based assessments. XDB-SRA can be implemented within a Bayesian framework, with the priors for the parameters updated based on index data. The additional parameters in XDB-SRA compared with DB-SRA include the catchability coefficient (q), and the extent of observation variance additional to that inferred from sampling error (a). The priors for these parameters are a weakly informative log-normal and a uniform distribution, respectively.

While data-moderate assessments are less complicated than full assessments, and can potentially be reviewed more expeditiously than full assessments, a full STAR panel is scheduled in 2013 to review data-moderate assessments for the first time (see Appendix A). Comparison of alternative methods (XDB-SRA and exSSS) is encouraged, but it is acceptable to present an assessment using a single modeling approach. The STAR panel can make requests of the STATs for additional runs, but should not impose an alternative method if STATs consider this is not appropriate for the stock concerned. In the event that more than one model is presented, the panel should recommend adoption of a preferred model, if one can be identified, for use in management.

Data-moderate stock assessment reports should follow the template in Appendix D.

6. UPDATE ASSESSMENTS

For CPS, update assessments typically occur during two years out of every three. For groundfish, the initial recommendation whether the next assessment should be full or update is made by the STAR panel during the STAR panel meeting. The final recommendation is made by the SSC.

An update assessment is generally restricted to the addition of new data that have become available since the last full assessment. It must carry forward the fundamental structure of the last full assessment reviewed and endorsed by a STAR panel, the SSC, and the Council. Assessment structure here refers to the population dynamics model, data sources used as inputs to the model, the statistical platform used to fit model to the data, and how the management quantities used to set harvest specifications are calculated. Particularly, when an update assessment is developed, no substantial changes should be made to:

1) the particular sources of data used;
2) the software used in programming the assessment;
3) the assumptions and structure of the population dynamics model underlying the stock assessment;
4) the statistical framework for fitting the model to the data and determining goodness of fit; and
5) the analytical treatment of model outputs in determining management reference points.

Major changes to the assessment should be postponed until the next full assessment. Minor alternations to the input data and the assessment can be considered as long as the update assessment clearly documents and justifies the need for such changes. A step-by-step transition (via sensitivity analysis) from the last full assessment to an update assessment under review should be provided. Minor alterations can be considered under only two circumstances: first, when the addition of new data reveals an unanticipated sensitivity of model, and second, when there are clear and straightforward improvements in the input data and how it is processed and analyzed for use in the model. Examples of minor alterations include: 1) changes in how compositional data are pooled across sampling strata; 2) the weighting of the various data components (including the use of methods for tuning the variances of the data components); 3) changes in the time periods for the selectivity blocks; 4) correcting data entry errors; and 5) bug fixes in software programming. This list is not meant to be exhaustive, and other alterations can be considered if warranted. Ideally, improved data or methods used to process and analyze data would be reviewed by the SSC prior to being used in assessments.

Review of Update Assessments

Update assessments are reviewed by members of the relevant SSC subcommittee (Groundfish or CPS), during a single meeting. Review typically requires one or two days with an option of early dismissal of a STAT. The STAT is responsible for producing the update assessment document and submitting it to Council staff in a timely manner, before the relevant SSC subcommittee reviews the assessment. The document should follow the outline in Appendix B. The STAT, however, can reference the last full assessment (or other relevant documentation) for description of methods, data sources, stock structure, etc., given that they have not been changed. Any new information to the assessment must be presented in sufficient detail for the subcommittee to determine whether the update meets the Council's requirement to use the best available scientific information.

The document must include a retrospective analysis illustrating the model performance with and without the most recent data (new to the update assessment) and discuss whether the new data and update assessment results are sufficiently consistent with those from the last full assessment. The assessment document should include a detailed step-by-step transition from the last full assessment to the update under review. The updated decision table, if there is one, should be of the same format as in the last full assessment; it should highlight differences among alternative models defined using the same axes of uncertainty as those in the last full assessment.

In addition to the update assessment document, Council staff will also provide the subcommittee with a copy of the last full stock assessment reviewed via the STAR process and the associated STAR panel report. The chair of the subcommittee designates a lead reviewer from the subcommittee members for each update assessment to document the meeting discussion, produce a review report, and ensure that each review is conducted according to the TOR. MT and the AP representatives also participate in the review.

The review of update assessments is not expected to require additional model runs or extensive analytical requests during the meeting, although changes in assessment outputs may necessitate some model exploration. The review focuses on two main questions:

1) Does the assessment meet the criteria of a stock assessment update?
2) Can the results of the update assessment form the basis of Council decision making?

If the answer to either of these questions is negative, a full stock assessment for the species would typically be recommended for the next assessment cycle (for groundfish) or the next year (for CPS). For groundfish, if the subcommittee agrees that the update assessment results require additional, but limited exploration before being endorsed for management use, further review at the mop-up meeting, at the end of the assessment cycle, could be recommended. In cases like this, the subcommittee needs to develop a list of requests for the STAT to address before the mop-up meeting.

Shortly after the meeting, the subcommittee issues a review report that includes: 1) comments on the technical merits and/or deficiencies of the update assessment; 2) explanation of areas of disagreement between the subcommittee and STAT (if any); and 3) recommendations on the adequacy of the update assessment for use in management. The report may also include subcommittee recommendations for modifications that should be made when the next full assessment is conducted.

The report is reviewed by the full SSC at the next Council meeting. If the subcommittee review concludes that it is not possible to use the update assessment, the SSC is responsible for evaluating all model runs examined during the review meeting and providing recommendations on an appropriate fishing level to the Council.

7. CATCH REPORTS

In certain cases (e.g., cowcod in 2011) only limited new data are available to inform the assessment. In such cases, it is appropriate for the STAT to provide a catch report, which documents recent removals and compares them to the ACLs established for the stock. For a catch report, the STAT does not need to conduct model runs since, if the estimated removals of a species are near the value projected by the previous assessment/rebuilding analysis, no new insight would be obtained by rerunning the assessment model.

Catch reports are reviewed by the relevant SSC subcommittee (Groundfish or CPS) during a single meeting (that during which update assessments are reviewed). The STAT is responsible for producing the catch report and submitting it to Council staff in a timely manner, before the relevant subcommittee reviews it. The report should be brief, but provide enough details on how total removals were estimated. It should provide only essential information about the stock and refer to the last assessment (or other relevant documentation) for full description of methods, data sources, model structure, etc. used to estimate the status of the stock and generate projections.

In common with a review of an assessment update, Council staff will provide the subcommittee with the catch report, along with a copy of the last full stock assessment reviewed via the STAR process, and the associated STAR panel report. The chair of the subcommittee will designate a lead reviewer from the subcommittee members for each catch report to document the meeting discussion, produce a review report, and ensure that each review is conducted according to the TOR. The report is reviewed by the full SSC at the next Council meeting. The MT and AP representatives also participate in the review.

APPENDIX A: ~~2013~~ 2015 GROUNDFISH AND CPS STOCK ASSESSMENT REVIEW CALENDAR

Review Meeting	Initial Review Deadline	Document Distribution Dates	STAR Panel Dates	Location	Species
~~Data-Moderate Panel~~TBD	~~April 8~~	~~April 15~~	~~April 22-26~~	~~Santa Cruz, CA~~	~~Brown rockfish, China rockfish, copper rockfish, English sole, rex sole, sharpchin rockfish, stripetail rockfish, vermilion rockfish, and yellowtail rockfish~~
~~GF Panel 1~~	~~April 22~~	~~April 29~~	~~May 13-17~~	~~Seattle, WA~~	~~Petrale sole and darkblotched rockfish~~
~~GF Update and catch reports~~	~~May 22~~	~~May 29~~	~~June 18~~	~~Garden Grove, CA~~	~~Bocaccio rockfish update; canary rockfish, Pacific ocean perch, and yelloweye rockfish catch reports~~
~~GF Panel 2~~	~~June 17~~	~~June 24~~	~~July 8-12~~	~~Seattle, WA~~	~~Rougheye rockfish and aurora rockfish~~
~~GF Panel 3~~	~~July 1~~	~~July 8~~	~~July 22-25~~	~~Seattle, WA~~	~~Shortspine thornyheads and longspine thornyheads~~
~~GF Panel 4~~	~~July 15~~	~~July 22~~	~~August 5-9~~	~~Santa Cruz, CA~~	~~Cowcod and Pacific sanddabs~~
~~GF Mop-Up Panel~~	~~Sept. 2~~	~~Sept. 9~~	~~Sept. 23-27~~	~~Seattle, WA~~	~~Rebuilding analyses and continuing issues~~

APPENDIX B: OUTLINE FOR STOCK ASSESSMENT DOCUMENTS

This is a general outline of elements that should be included in stock assessment reports for groundfish and CPS managed by the Pacific Fishery Management Council. Not every item listed in the outline is relevant (or available) for every assessment. Therefore, this outline should be considered a flexible guideline on how to organize and communicate stock assessment results. Items with asterisks (*****) are optional for draft assessment documents prepared for STAR panel meetings but should be included in the final document.

A. Title page and list of preparers **–** the names and affiliations of the stock assessment team (STAT) either alphabetically or as first and secondary authors.

B. Executive Summary (should follow the template in Appendix B).

C. Introduction
   1. Scientific name, distribution, the basis for the choice of stock structure, including regional differences in life history or other biological characteristics that should form the basis of management units.
   2. A map showing the scope of the assessment and depicting boundaries for fisheries or data collection strata.
   3. Important features of life history that affect management (e.g., migration, sexual dimorphism, bathymetric demography).
   4. Ecosystem considerations (e.g., ecosystem role and trophic relationships of the species, habitat requirements/preferences, relevant data on ecosystem processes that may affect stock or parameters used in the stock assessment, and/or cross-FMP interactions with other fisheries). This section should note if environmental correlations or food web interactions were incorporated into the assessment model. The length and depth of this section would depend on availability of data and reports from the IEA, expertise of the STAT, and whether ecosystem factors are informational to contribute quantitative information to the assessment.
   5. Important features of current fishery and relevant history of fishery.
   6. Summary of management history (e.g., changes in mesh sizes, trip limits, or other management actions that may have significantly altered selection, catch rates, or discards).
   7. Management performance, including a table or tables comparing Overfishing Limit (OFL), Annual Catch Limit (ACL), Harvest Guideline (HG) [CPS only], landings, and catch (i.e., landings plus discard) for each area and year
   8. Description of fisheries for this species off Canada, Alaska and/or Mexico, including references to any recent assessments of those stocks.

D. Assessment
   1. Data
      a. Landings by year and fishery (PacFIN is the standard source for all commercial landings), historical catch estimates, discards (generally specified as a percentage of total catch in weight and in units of mt), catch-at-age, weight-at-age, abundance indices (typically survey and CPUE data), data used to estimate biological parameters (e.g., growth rates, maturity schedules, and natural mortality) with coefficients of variation (CVs) or variances if available. Include complete tables and figures and date of extraction.

   b. Sample size information for length and age composition data by area, year, gear, market category, etc., including both the number of trips and fish sampled.
   c. All data sources that include the species being assessed, which are used in the assessment, and provide the rationale for data sources that are excluded.
   d. Clear description of environmental or ecosystem data if included in the assessment.
2. History of modeling approaches used for this stock – changes between current and previous assessment models
   a. Response to STAR panel recommendations from the most recent previous assessment.
   b. Report of consultations with AP and MT representatives regarding the use of various data sources in the stock assessment.
   c. If environmental or ecosystem data are incorporated, report of consultations with technical teams that evaluated ecosystem data or methodologies used in the assessment.
3. Model description
   a. Complete description of any new modeling approaches.
   b. Definitions of fleets and areas.
   c. Assessment program with last revision date (i.e., date executable program file was compiled).
   d. List and description of all likelihood components in the model.
   e. Constraints on parameters, selectivity assumptions, natural mortality, treatment of age reading bias and/or imprecision, and other fixed parameters.
   f. Description of stock-recruitment constraints or components.
   g. Description of how the first year that is included in the model was selected and how the population state at the time is defined (e.g., B_0, stable age structure, etc.).
   h. Critical assumptions and consequences of assumption failures.
4. Model selection and evaluation
   a. Evidence of search for balance between model realism and parsimony.
   b. Comparison of key model assumptions, include comparisons based on nested models (e.g., asymptotic vs. domed selectivities, constant vs. time-varying selectivities).
   c. Summary of alternate model configurations that were tried but rejected.
   d. Likelihood profile for the base-run (or proposed base-run model for a draft assessment undergoing review) configuration over one or more key parameters (e.g., M, h, Q) to show consistency among input data sources.
   e. Residual analysis for the base-run configuration (or proposed base-run model in a draft assessment undergoing review) e.g., residual plots, time series plots of observed and predicted values, or other approaches. Note that model diagnostics *are* required in draft assessments undergoing review.
   f. Convergence status and convergence criteria for the base-run model (or proposed base-run).
   g. Randomization run results or other evidence of search for global best estimates.
   h. Evaluation of model parameters. Do they make sense? Are they credible?
   i. Are model results consistent with assessments of the same species in Canada and Alaska? Are parameter estimates (e.g., survey catchability) consistent with estimates for related stocks?
5. Point-by-point response to the STAR panel recommendations**.* Not required in draft assessment undergoing review**.

6. Base-model(s) results
    a. Table listing all explicit parameters in the stock assessment model used for base model, their purpose (e.g., recruitment parameter, selectivity parameter) and whether or not the parameter was actually estimated in the stock assessment model.
    b. Population numbers at age × year × sex (if sex-specific *M*, growth, or selectivity) (May be provided as a text or spreadsheet file).* **Not required in draft assessment undergoing review**.
    c. Time-series of total, 1+ (if age 1s are in the model), summary, and spawning biomass (and/or spawning output), depletion relative to B_0, recruitment and fishing mortality or exploitation rate estimates (table and figures).
    d. Selectivity estimates (if not included elsewhere).
    e. Stock-recruitment relationship.
    f. OFL, ABC and ACL (and/or ABC and OY or HG) for recent years.
    g. Clear description of units for all outputs.
    h. Clear description of how discard is included in yield estimates.
    i. Clear description of environmental or ecosystem data if included in the assessment.
7. Uncertainty and sensitivity analyses. The best approach for describing uncertainty and the range of probable biomass estimates in groundfish assessments may depend on the situation. Important factors to consider include:
    a. Parameter uncertainty (variance estimation conditioned on a given model, estimation framework, data set choice, and weighting scheme), including likelihood profiles for important assessment parameters (e.g., natural mortality). This also includes expressing uncertainty in derived outputs of the model and estimating CVs using appropriate methods (e.g., bootstrap, asymptotic methods, Bayesian approaches, such as MCMC). Include the CV of spawning biomass in the first year for which an OFL has not been specified (typically end year +1 or +2).
    b. Sensitivity to data set choice and weighting schemes (e.g., emphasis factors), which may also include a consideration of recent patterns in recruitment.
    c. Sensitivity to assumptions about model structure, i.e., model specification uncertainty.
    d. Retrospective analysis, where the model is fitted to a series of shortened input data sets, with the most recent years of input data being dropped.
    e. Historical analysis (plot of actual estimates from current and previous assessments).
    f. Subjective appraisal of the magnitude and sources of uncertainty.
    g. If a range of model runs is used to characterize uncertainty it is important to provide some qualitative or quantitative information about relative probability of each. If no statements about relative probability can be made, then it is important to state that all scenarios (or all scenarios between the bounds depicted by the runs) are equally likely
    h. If possible, ranges depicting uncertainty should include at least three runs: (a) one judged most probable; (b) at least one that depicts the range of uncertainty in the direction of lower current biomass levels; and (c) one that depicts the range of uncertainty in the direction of higher current biomass levels. The entire range of uncertainty should be carried through stock projections and decision table analyses.

E. Harvest control rules (CPS only)

The OFL, ABC and HG harvest control rules for actively managed species apply to the U.S. (California, Oregon, and Washington) harvest recommended for the next fishing year and are defined as follows:

- OFL = BIOMASS * F_{MSY} * U.S. DISTRIBUTION
- ABC = BIOMASS * BUFFER * F_{MSY} * U.S. DISTRIBUTION
- ACL LESS THAN OR EQUAL TO ABC
- HG = (BIOMASS-CUTOFF)* FRACTION * U.S. DISTRIBUTION
- ACT EQUAL TO HG OR ACL, WHICHEVER VALUE IS LESS

where FMSY is the fishing mortality rate that maximizes catch biomass in the long-term.

Implementation for Pacific Sardine

1. BIOMASS is the estimated stock biomass (ages 1+) at the start of the next year from the current assessment,
2. CUTOFF (150,000 mt) is the lowest level of estimated biomass at which harvest is allowed,
3. FRACTION is an environment-based percentage of biomass above the CUTOFF that can be harvested by the fisheries. Given that the productivity of the sardine stock has been shown to increase during relatively warm-water ocean conditions, the following formula has been used to determine an appropriate (sustainable) FRACTION value:

   FRACTION = $0.248649805(T_2) - 8.190043975(T) + 67.4558326$,

   where T is the running average sea-surface temperature at Scripps Pier, La Jolla, California during the three preceding years. Under the harvest control rule, FRACTION is constrained and ranges between 5% and 15% depending on the value of T.
4. U.S. DISTRIBUTION is the percentage of BIOMASS in U.S. waters (87%).

Implementation for Pacific Mackerel

1. BIOMASS is the estimated stock biomass (ages 1+) at the start of the next year from the current assessment,
2. CUTOFF (18,200 mt) is the lowest level of estimated biomass at which harvest is allowed,
3. FRACTION (30%) is the fraction of biomass above CUTOFF that can be taken by fisheries, and
4. U.S. DISTRIBUTION (70%) is the average fraction of total BIOMASS in U.S. waters.

The CUTOFF and FRACTION values applied in the Council's harvest policy for mackerel are based on simulations published by MacCall et al. in 1985.

F. Reference points (groundfish only)

1. Unfished spawning stock biomass, summary age biomass, and recruitment, along with unfished spawning stock output.
2. Reference points based on $B_{40\%}$ for rockfish and roundfish and on $B_{25\%}$ for flatfish (spawning biomass and/or output, SPR, exploitation rate, equilibrium yield).
3. Reference points based on default SPR proxy (spawning biomass and/or output, SPR, exploitation rate, equilibrium yield).

4. Reference points based on MSY (if estimated) (spawning biomass and/or output, SPR, exploitation rate, equilibrium yield).
5. Equilibrium yield curve showing various B_{MSY} proxies.

G. Harvest projections and decision tables (groundfish only) *** Not required in draft assessment undergoing review**.
    1. Harvest projections and decision tables (i.e., a matrix of alternative models (states of nature) versus management actions) should cover the plausible range of uncertainty about current stock biomass and a set of candidate fishing mortality targets used for the stock. See section *"Uncertainty and Decision Tables in Groundfish Stock Assessment"* (this document, pp.12-13) on how to define alternative states of nature. Management decisions in most cases represent the sequence of catches including estimate of OFL based on F_{MSY} (or its proxy) and those obtained by applying the Council 40-10 harvest policy to each state of nature; however other alternatives may be suggested by the GMT as being more relevant to Council decision making. OFL calculations should be based on the assumption that future catches equal ABCs and not OFLs.
    2. Information presented should include biomass, stock depletion, and yield projections of OFL, ABC and ACL for ten years into the future, beginning with the first year for which management action could be based upon the assessment.

H. Regional management considerations.
    1. For stocks where current practice is to allocate harvests by management area, a recommended method of allocating harvests based on the distribution of biomass should be provided. The MT advisor should be consulted on the appropriate management areas for each stock.
    2. Discuss whether a regional management approach makes sense for the species from a biological perspective.
    3. If there are insufficient data to analyze a regional management approach, what are the research and data needs to answer this question?

I. Research needs (prioritized).

J. Acknowledgments: include STAR panel members and affiliations as well as names and affiliations of persons who contributed data, advice or information but were not part of the assessment team. *** Not required in draft assessment undergoing review.**

K. Literature cited.

L. An appendix with the complete parameter and data in the native code of the stock assessment program. (For a draft assessment undergoing review, these listings can be provided as text files or in spreadsheet format.)

APPENDIX C: TEMPLATE FOR AN EXECUTIVE SUMMARY

Items with asterisks (*****) are optional for draft assessment documents prepared for STAR panel meetings but should be included in the final document.

Stock	Species/area, including an evaluation of any potential biological basis for regional management.
Catches	Trends and current levels - include table for last ten years and graph with long term data.
Data and assessment	Date of last assessment, type of assessment model, data available, new information, and information lacking.
Stock biomass	Trends and current levels relative to virgin or historic levels, description of uncertainty-include table for last 10 years and graph with long term estimates.
Recruitment	Trends and current levels relative to virgin or historic levels-include table for last 10 years and graph with long term estimates
Exploitation status	Exploitation rates (i.e., total catch divided by exploitable biomass, or the annual SPR harvest rate) - include a table with the last 10 years of data and a graph showing the trend in fishing mortality relative to the target (y-axis) plotted against the trend in biomass relative to the target (x-axis).
Ecosystem considerations	A summary of reviewed environmental and ecosystem factors that appear to be correlated with stock dynamics, e.g., variability in the physical environment that directly or indirectly affects the vital rates (growth, survival, productivity/recruitment) of fish stocks, and/or trophic interactions that affect predators and prey. Note what, if any, ecosystem factors are used in the assessment and how.
Reference points (groundfish)/ Harvest control rules (CPS)	Groundfish: Management targets and definition of overfishing, including the harvest rate that brings the stock to equilibrium at $B_{40\%}$ (the B_{MSY} proxy) and the equilibrium stock size that results from fishing at the default harvest rate (the F_{MSY} proxy). Include a summary table that compares estimated reference points for SSB, SPR, Exploitation Rate and Yield based on SSB proxy for MSY, SPR proxy for MSY, and estimated MSY values. CPS: Results of applying the control rule to compute the harvest guideline, including specification of each of the quantities on which the harvest guideline is based (BIOMASS, CUTOFF, FRACTION, U.S. DISTRIBUTION)
Management performance	Catches in comparison to OFL, ABC, [HG], and OY/ACL values for the most recent 10 years (when available), overfishing levels, actual catch and discard. Include OFL (encountered), OFL (retained) and OFL (dead) if different due to discard and discard mortality.
Unresolved problems and major uncertainties	Any special issues that complicate scientific assessment, questions about the best model scenario, etc.
Decision table (groundfish only)*	Projected yields (OFL, ABC and ACL), spawning biomass, and stock depletion levels for each year. OFL calculations should be based on the assumption that future catches equal ABCs and not OFLs.
Research and data needs	Identify information gaps that seriously impede the stock assessment.
Rebuilding Projections*	Reference to the principal results from rebuilding analysis if the stock is overfished. For groundfish, see Rebuilding Analysis terms of reference for detailed information on rebuilding analysis requirements.

APPENDIX D: TEMPLATE FOR A DATA-MODERATE ASSESSMENT

1. Title page and list of preparers – the names and affiliations of the stock assessment team (STAT).
2. Introduction: Scientific name, distribution, basic biology (growth, longevity, ecology), the basis for the choice of stock unit(s)(no more than 1-2 paragraphs).
3. Development of indices (used and rejected). Novel approaches should be fully documented.
4. Survey of other data available for assessment: sample sizes by year and source of lengths, and ages (read and unread)--in case there is interest in conducting a full assessment in the future.
5. Selection of method (exSSS or XDB-SRA; authors “encouraged” to do both).
6. Assessment model
    a. Specification of priors / production function (defaults OK)
    b. Initial runs using catch-only methods (DB-SRA or SSS (or both))
    c. Diagnostics
        i. Evaluation of convergence
        ii. Residual plots
        iii. Posterior predictive intervals (if Bayesian)
        iv. Time-trajectories of biomass, depletion, etc.
        v. Sensitivity analyses using alternative catch streams, alternative priors for depletion, etc.
7. Estimates of OFL (median of the distribution), and
8. Estimates of stock status.

APPENDIX E: DEFINITIONS OF SPECIES CATEGORIES FOR GROUNDFISH ASSESSMENTS

Category 3: **Data poor**. OFL is derived from historical catch.	**a**	No reliable catch history. No basis for establishing OFL.
	b	Reliable catches estimates only for recent years. OFL is average catch during a period when stock is considered to be stable and close to BMSY equilibrium on the basis of expert judgment.
	c	Reliable aggregate catches during period of fishery development and approximate values for natural mortality. Default analytical approach DCAC.
	d	Reliable annual historical catches and approximate values for natural mortality and age at 50% maturity. Default analytical approach DB-SRA.
Category 2: **Data moderate**. OFL is derived from model output (or natural mortality).	**a**	M*survey biomass assessment (as in Rogers 1996).
	b	Historical catches, fishery-dependent trend information only. An aggregate population model is fit to the available information.
	c	Historical catches, survey trend information, or at least one absolute abundance estimate. An aggregate population model is fit to the available information.
	d	Full age-structured assessment, but results are substantially more uncertain than assessments used in the calculation of the P* buffer. The SSC will provide a rationale for each stock placed in this category. Reasons could include that assessment results are very sensitive to model and data assumptions, or that the assessment has not been updated for many years.
Category 1: **Data rich**. OFL is based on F_{MSY} or F_{MSY} proxy from model output. ABC based on P* buffer.	**a**	Reliable compositional (age and/or size) data sufficient to resolve year-class strength and growth characteristics. Only fishery-dependent trend information available. Age/size structured assessment model.
	b	As in 1a, but trend information also available from surveys. Age/size structured assessment model.
	c	Age/size structured assessment model with reliable estimation of the stock-recruit relationship.

Agenda Item F.8.a
Attachment 3
June 2014

TERMS OF REFERENCE

FOR THE

GROUNDFISH REBUILDING ANALYSIS FOR ~~2013~~2015-~~2014~~2016

DRAFT

~~SEPTEMBER~~MAY, ~~2012~~2014

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TABLE OF CONTENTS

1. INTRODUCTION

Amendment 11 to the Groundfish Fishery Management Plan (FMP) established a default overfished threshold equal to 25% of the unexploited female spawning output[1] (B_0), or 50% of B_{MSY}, if known. By definition, groundfish stocks falling below that level were designated to be in an overfished state ($B_{25\%} = 0.25 \times B_0$[2]). To reduce the likelihood that stocks would decline to that point, the policy specified a precautionary threshold equivalent to 40% of B_0. The policy required that the ACL, when expressed as a fraction of the allowable biological catch, be progressively reduced at stock sizes less than $B_{40\%}$. Because of this linkage, $B_{40\%}$ has sometimes been interpreted to be a proxy measure of B_{MSY}, i.e., the female spawning output that results when a stock is fished at F_{MSY}. In fact, theoretical results support the view that a robust biomass-based harvesting strategy for most rockfish (*Sebastes* spp.) would be to maintain stock size at about 40% of the unfished level (Clark 1991, 2002). In the absence of a credible estimate of B_{MSY}, which can be very difficult to estimate (MacCall and Ralston 2002), $B_{40\%}$ is a suitable proxy to use as a rebuilding target for most groundfish.

The recently revised Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that U.S. fishery management councils avoid overfishing by setting annual catch limits (ACLs). Stock assessments now will provide overfishing level (OFL) estimates, and an acceptable biological catch (ABC) will be derived from the OFL by reducing the OFL to account for scientific uncertainty. The ACL cannot exceed the ABC.
Following the 2008 assessment season, the Pacific Fishery Management Council ("Council") revised the reference points for flatfish, as separate from other groundfish species. The new reference points include an MSY proxy fishing rate of $F_{30\%}$, a target spawning output of $B_{25\%}$ and an overfished threshold of $B_{12.5\%}$. Similarly, the 40:10 policy has been replaced by a 25:5 policy for flatfish.

Under the MSA, rebuilding plans are required for stocks that have been designated to be in an overfished state. Amendment 12 of the Groundfish FMP provided a framework within which rebuilding plans for overfished groundfish resources could be established. Amendment 12 was challenged in Federal District Court and found not to comply with the requirements of the MSA

[1] The absolute abundance of the mature portion of a stock is loosely referred to here in a variety of ways, including: population size, stock biomass, stock size, spawning stock size, spawning biomass, spawning output; i.e., the language used in this document is sometimes imprecise. However, the best fundamental measure of population abundance to use when establishing a relationship with recruitment is spawning output, defined as the total annual output of eggs (or larvae in the case of live-bearing species), accounting for maternal effects (if these are known). Although spawning biomass is often used as a surrogate measure of spawning output, for a variety of reasons a non-linear relationship often exists between these two quantities (Rothschild and Fogarty 1989; Marshall *et al*. 1998). Spawning output should, therefore, be used to measure the size of the mature stock when possible.
[2] Estimates of stock status are typically obtained by fitting statistical models of stock dynamics to survey and fishery data. In recent years, the bulk of stock status determinations have been based on Stock Synthesis 3, an age- and size-structured population dynamics model (Methot 2005, 2007). Stock assessment models can be fitted using Maximum Likelihood or Bayesian methods. For both types of estimation methods, a stock is considered to be in an overfished state if the best point estimate of stock size is less than 25% (rockfish and roundfish) and 12.5% (flatfish) of unfished stock size. This corresponds to the maximum likelihood estimate for estimation methods based on Maximum Likelihood methods, to the maximum of the posterior distribution (MPD) for estimation methods in which penalties are added to the likelihood function, and to the mode of the posterior distribution for Bayesian analyses. The median of the Bayesian posterior is not used for determination of overfished status.

because rebuilding plans did not take the form of an FMP, FMP amendment, or regulation. In response to this finding, the Council developed Amendment 16-1 to the Groundfish FMP which covered three issues, one of which was the form and content of rebuilding plans.

The Council approach to rebuilding depleted groundfish species, as described in rebuilding plans, was re-evaluated and adjusted under Amendment 16-4 in 2006 so they would be consistent with the opinion rendered by the Ninth Circuit Court of Appeals in *Natural Resources Defense Council, Inc. and Oceana, Inc.* v. *National Marine Fisheries Service, et al.,* 421 F.3d 872 (9^{th} Cir. 2005), and with National Standard 1 of the MSA. The court affirmed the MSA mandate that rebuilding periods "be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem" (Section 304(e)). The court opinion also recognized that some harvest of overfished species could be accommodated under rebuilding plans to avoid severe economic impacts to West Coast fishing communities dependent on groundfish fishing. Under Amendment 16-4 rebuilding plans, more emphasis was placed on shorter rebuilding times and the trade-off between rebuilding periods and associated socioeconomic effects.

Rebuilding Plans include several components, one of which is a rebuilding analysis. Simply put, a rebuilding analysis involves projecting the status of the overfished resource into the future under a variety of alternative harvest strategies to determine the probability of recovery to B_{MSY} (or its proxy) within a pre-specified time-frame.

2. Overview of the Calculations Involved in a Rebuilding Analysis

This document presents guidelines for conducting a basic groundfish rebuilding analysis that meets the minimum requirements that have been established by the Council's Scientific and Statistical Committee (SSC), those of Amendment 16-1 of the Groundfish FMP, and those arising from the 9^{th} Circuit Court decision. It also outlines the appropriate documentation that a rebuilding analysis needs to include. These basic calculations and reporting requirements are essential elements in all rebuilding analyses to provide a standard set of base-case computations, which can then be used to compare and standardize rebuilding analyses among stocks. The steps when conducting a rebuilding analysis are:

1. Estimation of B_0 (and hence B_{MSY} or its proxy).
2. Selection of a method to generate future recruitment.
3. Specification of the mean generation time.
4. Calculation of the minimum and maximum times to recovery.
5. Identification and analysis of alternative harvest strategies and rebuilding times.

The specifications in this document have been implemented in a computer package developed by Dr André Punt (University of Washington). This package can be used to perform rebuilding analyses for routine situations. However, the SSC encourages analysts to explore alternative assumptions, calculations and projections that may more accurately capture uncertainties in stock rebuilding than the default standards identified in this document, and which may better represent

stock-specific concerns. In the event of a discrepancy between the generic calculations presented here and a stock-specific result developed by an individual analyst, the SSC groundfish subcommittee will review the issue and recommend which results to use.
The SSC also encourages explicit consideration of uncertainty in projections of stock rebuilding (see Section 8 below).

2.1. Estimation of B_0

B_0 is defined as mean unexploited female spawning output. The default approach for estimating B_0 for rebuilding analyses is to base it on some form of spawner-recruit model because most of the recent assessments of west coast groundfish have been based on stock assessments that integrate the estimation of the spawner-recruit model with the estimation of other population dynamic parameters. These stock assessments therefore link the recruitments for the early years of the assessment period with the average recruitment corresponding to B_0.

Stock assessment models that integrate the estimation of the spawner-recruit model also provide estimates of B_{MSY}. However, at this time, the SSC recommends that these estimates not be used as the target for rebuilding because they may not be robust. Rather, the rebuilding target should be taken to be the agreed proxy for B_{MSY} (e.g. $0.4B_0$ for most groundfish stocks) in all cases.

The recruitment process depends on the environment in addition to female spawning output. For example, the decadal-scale regime shift that occurred in 1977 (Trenberth and Hurrell 1994) is known to have strongly affected ecosystem productivity and function in both the California Current and the northeast Pacific Ocean (Roemmich and McGowan 1995; MacCall 1996; Francis *et al*. 1998; Hare *et al*. 1999). With the warming that ensued, West Coast rockfish recruitment appears to have been adversely affected (Ainley *et al*. 1993; Ralston and Howard 1995). In principle, B_0 and the approach used to generate future recruitment (see below) could take account of regime-shift effects on productivity. However, this would need to be justified (and the assumptions used for projection purposes would need to be consistent with those on which the assessment was based).

2.2. Selection of a Method to Generate Future Recruitment

One can project the population forward once the method for generating future recruitment has been specified, given the current state of the population from the most recent stock assessment (terminal year estimates of numbers at age and their variances) and the rebuilding target. The current default approach for generating future recruitment is to use the results of a fitted spawner-recruit model (e.g., the Beverton-Holt or Ricker curves), in particular because SS3-based assessments all assume a structural spawner-recruit model, either estimating or pre-specifying the steepness of the curve[3]. Moreover, this approach is consistent with that recommended above for setting B_0. This approach can, however, be criticized because stock productivity is constrained to behave in a pre-specified manner according to the particular spawner-recruit model chosen, and there are different models to choose from, including the

[3] The "steepness" of a spawner-recruit curve is related to the slope at the origin and is a measure of a stock's productive capacity. It is expressed as the proportion of virgin recruitment that is produced by the stock when reduced to $B_{20\%}$, and ranges between 0.2 and 1.0.

Beverton-Holt and Ricker formulations. These two models can produce very different reference points, but are seldom distinguishable statistically. Moreover, there are statistical issues when a spawner-recruit model is estimated after the assessment is conducted, including: (1) time-series bias (Walters 1985), (2) the "errors in variables problem" (Walters and Ludwig 1981), and (3) non-homogeneous variance and small sample bias (MacCall and Ralston 2002). Thus, analyses based on a spawner-recruit model should include a discussion of the rationale for the selection of the spawner-recruit model used, and refer to the estimation problems highlighted above and whether they are likely to be relevant and substantial for the case under consideration. A rationale for the choice of spawner-recruit model should also be provided. In situations where steepness is based on a spawner-recruit meta-analysis (e.g., Dorn 2002), the reliability of the resulting relationship should be discussed.

2.3. Specification of the Mean Generation Time

The mean generation time should be calculated as the mean age of the net maturity function. A complication that can occur in the calculation of mean generation time, as well as B_0 (see above), is when growth and/or reproduction have changed over time. In such instances, the parameters governing these biological processes should typically be fixed at their most recent, contemporary, values, as this best reflects the intent of "prevailing environmental conditions" as stated in the NMFS Guidelines for National Standard 1. Exceptions may occur if there are good reasons for an alternative specification (e.g., using growth and maturity schedules that are characteristic of a stock that is close to B_{MSY}).

2.4. Calculation of the Minimum and Maximum Times to Recovery

The minimum time to recovery (denoted T_{MIN}) is defined as the median time (i.e. 50% probability) for a stock to recover to the target stock size, starting from the time when a rebuilding plan was actually implemented (usually the year after the stock was declared overfished) to when the target level is first achieved, assuming no fishing occurs.

Although no longer used directly in Council decision-making for overfished stocks, rebuilding analyses should report the maximum time to recovery (denoted T_{MAX}). T_{MAX} is ten years if T_{MIN} is less than 10 years. If T_{MIN} is greater than or equal to 10 years, T_{MAX} is equal to T_{MIN} plus one mean generation. Likewise, rebuilding analyses should report an estimate of the median number of years needed to rebuild to the target stock size if all future fishing mortality is eliminated from the first year for which the Council is making a decision about[4] ($T_{F=0}$). This will typically differ from T_{MIN}.

Finally, when a stock rebuilding plan has been implemented for some time and recruitments have been estimated from an assessment, it may be that explicit, year-specific estimates of recruitment are available for the earliest years of the rebuilding time period. In such instances, rebuilding forecasts should be conducted setting the recruitments from the start of the rebuilding plan to the current year based on the estimates from the most recent assessment, rather than through re-sampling methods (see above) because this reflects the best available information regarding the recruitment during the rebuilding period.

[4] This year will generally not be the current year, but rather the year following the current two-year cycle.

2.5. Alternative Harvest Strategies during Rebuilding

The Council is required to rebuild overfished stocks in a time period that is as short as possible, but can extend this period to take into account the needs of fishing communities. The simplest rebuilding harvest strategy to simulate and implement is a constant harvest rate or "fixed F" policy. Such strategies should also mean that encounter rates with overfished species remain relatively constant over time, which is unlikely to be the case for constant catch strategies. All rebuilding analyses should, therefore, minimally consider fixed F (or SPR) strategies. However, many other strategies are possible, including constant catch and phase-in strategies, in which catch reductions are phased-in. In these latter cases, analysts should always assess whether fishing mortality rates exceed F_{MSY} (or its proxy), as this would constitute overfishing.

Analysts should consider a broad range of policy alternatives to give the Council sufficient scope on which to base a decision. The following represent the set of harvest strategies which have been identified by the GMT – all rebuilding analyses should minimally include these strategies:

1) eliminate all harvest beginning in the next management cycle (i.e., estimate $T_{\mathrm{F=0}}$),
2) apply the harvest rate that would generate the ACL specified for the current year (i.e., the latest year specified in regulations),
3) apply the spawning potential ratio[5] or relevant harvest control rule in the current rebuilding plan,
4) apply the harvest rate that is estimated to lead to a 50% probability of recovery by the current T_{TARGET},
5) apply the harvest rate that is estimated to lead to a 50% probability of recovery by the T_{MAX} from the current cycle,
6) apply the harvest rate that is estimated to lead to a 50% probability of recovery by the T_{MAX} from the previous cycle,
7) apply the default (e.g. 40-10 or 25-5) harvest policy, and
8) apply the ABC harvest rate (i.e., F_{MSY} less the uncertainty buffer).

For all of these strategies, except for numbers 1 and 8, the median catch streams from each run should be used as the harvest strategy in a follow-up run to evaluate the result of following the actual catch advice from the harvest policies above. In other words each of strategies 2-7 should be run twice; once with a given sequence of harvest rates and then using the median catches obtained from the first run. If the catch for a given year under one of the harvest strategies exceeds the ABC for that year, the catch should be set to the ABC (this is done automatically in the rebuilding software).

These polices should be implemented within the projection calculations in the year for which the Council is making a decision. For example, for assessments conducted in 2013 (using data up to 2012), the harvest decisions pertain to OFLs, ABCs and ACLs for 2015 and 2016. In this case, the catches for 2013 and 2014 should be set to the ACLs established by the Council for those years.

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[5] The Spawning Potential Ratio (SPR) is a measure of the expected spawning output-per-recruit, given a particular fishing mortality rate and the stock's biological characteristics, i.e., there is a direct mapping of SPR to *F* (and *vice versa*). SPR can therefore be converted into a specific fishing mortality rate in order to calculate ACLs.

Many other harvest policies could be implemented by the Council. Consequently, analysts should be prepared to respond to requests by the Council for stock-specific projections on an individual case-by-case basis.

3. EVALUATING PROGRESS TOWARDS REBUILDING

There are no agreed criteria for assessing the adequacy of the progress towards rebuilding for species that are designated to be in an overfished state and are under a Rebuilding Plan. The SSC currently reviews each stock on a case-by-case basis, considering the following two questions: (1) have cumulative catches during the period of rebuilding exceeded the cumulative ACL that was available, and (2) what is the difference between the year in which recovery is predicted to occur under the current SPR ($T_{REBUILD}$) and the currently-adopted T_{TARGET}? If the difference between $T_{REBUILD}$ and $T_{TARGEST}$ is minor, progress towards rebuilding is considered to be adequate. In contrast, if the difference between $T_{REBUILD}$ and T_{TARGET} is major, it will be necessary to define a new T_{TARGET}. As an initial step in this direction, a new maximum time to rebuild T^N_{MAX} will be computed based on the specifications outlined in Section 5. Analysts will be asked to assess whether the currently-adopted SPR will readily rebuild the stock before T^N_{MAX}.

Adequacy of progress will be evaluated when the SSC groundfish subcommittee reviews the draft rebuilding plans. Analysts should provide the information needed to address the two questions listed above. If the SSC agrees that progress is not sufficient, the draft rebuilding analysis documents will need to be updated to include T^N_{MAX} and the probability that the currently adopted harvest rate (SPR) will rebuild the stock before T^N_{MAX}.

4. DECISION ANALYSES / CONSIDERING UNCERTAINTY

The calculation of T_{MIN} and the evaluation of alternative harvest strategies involve projecting the population ahead taking account of uncertainty about future recruitment. There are several reasons for considering model and parameter uncertainty when conducting a rebuilding analysis. For example, if several assessment model scenarios were considered equally plausible by the assessment authors or, alternatively, one model was preferred by the assessment authors and another was preferred by the STAR Panel. Accounting for implementation uncertainty (i.e. the realized catch differing from the set ACL) is needed for cases in which the catch of the overfished stock is likely to differ appreciably from the set ACLs.

The uncertainty associated with parameters, such as the rate of natural mortality and the current age-structure of the population, can also be taken into account. This can be achieved in a variety of ways. For example, if the uncertainty relates to the parameters within one structural model, this uncertainty can be reflected by basing projections on a number of samples from a distribution which reflects this uncertainty (such as a Bayesian posterior distribution or bootstrap samples). Alternatively, if there are multiple models (e.g. different structural assumptions regarding data weights, use of data sources, etc.) projections can be conducted for each model and the results appropriately weighted when producing the final combined results if the uncertainty pertains to alternative structural models. In the case of assessments for which a decision table has been produced, the weights assigned to each model on which the decision table is based would be those assigned by the STAR Panel (and endorsed/modified by the SSC). Implementation uncertainty can take many forms. Two common ways to model implementation uncertainty are (a) the realized catch is distributed about the ACL (i.e. the catch equals the ACL on average), and (b) the realized catch is distributed about the ACL, but the expected catch is less [or greater] than the ACL. The latter case is appropriate if past data suggest that ACLs will be undercaught given management arrangements.

5. DOCUMENTATION

The analysts are responsible for conducting a complete and technically sound rebuilding analysis that conforms to accepted standards of quality, and in accordance with these TOR. It is important for analysts to document their work so that any rebuilding analysis can be repeated by an independent investigator at some point in the future. Therefore, all stock assessments and rebuilding analyses should include tables containing the specific data elements that are needed to adequately document the analysis. Clear specification of the exact assessment scenario(s) used as the basis for the rebuilding analysis is essential. Linkages with the most recent stock assessment document should be clearly delineated (e.g., through references to tables or figures). This is important because assessments often include multiple scenarios that usually have important implications with respect to stock rebuilding. The rebuilding analysis document should follow the outline below.

1) Title page and list of preparers – the names and affiliations of the analysts either alphabetically or as first and secondary authors.
2) Summary – condensed overview and results of the rebuilding analyses.
3) Introduction – scientific name; years when species declared overfished; summary of assessment efforts (when first assessed, brief overview of subsequent assessments and rebuilding analyses).
4) Overview of the most recent stock assessment – main assumptions, estimated stock status, sources of uncertainty, alternative states of nature used in the decision table, median and 95% intervals for: (a) summary / exploitable biomass, (b) spawning output (in absolute terms and relative to the target level), (c) recruitment, (d) catch, (e) landings (if different from catch), (f) OFL, (g) ABC, and (h) SPR for the actual harvest strategy selected by the Council.
5) Management performance under rebuilding – brief overview and a table comparing Overfishing Limit (OFL), Annual Catch Limit (ACL), and catch (i.e., landings plus discard) for each year of the rebuilding period.
6) Rebuilding calculations
    - Specifications for the software used for the analysis (including the version number); date on which the analysis was conducted; the program's input files (should be included as an Appendix).
    - The rationale for the approach used to estimate B_0 and to generate future recruitment.
    - The biological information on which the projections are based (e.g. natural mortality rate by age and sex, individual weight by age and sex, maturity by age, fecundity by age, selectivity-at-age by sex (and fleet), population numbers (by age and sex) for the

year the rebuilding plan commenced, population numbers (by age and sex) for the present year).
  - Description of how fishing mortality is allocated (and selectivity applied) to each fleet for rebuilding analyses based on multiple fleets.
  - Description of how uncertainty in input parameters from the stock assessment in the rebuilding analysis is accounted for.
  - List and description of alternate rebuilding strategies analyzed.
7) Results
  - Summary of rebuilding reference points. For each alternative model, a table (see Table 1 for an example based on canary rockfish) should be produced which lists: (a) the year in which the rebuilding plan commenced, (b) the present year, (c) the first year that the evaluated harvest policy calculates the ACL, (d) T_{MIN}, (e) mean generation time, (f) T_{MAX}, (g) $T_{F=0}$, (h) the estimate of B_0 and the target recovery level, (i) the current SPR, (j) the current T_{TARGET} and (k) the estimate of current stock size.
  - Results of harvest policy projections (see, for examples, Tables 2-5; Figures 1-3). The following information should be provided for each harvest policy evaluated: (a) the first year in which recovery to the target level occurs with at least 0.5 probability, (b) the SPR for the first year of the projection period, (c) the probability of recovery by the current T_{TARGET}, (d) the probability of recovery by the current T_{MAX}, (e) probability of the stock dropping below the female spawning biomass in the present year and the year the stock was declared overfished, (f) tables of median time-trajectories (from the present year to T_{MAX}) of: (i) spawning output relative to the target level, (ii) probability of being at or above the target level, (iii) OFL, and (iv) ABC. Median time-trajectories of SPR should be provided for the projection based on the 40:10 rule (as applied to the ABC) and any phase-in harvest policies that have been specified.
8) Acknowledgements
9) Literature cited

The software and data files on which the rebuilding analyses are based should be archived with the stock assessment coordinator. Much of the biological information will be stored in the input file for the projection software and does not need to be repeated unless there is good reason to do so. For cases in which the projections take account of uncertainty about the values for the biological parameters (e.g., using the results from bootstrapping or samples from a Bayesian posterior distribution), some measure of the central tendency of the values (e.g., the mode or median) should be provided and the individual parameter values should be archived with the stock assessment coordinator. Rebuilding analyses may be based on selectivity-at-age vectors constructed by combining estimates over fleets. If this is the case, the rebuilding analysis needs to document how the composite selectivity-at-age vector was constructed.

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Table 1. Summary of rebuilding reference points for canary rockfish (based on Stewart (2007)).

Parameter	Values
Year declared overfished	2000
Current year	2007
First ACL year	2009
T_{MIN}	2019
Mean generation time	22
T_{MAX}	2041
$T_{F=0}$ (beginning in 2009)	2019
B_0	32,561
Rebuilding target ($B_{40\%}$)	13,024
Current SPR	0.887
Current T_{TARGET}	2063
SB_{2007}	10,544

Table 2. Results of rebuilding alternatives for canary rockfish (based on Stewart (2007)). (This table should include the OFL, ABC and ACL).

	Run #			
	1	2	3	4
50% prob. recovery by:	2019	2021	2035	2041
SPR_{TARGET}	100%	88.7%	62.0%	59.2%
2009 ACL (mt)	0.0	155.2	636.9	700.0
2009 ABC (mt)	936.9	936.9	936.9	936.9
2010 ACL (mt)	0.0	155.0	623.1	683.1
2010 ABC (mt)	941.4	935.4	916.7	914.2
Probability of recovery				
2071 (T_{MAX})	97.1%	84.6%	73.5%	70.0%
2048 (T_{MIN})	76.4%	75.0%	64.8%	56.9%
2053 ($T_{F=0}$ from 2007)	79.4%	75.3%	67.9%	61.3%
2063 (T_{TARGET})	91.4%	78.8%	72.0%	66.8%

Table 3. Probability of recovery for four rebuilding alternatives for canary rockfish (based on Stewart (2007)). Note that after 25 years the table is compressed.

	Run #			
	1	2	3	4
2007	0.250	0.250	0.250	0.250
2008	0.250	0.250	0.250	0.250
2009	0.250	0.250	0.250	0.250
2010	0.250	0.250	0.250	0.250
2011	0.250	0.250	0.250	0.250
2012	0.250	0.250	0.250	0.250
2013	0.250	0.250	0.250	0.250
2014	0.250	0.250	0.250	0.250
2015	0.250	0.250	0.250	0.250
2016	0.251	0.250	0.250	0.250
2017	0.284	0.257	0.250	0.250
2018	0.407	0.288	0.250	0.250
2019	0.550	0.366	0.250	0.250
2020	0.660	0.473	0.256	0.251
2021	0.702	0.561	0.260	0.256
2022	0.732	0.633	0.267	0.261
2023	0.742	0.681	0.279	0.267
2024	0.746	0.707	0.290	0.275
2025	0.749	0.725	0.309	0.281
2026	0.749	0.735	0.321	0.293
2027	0.749	0.742	0.341	0.300
2028	0.750	0.746	0.358	0.313
2029	0.750	0.746	0.376	0.324
2030	0.750	0.747	0.402	0.336
2031	0.750	0.749	0.424	0.348
2041	0.750	0.750	0.586	0.500
2051	0.781	0.751	0.671	0.601
2061	0.895	0.776	0.714	0.660
2071	0.971	0.846	0.735	0.700

Table 4. Median spawning biomass (mt) for four rebuilding alternatives for canary rockfish (based on Stewart (2007)). Note that after 25 years the table is compressed.

	Run #			
	1	2	3	4
2007	10,544	10,544	10,544	10,544
2008	10,841	10,841	10,841	10,841
2009	11,073	11,073	11,073	11,073
2010	11,258	11,197	11,010	10,985
2011	11,383	11,260	10,880	10,831
2012	11,463	11,274	10,701	10,627
2013	11,524	11,268	10,501	10,403
2014	11,607	11,280	10,318	10,197
2015	11,751	11,351	10,186	10,041
2016	11,987	11,508	10,133	9,964
2017	12,328	11,765	10,163	9,969
2018	12,738	12,089	10,251	10,029
2019	13,181	12,432	10,357	10,113
2020	13,685	12,838	10,520	10,247
2021	14,236	13,293	10,721	10,419
2022	14,773	13,731	10,909	10,583
2023	15,350	14,210	11,130	10,775
2024	15,941	14,674	11,345	10,966
2025	16,500	15,133	11,515	11,105
2026	17,015	15,536	11,679	11,251
2027	17,517	15,959	11,852	11,391
2028	18,045	16,348	11,999	11,515
2029	18,600	16,811	12,211	11,699
2030	19,093	17,183	12,329	11,799
2031	19,528	17,519	12,432	11,877
2041	23,511	20,635	13,491	12,751
2051	26,282	22,743	14,238	13,357
2061	27,862	24,058	14,655	13,689
2071	28,903	24,832	15,097	14,073

Table 5. Median catches (mt) for four rebuilding alternatives for canary rockfish (based on Stewart (2007)). Note that after 25 years the table is compressed.

	Run #			
	1	2	3	4
2007	0.0	44.0	44.0	44.0
2008	0.0	44.0	44.0	44.0
2009	0.0	155.2	636.9	700.0
2010	0.0	155.0	623.1	683.1
2011	0.0	157.5	621.9	680.2
2012	0.0	163.7	635.4	693.4
2013	0.0	171.5	654.9	713.1
2014	0.0	179.7	675.9	734.4
2015	0.0	186.9	691.6	750.1
2016	0.0	193.4	705.3	763.1
2017	0.0	198.7	713.8	770.8
2018	0.0	205.1	724.3	780.5
2019	0.0	210.6	733.9	789.5
2020	0.0	216.8	744.3	798.9
2021	0.0	222.0	753.8	807.8
2022	0.0	228.3	765.2	818.8
2023	0.0	234.0	769.3	821.3
2024	0.0	239.0	778.8	830.7
2025	0.0	245.3	786.9	837.4
2026	0.0	250.0	795.2	845.3
2027	0.0	257.0	807.6	856.9
2028	0.0	261.7	814.0	862.9
2029	0.0	267.3	821.5	868.6
2030	0.0	272.3	830.5	877.2
2031	0.0	276.5	836.3	882.5
2041	0.0	318.0	897.1	938.2
2051	0.0	346.9	937.3	972.9
2061	0.0	365.2	967.1	1,002.9
2071	0.0	377.7	985.9	1,019.3

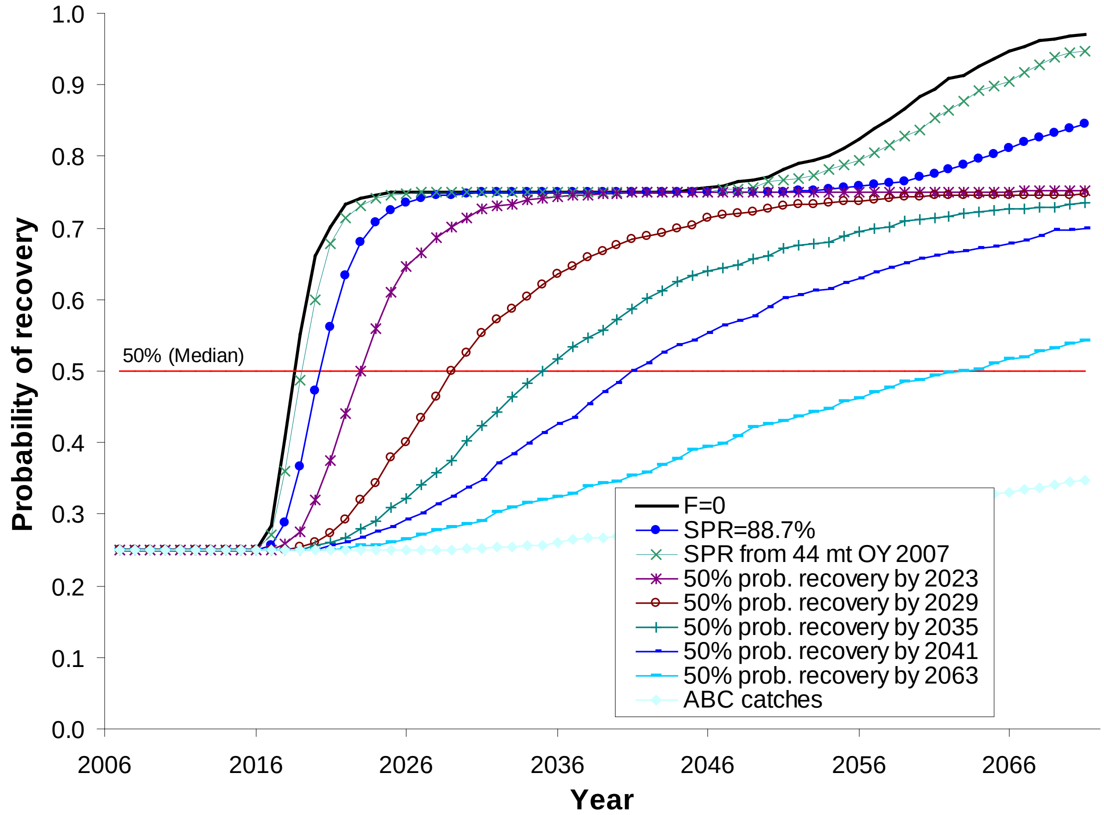


Figure 1. Probability of recovery for nine rebuilding alternatives for canary rockfish.

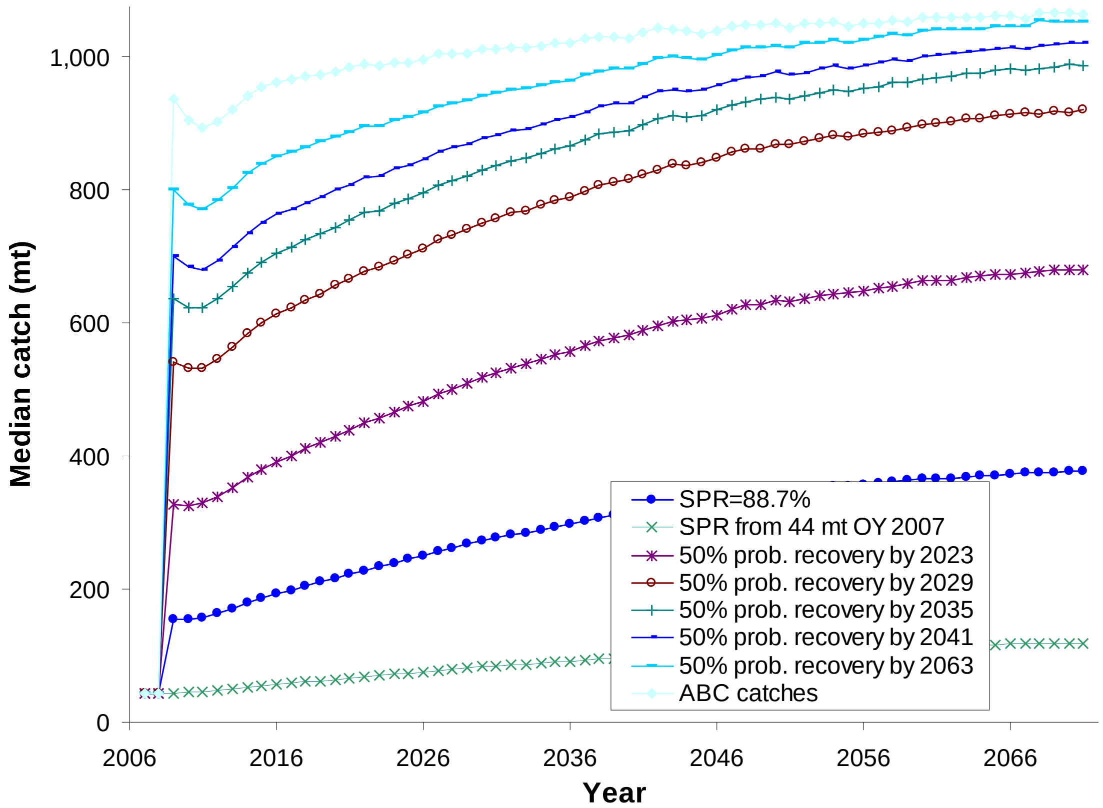


Figure 2. Projected median catch (mt) for nine rebuilding alternatives for canary rockfish.

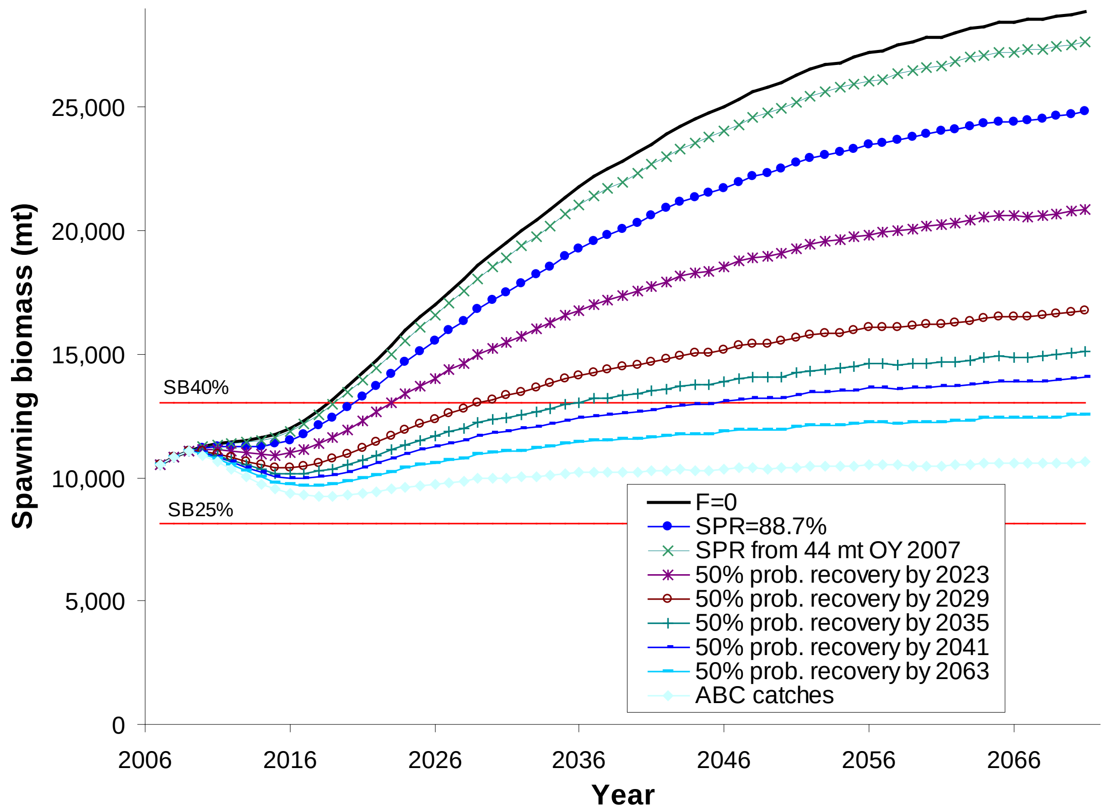


Figure 3. Projected median spawning biomass (mt) for nine rebuilding alternatives for canary rockfish.

Agenda Item F.8.a
Attachment 4
June 2014

TERMS OF REFERENCE

FOR THE

METHODOLOGY REVIEW PROCESS FOR GROUNDFISH AND COASTAL PELAGIC SPECIES

DRAFT

~~JANUARY 20~~MAY, ~~2012~~2014

Published by the Pacific Fishery Management Council

Introduction

This document lays out general procedures for methodology and data reviews related to the assessment and management of coastal pelagic species (CPS) and groundfish by the Pacific Fishery Management Council (Council). It clarifies the responsibilities of the proponents of new methods or data sets proposed for use in CPS or groundfish stock assessment and the responsibilities of participants in the review process. Each review is likely to have additional requirements that will be defined in a set of Specific Terms of Reference (TOR), which should conform to the general terms defined in this document. Although these General Terms of Reference focus on methodology and data reviews for CPS and groundfish stock assessments, they may be applied to methods in other areas, including economic analyses and ecosystem-based fishery management. In the text below the term "methodology review" should be understood to mean "methodology and data review".

The methodology review process provides for peer review as referenced in the 2006 Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA), which states that "the Secretary and each Regional Fishery Management Council may establish a peer review process for that Regional Fishery Management Council for scientific information used to advise the Regional Fishery Management Council about the conservation and management of the fishery" (MSRA section 302(g)(1)(E)). The peer review process is not a substitute for the Council's Scientific and Statistical Committee (SSC), and should work in conjunction with the SSC. This document will be included in the Council's Statement of Organization, Practices and Procedures as documentation of part of the review process that underpins the SSC's scientific advice.

Parties involved in implementing the peer review process described here are the Council; Council staff; members of Council Advisory Bodies, including the SSC; the relevant Management Team and Advisory Panel (CPSMT and CPSAS for CPS, and GMT and GAP for groundfish); the National Marine Fisheries Service (NMFS); state agencies; and interested persons (including external reviewers).

Unlike Stock Assessment Review (STAR) Panels, methodology review panels do not occur on a regular timetable but are instead established by the Council to provide peer and in-depth review of major changes to the methodology on which stock assessments are based. Consequently, the outcomes from a methodology review are recommendations regarding whether a particular methodology should be applied in future stock assessments, and on recommended (or required) improvements and modifications. Existing methodologies could be reviewed, particularly if they are key to stock assessments and have not been reviewed for many years or if incremental changes in how the methodology is applied have occurred.

Methodology reviews may be appropriate when a major new data source is introduced or when a major change in the stock assessment modeling is contemplated. In both cases, a methodology review is needed when the change(s) from how assessments have been conducted in the past are deemed to be more than what a STAR Panel can reasonably be expected to handle. The introduction of a new survey will generally require a methodology review, as will a change to a new stock assessment modeling platform. However, changes to the structure of a previously reviewed assessment model (e.g., changes in selectivity year-blocking) fall within the scope of a standard STAR Panel review.

No explicit guidelines for what topics can be covered in a methodology review are provided here, but typical examples would be evaluation of: (a) proposed major new data types which if included in an assessment could change its outcomes markedly (e.g., the aerial survey for Pacific sardine), (b) proposed changes to the design of existing surveys, (c) existing data inputs to assessments which have not been reviewed in depth by a Council-sponsored peer-review panel for many years (e.g., the egg production method for Pacific sardine), (d) data or model results that contribute to ecosystem-based management of CPS and groundfish stocks, and (e) proposed major changes to stock assessment methods that fall outside the scope of a normal STAR Panel review (for example, a change to the stock assessment modelling platform).

Changes to harvest control rules could also be considered by a methodological review. Care must be taken to separate the scientific analysis supporting the change (e.g. the structure and technical aspects of simulation studies used to compare a revised control rule against the *status quo*) and the management objectives used to measure performance (e.g. minimize year-to-year catch variance, maximize long-term average catch, etc.). The former are amenable to methodological review (provided adequate background analyses have been completed), but the latter are management decisions – not well suited to a methodological review.

These TOR reflect how previous methodology reviews have been undertaken. Nevertheless, no set of guidelines can be expected to deal with every contingency, and all participants should anticipate the need to be flexible and address new issues as they arise.

Methodology Review Goals and Objectives

The general goals and objectives for the methodology review process are to:

1. Ensure that research surveys, data collection, data analyses and other scientific techniques in support of CPS and groundfish stock assessments are the best available scientific information and facilitate the use of information by the Council.
2. Provide recommendations regarding whether, and if so, how a particular methodology can be applied in future stock assessments.
3. Meet the MSRA and other legal requirements.
4. Follow a detailed calendar and fulfil explicit responsibilities for all participants to produce required outcomes and reports.
5. Provide an independent external review of survey and analytical methods used to develop data to inform CPS and groundfish stock assessments.
6. Increase understanding and acceptance of CPS and groundfish research methodologies and review by all members of the Council family.
7. Identify research needed to improve assessments, reviews, surveys, analyses, and fishery management in the future.

Responsibilities of Methodology Review Participants

Shared Responsibilities

All parties have a stake in ensuring adequate technical review of stock assessments and the information on which they are based. The National Marine Fisheries Service (NMFS), as the designee of the Secretary of Commerce, must determine that the best scientific advice has been used when it approves fishery management recommendations made by the Council. The Council uses statements from the SSC to determine whether the information on which it will base its recommendation represents the "best available" science. Fishery managers and scientists providing technical documents to the Council for use in management need to ensure their work is technically correct.

The Council, NMFS, and the Secretary of Commerce share primary responsibility to create and foster a successful peer review process. The Council will oversee the process and involve its standing advisory committees, especially the SSC. The SSC will designate a member to coordinate, oversee, and facilitate each methodology review. Together, NMFS and the Council will consult with all interested parties to plan, prepare terms of reference, and develop a calendar of events for each methodology review and a list of deliverables for final approval by the Council. NMFS and the Council will share fiscal and logistical responsibilities and both should ensure that there are no conflicts of interest in the process[1].

The peer-review process is sponsored by the Council, because the Federal Advisory Committee Act (FACA) limits the ability of NMFS to establish advisory committees. FACA specifies a procedure for convening advisory committees that provide consensus recommendations to the federal government. The intent of FACA was to limit the number of advisory committees; ensure that advisory committees fairly represent affected parties; and ensure that advisory committee meetings, discussions, and reports are carried out and prepared in full public view. Under FACA, advisory committees must be chartered by the Department of Commerce through a rather cumbersome process. However, the Sustainable Fisheries Act exempts the Council from FACA per se, but requires public notice and open meetings similar to those under FACA.

Management Team Responsibilities

The Management Team (MT) is responsible for identifying and evaluating potential management actions based on the best available scientific information. In particular, the MT makes Annual Catch Limit (ACL) and Annual Catch Target (ACT) recommendations to the Council.

A representative of the relevant MT may be appointed by the MT chair and, if appointed, will serve as a liaison to the methodology review panel meeting and will participate in discussions. The MT representative will not serve as a member of the Panel. The MT representative should be prepared to advise the Panel on fishing regulations or practices that may influence data used in assessments and the nature of the fishery in the future (this will be more relevant for some of the topics which are considered by methodology reviews than others).

[1]The proposed NS2 guidelines state: “Peer reviewers who are federal employees must comply with all applicable federal ethics requirements. Peer reviewers who are not federal employees must comply with the following provisions. Peer reviewers must not have any real or perceived conflicts of interest with the scientific information, subject matter, or work product under review, or any aspect of the statement of work for the peer review. For purposes of this section, a conflict of interest is any financial or other interest which conflicts with the service of the individual on a review Panel because it: (A) Could significantly impair the reviewer’s objectivity; or (B) Could create an unfair competitive advantage for a person or organization. (C) Except for those situations in which a conflict of interest is unavoidable, and the conflict is promptly and publicly disclosed, no individual can be appointed to a review Panel if that individual has a conflict of interest that is relevant to the functions to be performed. Conflicts of interest include, but are not limited to, the personal financial interests and investments, employer affiliations, and consulting arrangements, grants, or contracts of the individual and of others with whom the individual has substantial common financial interests, if these interests are relevant to the functions to be performed. Potential reviewers must be screened for conflicts of interest in accordance with the procedures set forth in the NOAA Policy on Conflicts of Interest for Peer Review subject to OMB’s Peer Review Bulletin.”

Advisory Panel Responsibilities

It is the responsibility of the AP representative to ensure that AP concerns regarding the issue being reviewed are conveyed to the Panel. The chair of the AP may appoint a representative to participate in a methodology review. If appointed, the AP representative will serve as an advisor to the review meeting. The AP representative will participate in review discussions as an advisor to the Panel, in the same capacity as the MT advisor. The AP representative may provide appropriate data and advice to the review meeting and will report to the AP on the meeting.

Scientific and Statistical Committee Responsibilities

The SSC will assign at least one member to each methodology review. This member will chair the review meeting, and present the report of the meeting to the SSC and the Council. The SSC will review any additional analytical work arising from the review meeting, will serve as arbitrator to resolve disagreements that arose during the review meeting, and will make recommendations to the Council (e.g. whether the reviewed methodology provides the "best available science", and hence could be used for stock assessment and developing conservation and management measures).

Council Staff Responsibilities

Council staff will be assigned to coordinate, monitor and document the review process. Council staff will be responsible for timely issuance of meeting notices and distribution of appropriate documents. Council staff will coordinate with the panel chair and NMFS to assure that all documents are received on time, and are complete. Council staff will coordinate materials and presentations for Council meetings relevant to Council decision making. Council staff will also collect and maintain file copies of reports from each methodology review, the documents considered during the review, SSC, Management Team, and Advisory Panel comments and reports, letters from the public, and any other relevant information.

A primary role for Council staff assigned to each methodology review will be to monitor review meetings and SSC activities to ensure compliance with these TOR. Council staff will identify inconsistencies with the TOR that occur during review meetings and work with the panel chair to develop solutions and to correct them. Council staff will work with the panel chair to finalize the panel report and provide it to the Council.

National Marine Fisheries Service Responsibilities

NMFS will assign a coordinator to work with the Council, other agencies, groups, or interested persons that carry out assessment work to assist in organizing methodology reviews. The NMFS coordinator will identify independent panellists following criteria for reviewer qualifications. The costs associated with these reviewers will be borne by NMFS. The NMFS coordinator will work with methodology proponents to facilitate delivery of materials by scheduled deadlines and in compliance with other requirements of these terms of reference, to the extent possible and with the assistance of the assigned Council staff officer and the panel chair.

General Review Panel Responsibilities

The objective of a methodology review panel is to complete a detailed evaluation of a topic selected by the Council which could have a major impact on stock assessments or the provision of scientific advice and to make a recommendation regarding whether the methodology represents the best available scientific information for the Council. The general responsibilities of the Panel are to:

1. review documents pertinent to the topic under consideration;
2. evaluate the technical merits and deficiencies of the proposed method(s) during the panel meeting and work with the proponents to correct deficiencies;
3. provide recommendations for alternative methods or modifications to proposed methods, or both, as appropriate during the panel meeting;
4. provide recommendations on application of the methods to the stock assessment and/or management process;
5. document meeting discussions;
6. provide complete panel reports.

The panel chair has, in addition, the responsibility to:

7. review revised documents and panel reports before they are forwarded to the SSC.

Review panels may have additional responsibilities that are defined in the Specific Terms of Reference for the review.

Panel Composition

Methodology review panels normally include a chair, at least one "external" member (i.e., who is outside the Council family and not involved in management or assessment of West Coast fisheries, often designated by the Center for Independent Experts [CIE]), and at least two additional members. Selection of the external and independent panellists should aim for balance between outside expertise of the topic being reviewed and in-depth knowledge of West Coast fisheries, data sets available for those fisheries, and relevant modelling approaches. Reviewers should not have financial or personal conflicts of interest, either current to the meeting, within the previous year (at minimum), or anticipated. Panellists should be knowledgeable about the specific approaches being reviewed. In addition to panel members, methodology review meetings will include Council staff to help advise the Panel and assist in recording meeting discussions and results, and may include MT and AP representatives with responsibilities as laid out above. The length of a methodology review meeting will be selected by the SSC and could range one to five days.

The panel chair is responsible for: 1) developing an agenda, 2) ensuring that the Panel follows the TOR, 3) guiding the participants in the review (proponents and Panel) to mutually agreeable solutions, 4) coordinating review of documents, and 5) providing Council staff with a camera ready and suitable electronic version of the panel report. The Panel, those proposing the methodology, the MT and AP representatives, and the public are legitimate meeting participants that should be accommodated during discussions. It is the panel chair’s responsibility to manage discussions and public comment so that work can be completed.

Conduct of a Review

The Panel’s review solely concern technical aspects of the method. It is therefore important that the Panel strive for a risk neutral perspective in its reports and deliberations. Methods or results that have a flawed technical basis, or are questionable on other grounds, should be identified by the Panel and a recommendation made that they should excluded from consideration in developing management advice. The Panel should comment on the degree to which the uncertainty associated with the method being reviewed is quantified (e.g. through confidence or prediction intervals) because uncertainty is taken into account during the management process.

Recommendations and requests to the proponents for additional or revised analyses must be clear, explicit, and in writing. Panel recommendations and requests to the proponents should reflect the consensus opinion of the entire Panel and not the minority view of a single individual or individuals on the Panel. A written summary of discussion on significant technical points and lists of all panel requests and recommendations and requests to the proponents are required in the panel report, which should be completed (at least in draft form) prior to the end of the review meeting. It is the chair and Panel's responsibility to carry out any follow-up review of work that is required.

The Panel's primary duty is to conduct a peer review of the proposed methodology. Methodology panel meetings are not workshops, although the involvement of the Panel in shaping the methodology is greater during methodology reviews than during STAR Panels. This is particularly the case when the outside reviewers have considerably more experience with a given methodology than the proponents and the reviewers from within the Council family. In the course of this review, the Panel may ask for a reasonable number of additional analyses, as well as for additional details of the proposed methodology. It would not be unusual for this evaluation to result in a change to the initial methodology, provided both the Panel and the proponents agree. Panels are expected to be judicious in their requests of the proponents, recognizing that some issues uncovered during a review are best flagged as research priorities (and use of the methodology possibly deferred until those issues are resolved). The Panel should not impose as a requirement their preferred methodologies when such is a matter of professional opinion. Rather, if the Panel finds that a method is inadequate, it should document and report that opinion.

Panels and proponents are required to make an honest attempt to resolve any areas of disagreement during the review meeting. Occasionally, fundamental differences of opinion remain between the Panel and the proponents that cannot be resolved by discussion. In such cases, the Panel must document the areas of disagreement in its report. In exceptional circumstances, the proponents may choose to submit a supplemental report supporting its view, but in the event that such a step is taken, an opportunity must be given to the Panel to prepare a rebuttal. These documents will then be appended to panel report as part of the record of the review meeting. Panel members may have fundamental disagreements that cannot be resolved during the meeting. In such cases, panel members may prepare a minority report that will become part of the record of the review meeting. The SSC will then review all information pertaining to Panel or Panel/proponent disputes, and issue a recommendation.

Additional analyses required by the Panel should be completed by the proponents during the review meeting. It is the obligation of the panel chair, in consultation with other panel members, to prioritize requests for additional analyses. If follow-up work by the proponents is required after the review meeting, then it is the Panel's responsibility to track progress. In particular, the chair is responsible for communicating with proponents (by phone, e-mail, or any other convenient means) to determine if the revised analyses and documents are complete and ready to be presented to the SSC.

Review Panel Report

The panel chair is responsible for preparing the final draft of the panel report, obtaining the Panel's approval, and providing the report to the Council for inclusion in the Briefing Book. The chair will appoint members of the Panel (the "external" members and other members) to act as rapporteurs who will draft the report according to guidance by the panel chair on format and level of detail. The aim of the report is to provide information to the SSC on whether it should recommend the methodology for use in Council assessments and, if necessary, what additional work must be completed before the methodology can be used. The report is not meant as a detailed summary of the methodology, nor is it meant to be the minutes of the meeting. The report may include Appendices which summarize work presented to the Panel in response to requests. The chair will solicit comment on the draft report from the proponents and the MT and AP advisors. The purpose of this review is limited to ensuring that the report is technically accurate, and reflects the discussion that occurred at the meeting, and should not be viewed as an opportunity to reopen debate on issues. The chair will be the final arbiter on wording changes suggested by proponents and the MT and AP advisors—i.e., the report is the Panel's report of the meeting. Any detailed commentary by MT and AP advisors should be drafted separately, reviewed by full advisory body, and included in the Briefing Book.

Suggested Template for Methodology Review Panel Report

- Summary of the Methodology Review Panel meeting, containing:
  - names and affiliations of panel members;
  - topic(s) being reviewed; and
  - list of analyses requested by the Panel, the rationale for each request, and a brief summary the responses to each request.
- Comments on the technical merits and/or deficiencies of the methodology and recommendations for remedies. Comments should address each of the following issues:
  - What are the data requirements of the methodology?
  - What are the situations/stocks for which the methodology is applicable?
  - What are the assumptions of the methodology?
  - Is the methodology correct from a technical perspective?
  - How robust are results to departures from the assumptions of the methodology?
  - Does the methodology provide estimates of uncertainty? How comprehensive are those estimates?
  - Will the new methodology or data set result in improved stock assessments or management advice?
- Areas of disagreement regarding panel recommendations:
  - among panel members (including concerns raised by the MT and AP representatives); and
  - between the panel and proponents.
- Unresolved problems and major uncertainties, e.g., any issues that could preclude use of the methodology.
- Management, data or fishery issues raised by the public and MT and AP representatives during the panel review.
- Prioritized recommendations for future research and data collection.

General Responsibilities Proponents of New Methodology or Data Sets

New methods or data sets will be used in producing CPS or groundfish stock assessments (or in providing management advice) if there is a reasonable expectation that doing so will result in an improved assessment relative to a status quo assessment that did not use the new method or data set.

Proposing a New Methodology for Review

The proponents of new methods or data sets for use in CPS or groundfish stock assessments will submit a 1-2 page proposal for consideration by the SSC and the Council. The proposal should be submitted by the briefing book deadline of the appropriate Council meeting, and should address the following:

- Title
- Name of proposers (including the researchers who will participate at the methodology review and will be expected to conduct analyses during that review).
- How the proposed methodology will improve assessment and management for the stock(s) in question.
- Outline of methods (field and analytical).

Proponents of methods to be reviewed should be prepared to present their proposal to the SSC, the relevant MT, and the full Council. Proponents should also include a description of the funding, logistics, or other factors that would indicate the likelihood of success of the proposed methodology

The proposed methodology should be field tested, and preferably there will be available data for one or more years. Untested or experimental methods are typically not appropriate for this type of review.

Methodology reviews are intended for methods or data sets that apply to a range of stocks. A STAR Panel would be more appropriate for reviewing methods or data sets that apply to only one or to a small number of related stocks.

Responsibilities of Methodology Proponents

If the Council recommends review of the methodology, the proponents will appoint a representative to coordinate work with the Panel and attend the panel meeting. A representative of the proponents should attend the SSC meeting at which the outcomes from the panel review are discussed.

The proponents are responsible for preparing two versions of the methodology review document:

1) a "draft", including an executive summary, for discussion during the review meeting; and
2) a "final" version for presentation to the SSC, the Council, and the relevant Management Team and Advisory Panel.

The proponents will distribute "draft" documents fully describing the methodology to the Panel, Council staff, and the MT and AP representatives at least two weeks prior to the review meeting. The proponents are responsible for bringing analysis methods and relevant data (in digital format) to the review meeting so that data can be analyzed on site and sensitivity analyses conducted. In most cases, the proponents should produce a revised document outlining the methodology (and preliminary results / responses to the panel recommendations) three weeks after the end of the panel meeting (including any internal agency review).

The proponents and the Panel may disagree on technical issues, but “final” documents must include a point-by-point response by the proponents to each of the panel recommendations.

The draft and final reports on the methodology should include information that addresses the following:

- Data requirements of a new methodology or documentation of how information in a new data set was collected.
- The situations/stocks for which the methodology or data are applicable.
- The assumptions of the methodology and whether those assumptions are likely to be satisfied by data sets to which the method would be applied.
- An evaluation of robustness of the methodology to departures from the underlying assumptions.
- An application of a new methodology to real or simulated data, including an evaluation of the bias and accuracy of the results.
- An evaluation of how the new method(s) or data set(s) would improve stock assessments or the provision of management advice.

Agenda Item F.8.a
Attachment 5
June 2014

RECOMMENDED CHANGES TO THE GROUNDFISH/CPS STOCK ASSESSMENT TERMS OF REFERENCE, REFLECTING COASTAL PELAGIC SPECIES MANAGEMENT AND ASSESSMENT SCHEDULES

The edits below are recommended to bring the joint groundfish/CPS terms of reference in line with recent changes to the management and assessment schedules for Pacific sardine and Pacific mackerel. Suggested deletions are in strikethrough, and suggested additions are underlined.

Global: The term "HG control rule" should be changed to "harvest control rule."

Page 6 (In 2, Stock Assessment Prioritization):
"Stock assessments for Pacific sardine ~~and Pacific mackerel~~ are conducted annually, with full assessments occurring every third year, and update assessments during interim years. Full stock assessments for Pacific mackerel are conducted every four years, with catch-only projection estimates also conducted two years after each full assessment. Assessments for groundfish species….."

Page 7 (In 4.1, Shared Responsibilities):
Delete "assuring" and replace with "ensuring."

Page 11 (In *STAR panel requests for addition analyses*):
"…If the STAR panel agrees that important results have been generated, it should forward its findings and conclusions to the SSC and the Council for consideration in setting of OFLs, ABCs, and ACLs (for groundfish and CPS), and HGs (for CPS only). A key section of the assessment is that on research needed to improve the assessment. Highlighting research priorities should increase the likelihood that future stocks assessments can be raised to category 1."

Page 18 (In 6, Update Assessments):
"For ~~CPS~~ Pacific sardine, update assessments typically occur during two years out of every three. For Pacific mackerel, catch-only projection estimates occur every four years, alternating with full assessments. For groundfish, the initial…."

Page 26 (In Implementation for Pacific Sardine):

1. BIOMASS is the estimated stock biomass (ages 1+) at the start of the next year from the current assessment,
2. CUTOFF (150,000 mt) is the lowest level of estimated biomass at which harvest is allowed,
3. FRACTION is an environment-based percentage of biomass above the CUTOFF that can be harvested by the fisheries. Given that the productivity of the sardine stock has been shown to increase during relatively warm-water ocean conditions, the following formula has been used to determine an appropriate (sustainable) FRACTION value:

   FRACTION = $0.248649805(T^2) - 8.190043975(T) + 67.4558326$, where T is the running average sea-surface temperature at Scripps Pier, La Jolla, California during the three preceding years. Under the harvest control rule, FRACTION is constrained and ranges between 5% and 15% depending on the value of T.

4. U.S. DISTRIBUTION is the percentage of BIOMASS in U.S. waters (87%).

NOTE: at its April 2014 meeting, the Council adopted a new FRACTION formula and SST index for immediate use in calculating the sardine OFL, and for future use in calculating the HG, after the Council takes final action. The new FRACTION formula is $E_{msy} = -18.46452 + 3.25209T - 0.19723T^2 + 0.0041863T^3$, with the Temperature term (T) derived from the CalCOFI SST index.

Agenda Item F.8.b
NWFSC Report
June 2014

INITIAL STOCK ASSESSMENT PLANS AND TOR
NORTHWEST FISHERIES SCIENCE CENTER REPORT

Groundfish Stock Assessment Prioritization For 2015

In April, NWFSC provided the Council and its advisors with a table which summarized numerous informational elements relevant to the selection of species for 2015. Although the Council did not address this issue in April, Dr. Jim Hastie had opportunities to conduct productive, preliminary discussions with the SSC and GAP during that meeting. Those discussions have resulted in some revisions to the assessment suggestions for 2015 that were included in the April table (see attached). As in April, there has been no attempt to derive a systematic overall priority rating from the factors that are included in the table. Color-coding in the table is intended to draw attention to factors that support consideration of a species for assessment in 2015, with green representing the upper tier, and yellow the intermediate tier, *for that factor*.

The upper half of first page of the attached table focuses on species which we believe are the most compelling candidates for some level of assessment (or data report). The first columns indicate what level/type of assessment we think would be appropriate. Our highest priorities are marked with capital 'X's and highlighted in green (e.g. black rockfish), with less compelling choices designated by lower-case 'x's, in yellow. For several species, an assessment could be conducted as one of two or three different types, and the selection of a particular type (if any) will depend on workload considerations, species' priority, and other factors. The next set of columns summarizes information from the most recent assessment (excluding data-poor), if one exists. The column showing the year of the most recent assessment is colored green for stocks that are unassessed or were last assessed before 2009. Stocks assessed in 2009 or 2011 are colored yellow. This section includes the current category in which each species is managed, the last estimated depletion level, and an indicator for rebuilding stocks.

The next column shows the PSA (vulnerability) score for each species. Frequently, the highest PSA values are presented as red, to indicate the stocks' higher vulnerability. However, since greater vulnerability elevates the importance for assessing a stock, those values are colored green in this table. Next is a block of 5 columns containing information regarding the importance of each stock to commercial and recreational fisheries. The commercial columns show the ranking of each species, on the basis of shoreside, ex-vessel revenue (2008-2012), for all gears and for hook-and-line gears. The recreational columns rank species on the basis of landed catch amounts for the entire coast, for California, and for Oregon and Washington, combined. In addition to the green and yellow coloring, situations where rebuilding species ranked outside the top-30 but are constraining for a fleet were highlighted in pink. The next two columns report the estimated fishing mortality in 2012, for each species as a percentage of its ABC and OFL (or the species' contributions to assemblage ABCs and OFLs). Where necessary, catch and specifications were combined across multiple areas, for purposes of this table. The final column provides a qualitative indication of the suitability of the NWFSC's bottom-trawl survey to provide index and biological information to support an assessment. Species' cells for which the survey is most informative are colored green.

The list of species in the upper block of page 1 is a larger list than could likely be completed in 2015, even if the least time-consuming option were selected for each species. Given issues that arose in the 2013 data-moderate assessment and review process, it is probably desirable to limit the number of species assessed in that manner to 4, so that assessments using both modeling platforms can be completed and reviewed for each species. There should also be a balance between species utilizing survey and fishery CPUE abundance indices, as the latter are more analytically demanding. In many cases, models must be developed for multiple areas, which increases the development and review burden. The issue of single species requiring multiple assessment models is also a concern in the STAR process. Often, multiple modeling areas are dictated by differences in the available data, as with black rockfish. In determining how many species can be assigned to a particular STAR panel, attention should be paid to how many separate models the panel will be asked to review. Several of these are indicated by an 'x2' notation, after the species name.

Bocaccio, darkblotched, and petrale sole are suggested assessments, because they may have completed the process of rebuilding. Because petrale has had a full assessment in each of the last 3 cycles, it is suggested for an update. Bocaccio and darkblotched are suggested for full assessments, based the SSC's prior recommendations. Black rockfish is an extremely important species to both the commercial and recreational fisheries and has not been assessed since 2007. Similarly, canary rockfish received its last full assessment in 2007, and NWFSC staff have been working throughout the winter to review and streamline the inputs used in this assessment. Though widow rockfish was determined to be rebuilt in 2011, considerable uncertainty was associated with that finding. Given industry interest in renewing a targeted mid-water fishery for widow, a full assessment in 2015 is suggested. Given that black rockfish will likely be assessed with two separate area models, the strongly recommended species would fill 3 panels, leaving room for two additional species, or one requiring multiple models. At the April Council meeting, the SSC noted that current estimates of historical catch for kelp greenling in Oregon are very different from the time series that was used in the 2005 assessment of that area. This development makes Oregon kelp greenling a strong candidate for a new full assessment. The amount of kelp greenling biological data that is available from California fisheries is not believed to be adequate to support a full assessment.

The 2011 sablefish assessment showed the stock to be stabilizing after a period of decline during the late 2000s; however, its status was squarely in the middle of the precautionary zone. Given the economic importance of this species and the soundness of the last assessment, an update is suggested. Another stock suggested for an update is lingcod, last assessed in 2009. Although this species has been relatively lightly exploited, we are likely to be able to utilize student help in conducting the updates of the northern and southern models. Additionally, updating this assessment will support anticipated research by UW and The Nature Conservancy to examine the effects of lingcod predation on rockfish recovery.

The 2013 data-moderate assessment for northern China rockfish was a subject of considerable discussion at the March Council meeting. Barring the ability to establish a CPUE index for

China rockfish in Washington waters, it is suggested that, in 2015, a new data-moderate or full assessment be conducted for Oregon waters and California north of 40°10', along with a data-poor assessment for Washington. If the Council wishes to have China rockfish assessed with an area boundary at the OR-CA border, then the options suggested above would apply to Oregon waters. If a full assessment were chosen for the area including Oregon, with either boundary, the Council could consider adding a full for the corresponding California area. There is a considerable amount of recreational length data in California, however, the only age structures were collected prior to 1990. Oregon, on the other hand has considerable length data and age structures from recent commercial and recreational fisheries, and also has a nearshore logbook that may yield useful CPUE information. Several other species are identified as candidates for data-moderate assessments. Of these, only arrowtooth flounder and bank rockfish are apt to benefit from trawl survey abundance indices. The remaining species comprise a suite of important nearshore species that have not received full assessments since 2007, if ever. Data reports are suggested for yelloweye rockfish and Pacific ocean perch in 2015.

The lower part of page 1 shows information for all remaining previously-assessed, category 1 and 2 species. The second page of the table shows species that have only been assessed previously with data-poor methods. in the upper section, and a selection of the remaining species that have some high-priority aspects, in terms of PSA score, fleet importance, or ABC attainment. The last page of the table includes all of the remaining species for which only data-poor assessments have been conducted.

Although the Council is not scheduled to take final action on the 2015 assessment schedule until September, it would be very useful to have as clear a statement of Council priorities as is possible during the June discussion of this topic. Many of the species under consideration for full or update assessments have not been assessed for 5 or more years. In many such cases, there may be a substantial inventory of un-aged otoliths, and the additional 3 months of ageing time may be quite important.

A final important issue relating to planning and workload involves the management line that the Council intends to use for delineating northern and southern areas in the next round of specifications, and whether the Council is expecting that all existing data-poor and data-moderate assessments for such species would need to be re-modeled, with partitioning at the OR-CA border. This would require numerous new data-poor assessments, and potentially re-apportionment of catch limits for some other species. This workload could impact the number of other new assessments that could be conducted, and should be identified as a priority before other assignments are finalized.

Background Information Pertaining to Selection of Groundfish Stocks for Assessment in 2015.

Species	Suggestions for 2015 Assessments				Most Recent Assessment and Current Status					PSA	Fleet rank (2008-2012): Comm. $		Rec. mt			2012 catch as a % of		Survey info
	Full	UpD	D-M	Dat Rpt	Current Tier	Last year assessed	Type	Last Depl. N | S	Rbld?		All	H & L	All	CA	OR-WA	ABC*	OFL*	
arrowtooth fl.			x		2	2007	Full	79%		1.21	8	48	52		26	21%	17%	
bank rf			x		2	2000	Full			2.02	30	42	47	44		4%	3%	
black rf x2	X				1	2007	Full	53% | 71%		1.94	6	3	1	1	1	53%	51%	
blue rf			x		2	2007	Full	30%		2.01	33	17	4	9	5	33%	29%	
bocaccio	X				1	2013	Update	31%	Y	1.93	42	26	7	5	13	20%	19%	
CA scorpionfish			x		1	2005	Full	80%		1.41	36	20	5	4		65%	62%	
canary rf	X				1	2011	Update	23%	Y	2.01	46	67	17	19	12	8%	7%	
chilipepper	x	x			1	2007	Full	71%		1.35	14	27	30	29	39	17%	16%	
China rf	x		X		2	2013	D-M	37% | 66%		2.23	25	12	16	15	10	124%	104%	
cowcod	x			x	2	2013	Full	34%	Y	2.13	73	56	45	42		11%	9%	
darkblotched rf	X				1	2013	Full	36%	Y	1.92	22	24				22%	21%	
gopher rf			x		1	2005	Full	97%		1.76	12	7	10	7		42%	39%	
kelp greenling (OR)	x		x		1	2005	Full	49%		1.56	18	10	15	17	6	79%	59%	
lingcod x2	x	X			1	2009	Full	62% | 74%		1.55	7	5	2	2	2	28%	26%	
olive rf			x		3					1.87	47	31	13	13	31	21%	17%	
POP	x	x		X	1	2011	Update	19%	Y	1.69	31	43				6%	6%	
petrale sole	x	X			1	2013	Full	22%	Y	1.94	3	44	40	40	19	91%	87%	
quillback rf x2	x		x		3					2.22	35	18	20	28	7	169%	141%	
sablefish	x	X			1	2011	Full	33%		1.64	1	1	42	48	15	66%	63%	
widow rf	X				1	2011	Full	51%		2.05	28	41	33	32	17	6%	6%	
yelloweye rf	x			X	2	2011	Full	21%	Y	2.00	61	45	27	33	11	25%	24%	
starry flounder					2	2005	Full	50%		1.02	41	49	41	39	24	1%	1%	
longnose skate					1	2007	Full	66%		1.68	9	25	61		32	34%	33%	
cabezon					1	2009	Full	52% | 48%		1.48	10	4	11	12	4			
greenstriped rf					2	2009	Full	81%		1.88	45	60	38	36	26	3%	2%	
splitnose rf					1	2009	Full	66%		1.82	34	46				6%	6%	
blackgill rf					1	2011	Full	30%		2.08	15	9				77%	73%	
Dover sole					1	2011	Full	84%		1.54	2	33	57	53	37	17%	16%	
greenspotted rf					2	2011	Full	35%		1.98	53	34	18	16	32	11%	9%	
spiny dogfish					1	2011	Full	63%		2.13	29	23	31	30	23	41%	38%	
aurora rf					1	2013	Full	64%		2.10	38	30				116%	97%	
brown rf					2	2013	D-M	42%		1.99	13	6	9	6	20	57%	48%	
copper rf					2	2013	D-M	48% | 76%		2.27	32	16	8	8	9	65%	54%	
English sole					2	2013	D-M	89%		1.19	24	63	58	55	39	2%	2%	
longspine thd					2	2013	Full	75%		1.53	5	14				32%	27%	
Pacific sanddab					3	2013	Full	96%		1.25	20	22	12	10	21	9%	6%	
rex sole					2	2013	D-M	79%		1.28	16	64				15%	10%	
rougheye/blksp. rf					2	2013	Full	47%		2.27	23	15	28	26	37	375%	313%	
sharpchin rf					2	2013	D-M	89%		2.05	55	72				7%	6%	
shortspine thd					1	2013	Full	74%		1.80	4	2				41%	39%	
stripetail rf					3	2013	D-M	>77.5%		1.80	75	75	51	47		35%	29%	
yellowtail rf					1	2013	D-M	69%		1.88	11	29	6	11	3	36%	34%	

Key					
(green)	Higher Priority	X	Recommended	(pink)	Constraining (and not ranked in top-30)
(yellow)	Lower Priority	x	Potential	(orange)	From prior Data-Poor assessment

* In cases where individual ABCs and OFLs were not published for a species, its ABC- and OFL-contributions were used

Background Information Pertaining to Selection of Groundfish Stocks for Assessment in 2015. (cont.)

Species	Suggestions for 2015 Assessments				Most Recent Assessment and Current Status					PSA	Fleet rank (2008-2012): Comm. $		Fleet rank (2008-2012): Rec. mt			2012 catch as a % of		Survey info
	Full	UpD	D-M	Dat Rpt	Cur Tier	Last year	Type	Last Dep.	Rbld?		All	H & L	All	CA	OR-WA	ABC*	OFL*	
black and yellow rf					3					1.70	**21**	**11**	**21**	**20**	34	76%	63%	
calico rf					3					1.57	82	77	34	34		95%	91%	
flag rf					3					1.97	57	40	**25**	**24**	39	65%	55%	
grass rf					3					1.89	**17**	**8**	**23**	**22**	**25**	72%	60%	
honeycomb rf					3					1.97	78	69	**29**	**27**		96%	80%	
kelp rf					3					1.59	43	**28**	**22**	**21**		91%	76%	
redbanded rf					3					2.02	37	**21**	52	52	34	71%	59%	
shortraker rf					3					2.25	40	35				365%	304%	
squarespot rf					3					1.86	66	58	32	31		95%	79%	
starry rf					3					2.09	50	32	**14**	**14**		41%	34%	
tree rf					3					1.73	39	**19**	**24**	**23**		117%	98%	
vermilion/sunset rf					3					2.05	**27**	**13**	**3**	**3**	**8**	94%	79%	
redstripe rf					3					2.16	70	70	62	59	39	5%	4%	
bronzespotted rf					3					2.12	74	65						
California skate					3					2.12	69	73	55	50		5%	3%	
greenblotched rf					3					2.12	64	54	43	41		5%	4%	
speckled rf					3					2.10	63	51	**26**	**25**		27%	23%	
rosethorn rf					3					2.09	60	52				35%	29%	
tiger rf					3					2.06	54	36	36	45	**14**	274%	229%	
chameleon rf					3					2.03	65	55						
pink rf					3					2.02	79	79				34%	28%	
silvergray rf					3					2.02	62	59	49		**22**	2%	2%	
soupfin shark					3					2.02	44	50	46	43	39	6%	4%	
leopard shark					3					2.00	49	38	**19**	**18**		33%	23%	
big skate					3					1.99	58	71	48	46	**28**	24%	17%	
yellowmouth rf					3					1.96	52	47				6%	5%	
southern rock sole					3					1.95	48	61	39	38	34	32%	22%	
harlequin rf					3					1.94								
Swordspine rf					3					1.94	81	76	62	58		1%	0%	
rosy rf					3					1.89	56	39	50	50	**29**	20%	17%	
pinkrose rf					3					1.82	80	74	60	55				
Mexican rf					3					1.80	67	57	59	53		2%	1%	
spotted ratfish					3					1.72	71	66	54	48		9%	6%	
freckled rf					3					1.55	77	68						
pygmy rf					3					1.55	83	79						
halfbanded rf					3					1.38			35	35				
Pacific cod					3					1.34	**19**	37	44		**16**	29%	20%	
curlfin sole					3					1.23	68	62				30%	21%	
sand sole					3					1.23	**26**	53	37	37	**18**	16%	11%	
butter sole					3					1.18	72	79	55	57	**30**	72%	50%	
shortbelly rf					2				73%	1.13	76	78				0%	0%	
flathead sole					3					1.03	59	79				39%	27%	

Key	
(green)	Higher Priority
(yellow)	Lower Priority

* In cases where individual ABCs and OFLs were not published for a species, its ABC- and OFL-contributions were used

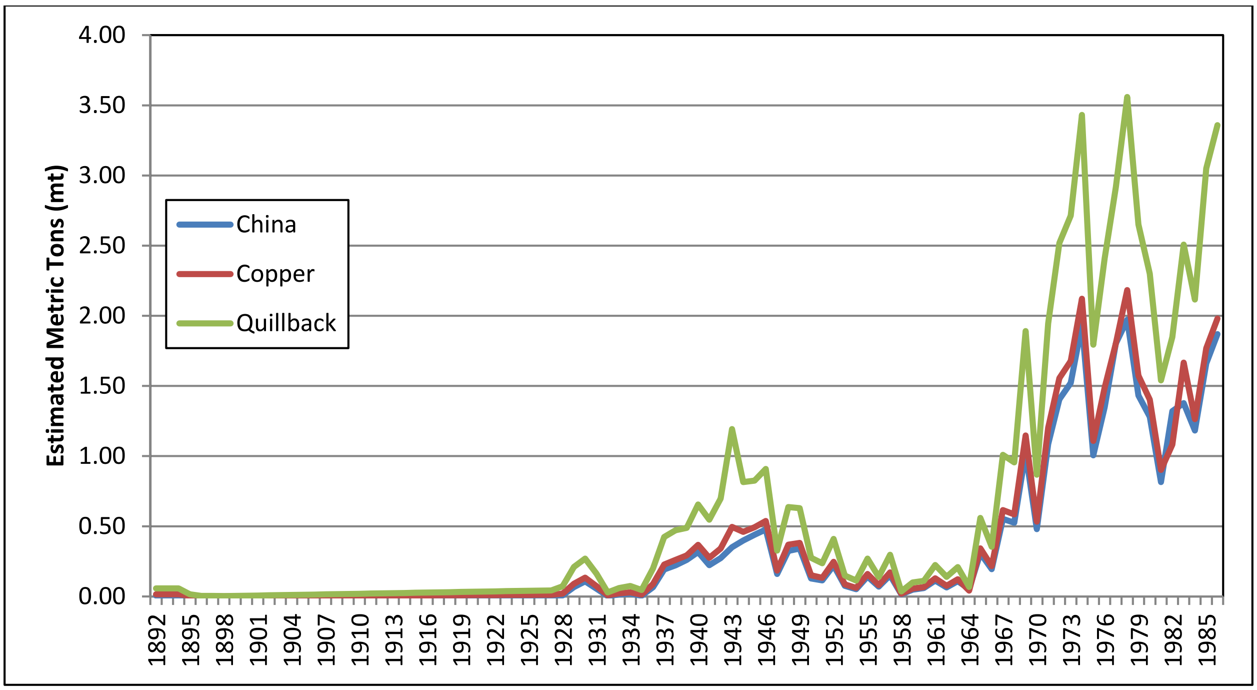
STOCK ASSESSMENT DATA AVAILABLE FOR KELP GREENLING, AND CHINA, COPPER AND QUILLBACK ROCKFISHES FOR THE 2015-16 STOCK ASSESSMENT CYCLE

This report details the Oregon Department of Fish and Wildlife (ODFW) data and information available for kelp greenling (*Hexagrammos decagrammus*), and china (*Sebastes nebulosus*), copper (*S. caurinus*) and quillback rockfishes (*S. malinger*). These data will help to inform decision makers as priorities are set for species assessments for the upcoming 2015-16 stock assessment cycle.

Commercial Data

Commercial catch: Most commercial catch of these species off Oregon is taken using hook and line gear types such as bottom longline, pole and line, or vertical longline. A relatively small amount is taken by trawl gear. Historical estimates of commercial catch are available for china, copper and quillback rockfishes in Oregon's commercial historical reconstruction (1892-1986; Karnowski et al. 2014; Figure 1). These estimates are based on several historical sources of data of large market categories to which species compositions are applied. These data are freely available from ODFW, in addition to an ODFW informational report (Karnowski et al. 2014) detailing the methodology that is available online[1]. There are no historical catch data available for kelp greenling in this reconstruction.

Figure 1: Oregon historical commercial catch reconstruction time series for china, copper and quillback rockfishes (1892 – 1986; Karnowski et al. 2014).



Contemporary commercial catches directly from ODFW are available via our fish ticket database (i.e. landing receipts), which feed directly into the Pacific Fisheries Information Network (PacFIN). These

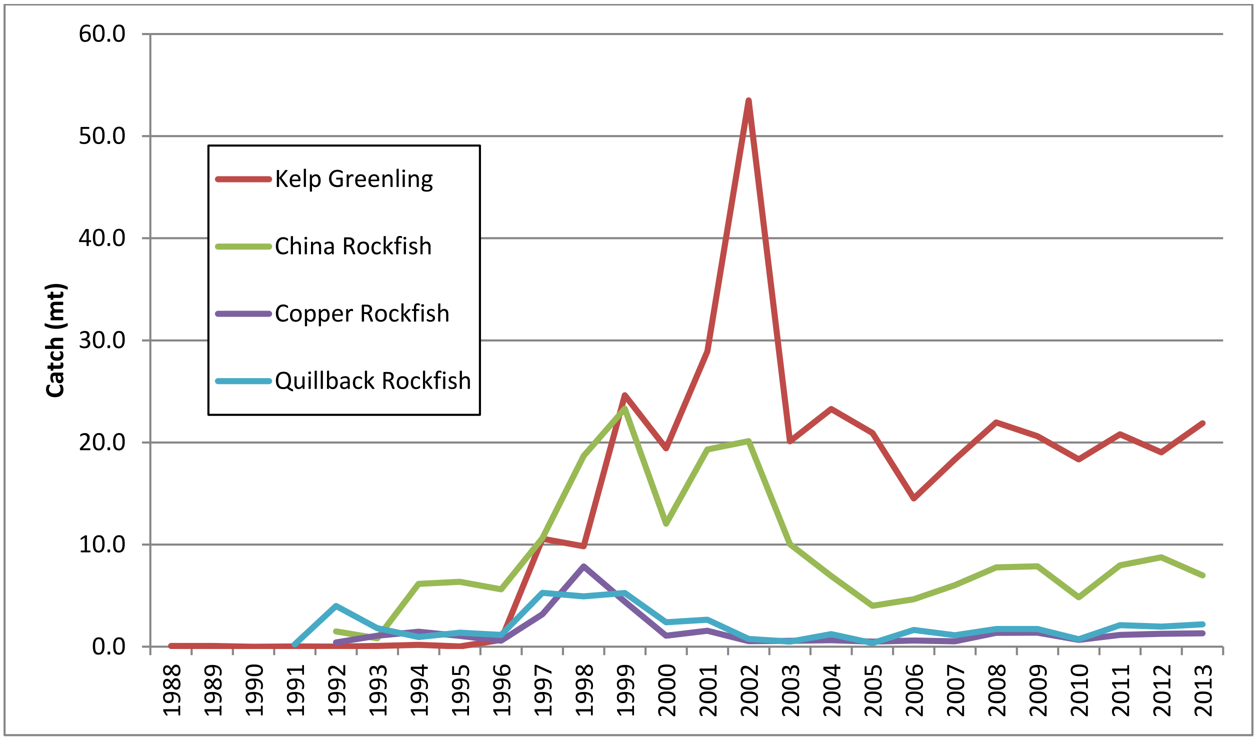
[1] http://www.dfw.state.or.us/MRP/publications/docs/ODFW_Info_Rpt%202014-02_Historic_Reconstruction_Oregon_Commercial_Fish_Landings.pdf

data are freely available to stock assessors, but ODFW staff can also assist assessors with obtaining PacFIN downloads or raw fish ticket information.

There are commercial landings available for kelp greenling from 1988 to present (Figure 2). In Oregon, kelp greenling are landed as part of a greenling market category that can include extremely minor amounts of rock greenling (*Hexagrammos lagocephalus*). Species compositions are routinely taken, but the market category is consistently > 99% kelp greenling. PacFIN does not allow for non-rockfish species compositions, but they are available directly from ODFW. Oregon greenling landings in PacFIN are also at the market category level (Greenlings; alpha code: KGL1).

There are PacFIN estimates of commercial landings for china and copper rockfish from 1992 to present and for quillback rockfish from 1991 to present (Figure 2). Prior to 1999, these three rockfishes were landed as part of the Other Rockfish market category (PacFIN alpha code: URCK; ODFW species code: 410) and from 2000 – 2007, they were landed as part of the Nearshore Rockfish market category (401). In 2008, the Nearshore Rockfish market category was separated into 11 individual nearshore rockfish species, including china, copper and quillback rockfishes, and these species have been recorded individually on fish tickets since that time. When the multi-species market categories were in place, species compositions were routinely collected by ODFW port biologists (Table 1; 1980-2013). In PacFIN, catch data for these three species prior to 2008 applies these species compositions to produce catch estimates by individual species. However, species compositions for fixed gear landings are sparse prior to 1991/1992 (Table 1), and the few that were taken did not contain any of the three species of interest. This leads to PacFIN estimates of zero catch for these species from 1981-1991/1992. On the other hand, the Karnowski et al. (2014) historical reconstruction used aggregated species composition and landing data from 1985-1993 to derive average proportions for each species in each market category, and applied these proportions to historical fixed gear catches to estimate species specific catches, including China, copper, and quillback rockfish. Methods similar to Karnowski et al. (2014) could be used to estimate catches for the time period which is not covered by the historical reconstruction and in which PacFIN estimates zero catch for these species. ODFW staff can assist with developing more exact methods for this application.

Figure 2: PacFIN commercial catch (mt) for china, copper and quillback rockfishes and kelp greenling (1988-2013).



Commercial discards: There are two potential sources of information for these four species, including the logbook program from the nearshore commercial groundfish fishery and the federal observer program, which observes this fishery as part of the observed fixed gear fleet. This fishery is a state-managed limited entry fishery that operates in nearshore waters and targets a variety of nearshore groundfish to supply primarily the live fish market. The limited entry permit program began in 2004. Annual logbook compliance in this fishery averages 85% (SD = 9.3%) from 2004 – 2013 and in recent years, has been greater than 95%. Data can be aggregated at the trip- or set-level and consist of pounds discarded (legal or sub-legal sized) by each of these four individual species. Additional work would be needed to evaluate the integrity of this data, as quality can depend on the species in question and a wide range of additional considerations. Though confidential, logbook data is available upon request from ODFW.

Additionally, the West Coast Groundfish Observer Program (WCGOP) observes the nearshore groundfish fishery as part of their non-catch share fishery observer program. From 2004 – 2011 (all years freely available), WCGOP observed an average of 7.6% of landings from the Oregon commercial nearshore fishery[2]. Annual summaries of the observed catch, discarded catch, and percent observed by species are available online[3] (Table 2). Disaggregated data are available to stock assessors directly from WCGOP.

[2] http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm

[3] http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm#obs

Commercial length/weight composition: ODFW port biologists routinely collect biological information from commercially landed catches throughout Oregon that include length, weight and age structures. These are commonly referred to as “market samples”. Length samples are available for china rockfish from 1995 – present, for quillback rockfish and kelp greenling for 1998 – present and for copper rockfish from 1999 – present (Table 3). Weights are available for copper and quillback rockfishes and kelp greenling from 2000 – present and for china rockfish in 1995 and 2000- present (Table 4). These data are available on request from ODFW or can be downloaded from PacFIN.

Commercial Ages: Table 5 shows the number of age structures collected for all available years for each species from market samples. Additionally, Table 6 shows those that have been aged and the percent of structures aged from the available years and overall. Most of the commercial catch is marketed live, which limits the number of age structures that can be obtained.

No market sample age structures from copper rockfish or kelp greenling have been aged, but most China rockfish and quillback rockfish structures have been aged. Age structures are also collected from the recreational fisheries and through special projects; however, the protocols for collecting samples from these programs differ from those collected as market samples. These samples are documented in later sections in this document.

Market samples also provide additional associated biological information, such as length and weights of landed fish, which would provide information on species- and Oregon- specific growth rates when combined with age structures.

Commercial CPUE: There are several sources available for commercial catch-per-unit-effort (CPUE) indices. The first potential source is the commercial nearshore fishery logbook program. As mentioned previously, this fishery is a state-managed fishery that operates in nearshore waters and targets a variety of nearshore groundfish. CPUE indices could be created using numbers of hooks, hours fishing, numbers of people, or combinations of these (e.g. hook-hours). These data could be aggregated at the trip- or set-level and consist of pounds landed by each of these four individual species. Additional work would be needed to evaluate the integrity of this data, as quality can depend on the species in question and a wide range of additional considerations. The second potential source is ODFW fish ticket data. These data would consist of catch per trip or per day. A final source would be the WCGOP, which observes the commercial nearshore groundfish fishery as part of their non-catch share fishery observer program. From 2004 – 2011 (all years freely available), WCGOP observed an average of 7.6% of landings from the Oregon commercial nearshore fishery[4]. Combinations of these data sources could also be a viable option for a CPUE index for any of these four species. For example, catch could be estimated from fish tickets and combined with an effort estimate from the nearshore logbooks.

Recreational Data

Recreational catch: Recreational catch estimates have been derived from at least three distinct sampling programs, which have varied in occurrence, sampling protocols, and estimation methods over time. The basis for catch estimates available from the Recreational Fishery Information Network (RecFIN) also vary over time (Table 7).The Oregon Recreational Boat Sampling (ORBS) has been collecting data on sport catch and effort since the late 1970s. These data are available from 1979 – present for all four species in various forms and represent ocean boat catches only. From 1979 to 1989, there are ORBS data available in numbers of fish by individual species (Figure 3). Since monitoring sport salmon catches is the primary focus of ORBS, data on other species during this early time period were aggregated to a set of five categories. All rockfish species were part of a generic “rockfish” category and kelp greenling were part

[4] [4] http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm

of a “miscellaneous” category. Data from these categories were separated by species using species composition data taken during the same time period, though potentially, these compositions were not taken methodically. The level at which species compositions were collected in ORBS has changed over the years. Figure 4 documents how trip type classifications and protocols for collecting species compositions have changed over time in ORBS. These data would need to be expanded to account for unsampled ports and time periods, but similar expansions have been developed for other species, including yelloweye rockfish (2009) and cabezon (2009) for other assessments. These data are only available by request from ODFW and are not available on RecFIN.

Figure 3: Numbers of fish (unexpanded) for kelp greenling, and china, copper and quillback rockfishes in legacy ORBS data.

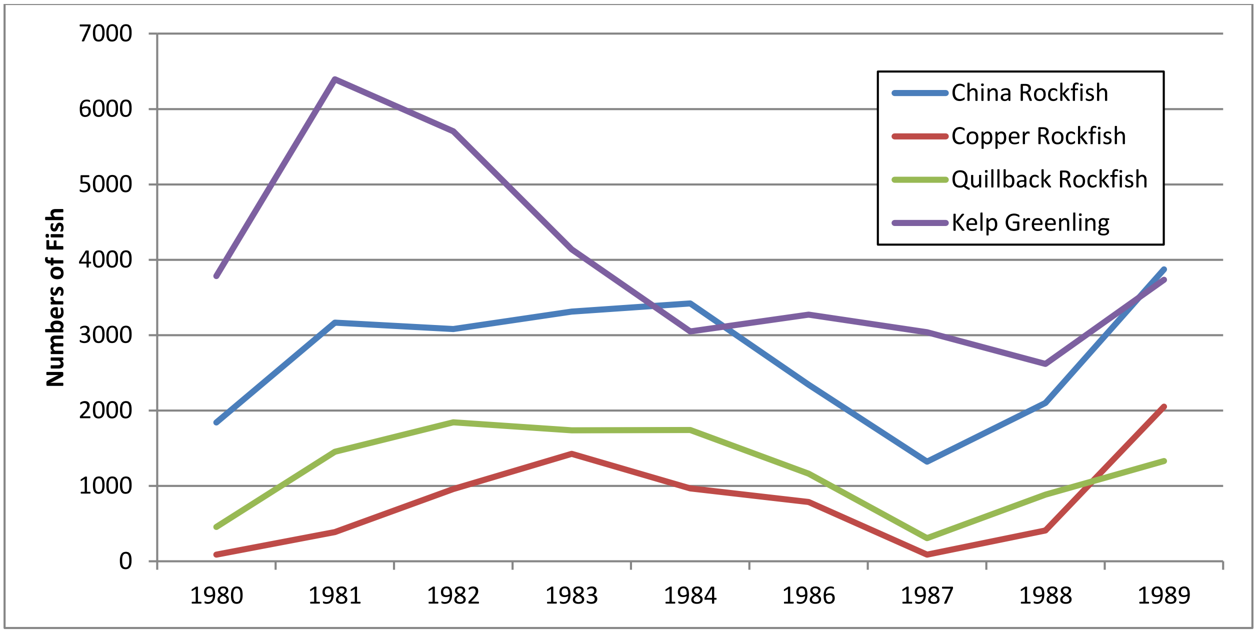
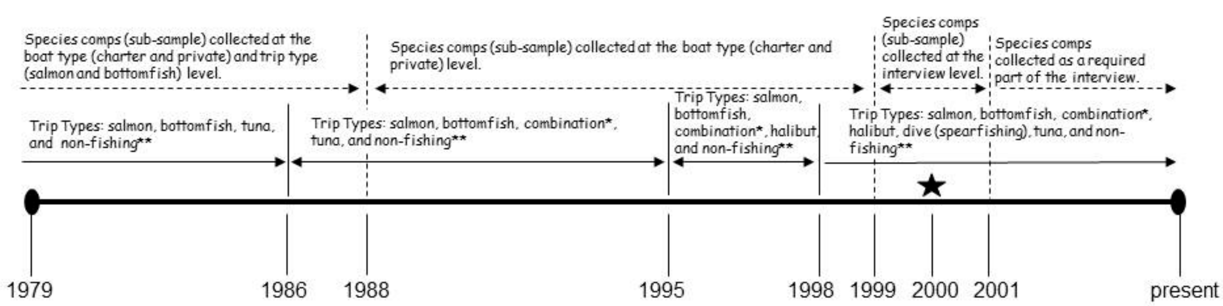


Figure 4: Timeline of bottomfish species composition collection and sampling, 1979 – present.



* From 1986-1994, the “combination” trip type was assigned only to charter trips that targeted both salmon and bottomfish. From 1995-1997, the “combination” trip type was assigned to both charter and private trips that targeted salmon and bottomfish. In 1998, the definition of “combination” was expanded to include any trip that targeted salmon and another species/species group (e.g. salmon/halibut, salmon/bottomfish, etc.)

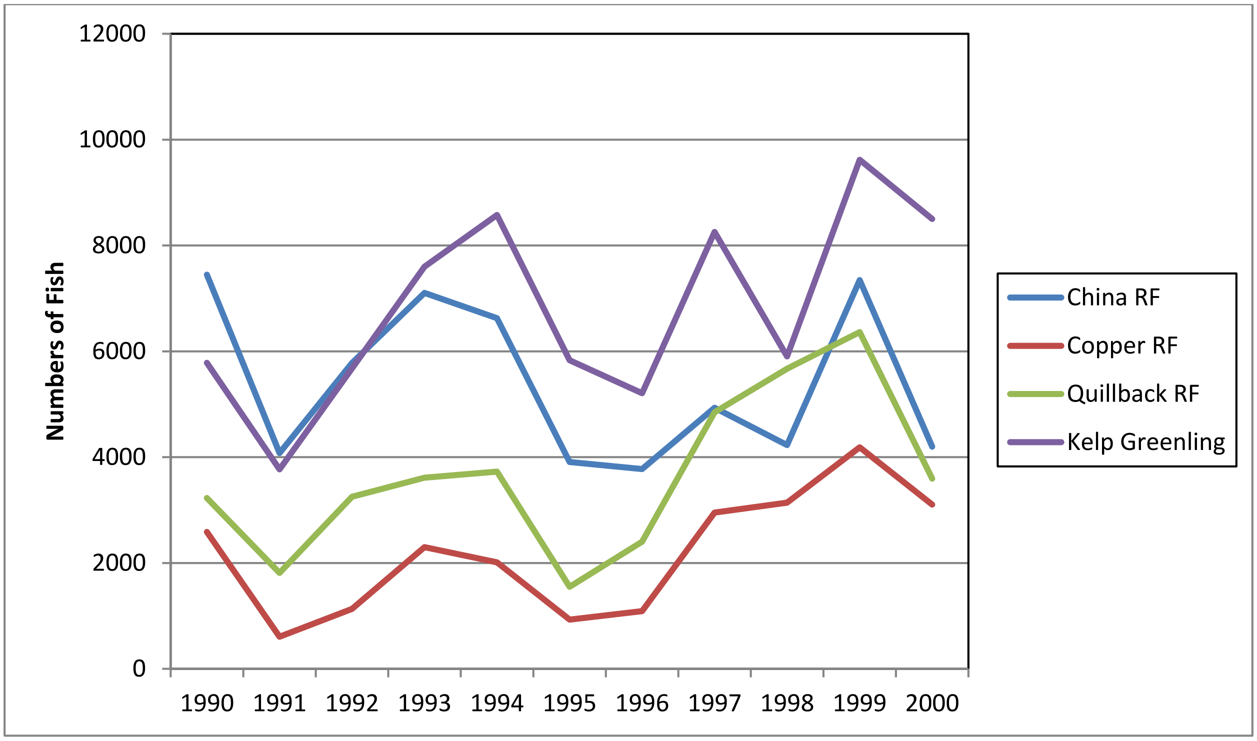
** From 1979-1998, dive trips on which anglers spearfished were included in the “non-fishing” trip type category.

★ From 1979-1999, information was collected on bottomfish catch only; no information was collected on released bottomfish. In 2000, samplers collected data on released lingcod and halibut. From 2001-present, samplers collect information on releases of all bottomfish.

There are also ORBS data from 1990 – 2000 with applied species compositions that are expanded for unsampled ports and times (Figure 5). These data constitute the ocean boat catches in RecFIN from 1993 to 2000 and consist of numbers of fish. It is unclear at this time why data from 1990-1992 were not included in the RecFIN database, but it is available directly from ODFW. From 1993 to present, all ocean boat mode data on RecFIN are from ORBS, and are available directly from RecFIN or from ODFW.

To convert numbers of fish to biomass, measurements of fish weights are needed. These sources are discussed in another section below. For the yelloweye rockfish and cabezon assessments, average weights from RecFIN were used, in addition to internal ODFW sources, such as ORBS or from specific special projects.

Figure 5: Numbers of fish (expanded for unsampled ports and times) for kelp greenling, and china, copper and quillback rockfishes in legacy ORBS data. Data shown from 1993-2000 are available on RecFIN.



ORBS data represent ocean boat data (charter and private) only. There are data on other fishing modes from the Marine Recreational Fisheries Statistics Survey (MRFSS), available on RecFIN from 1980 – 2003. These modes include several shore based categories, including "man-made" and "beach/bank", or a combined "shore modes". From 1980 to 1989, recreational ocean boat catches are also from MRFSS. There are no data on RecFIN from 1990-1992. Annual catch estimates for MRFSS shore modes are sporadic for both china and quillback rockfish (non-zero catch estimates in five years and six years between 1980 and 2003, respectively), but are more consistent for copper rockfish (non-zero catch estimates in 19 years between 1980 and 2003). There are non-zero kelp greenling catch estimates for MRFSS shore modes for all years between 1980 and 2003. However, ODFW cautions that the kelp greenling estimates may be inflated and are working to find alternative data sources to document shore-side catches.

There are also shore-based catch data available from the Shore and Estuary Boat Survey (SEBS) from mid-2003 to mid-2005. This survey was an extension of the MRFSS protocols with a few minor changes.

Catch estimates are available on RecFIN. There are no recent estimates of shore-based catches after SEBS was terminated in 2005. There are no catch estimates for china rockfish in SEBS, but the other three species are available.

Recreational discard: There are MRFSS estimates for discarded catch available on RecFIN from 1980 – 2000. For selected fishing modes, china rockfish discards are available from 1980 – 1989, quillback rockfish discards are available in 1982 and 1984 and copper rockfish for 1980-1982, 1987 and 2002. Kelp greenling discards are available from 1980 – 2003.

ORBS has also been collecting information on discarded fish since 2001 (Table 8). These data consist of numbers of fish discarded and are collected when anglers are interviewed dockside. These data are also expanded for unsampled days using boat counts in each sampled port. The expanded data are available on RecFIN from 2001 to present.

An additional source of recreational discards includes the State Sport Observer (SSO) program, which the ODFW maintains as a state program to observe on-board activity of the charter boat (CPFV) fleet. The SSO program was initiated as a pilot program in 2001, and became a permanent program in 2003. Recently, staff from ODFW and the Southwest Fishery Science Center developed a relational database with the data collected in this program (Monk et al. 2013). These data are confidential but available by request through the ODFW. Data are aggregated at the drift- or trip-level and consist of numbers of discarded fish by individual species (Table 9).

Recreational length/weight composition: MRFSS has annual average lengths and weights for all four species on RecFIN from 1980 – 1989, though not for each mode for all those years.

ORBS subsamples recreational catch to obtain biological data, such as length, weight, sex (when applicable) and scans for various types of tags. Average lengths and weights from 1993 to present in RecFIN are based on ORBS data. The number of length and associated weight samples for each of the four species from ORBS is available in Table 10 (2001-2014). ODFW notes that the average lengths and weights available on RecFIN are different than those based on the raw data because of the post-processing protocols that RecFIN applies to those data.

Limited information is available on discard lengths from the SSO database. Lengths are only collected on discarded fish, but can be compared to retained catch length compositions recorded by the ORBS program. Initially, observers measured as many discarded fish as possible (2003-2009) but more recently, as many as possible were measured but no more than 10 fish per drift (2010 – present). Samples are very limited for all three of the rockfish species (n = 41 for all three), but samples are slightly higher for kelp greenling (n = 81). Minimum size limits for kelp greenling have been in place in the recreational fishery since 2004. Fish weights (W) are calculated in the database using fork length (L; equation: $W = aL^b$), but are not directly measured at sea.

Recreational Ages: Age structures are collected from recreational fisheries routinely, but the majority of structures collected from these species have not been aged. There have been recreational structures collected for all four species from 1998 to present (Table 11). There were some kelp greenling samples aged from the majority of those years, but the three rockfishes were only aged in a relatively small number of years (Tables 12 and 13). These recreational samples also provide additional associated biological information, such as length and weights of fish, which would provide information on species- and Oregon- specific growth rates when combined with age structures.

Recreational CPUE: There are effort data available from ORBS from 1986 to 2000 in numbers of trips and anglers. These data are also expanded to account for unsampled times in the sampled ports. However, these data have not yet been disaggregated to the species-level, and are currently only available at the category levels mentioned previously (e.g. rockfish and miscellaneous).

From 2001 to present, ORBS has effort estimates of numbers of boats and anglers. Angler effort is estimated from the interview and boat counts are obtained through a camera network in the major ports. ORBS also collects information on hours fished during interviews; however, this can be a misleading estimate of time actually spent bottomfishing, as trips are often combinations of several types of fishing and crabbing.

Additionally, there are effort data from the MRFSS and SEBS programs available (1980 – 2005, collectively). Interview-level data, which contains estimates of catch per angler, can be requested directly from RecFIN.

The SSO database also contains information on effort of the recreational charter fleet (Monk et al. 2013). These data can be aggregated at the trip- or drift-level, depending on the type of effort measurement, and consist of number of observed anglers, drift hours, and some information on gear at the trip level, including number of hooks. As part of the Council's "data-moderate" assessment process, CPUE indices for copper and china rockfish have been developed from this data.

Special Project and Research Biological Data

Length, weight, age structures and other biological data are often collected by ODFW for "special projects" and research. Special project samples are typically fishery samples collected in a manner similar to commercial market samples or recreational age samples. They may represent targeted sampling for a specific purpose (e.g., estimating maturity curves, see next paragraph), or samples that did not meet standard protocols for any number of reasons. Depending on how they were collected, a number of these samples may be integrated with standard fishery samples, especially where sample size is lacking. These samples are often associated with additional material such as maturity status, gonad samples, or tissue samples. The same types of information are also collected during targeted, fishery independent research projects which often mimic commercial or recreational fishing practices. Tables 14, 15, 16, 17, and 18 tabulate the number of available lengths, weights, age structures, ages, and percent of structures aged respectively by species and source for special project and research samples. Samples designated as from an unknown source are typically fishery samples that lack a record of whether they were collected from a recreational or commercial fishery.

Maturity Information

In 2011, ODFW staff published a report that detailed age- and length-at-maturity data for quillback rockfish and length-at-maturity for china rockfish (Hannah and Blume 2011). Additionally, in 2014, ODFW staff published a report that detailed age- and length-at-maturity for copper rockfish (Hannah 2014). These data are based on histological evaluation of ovaries, generally considered more reliable than macroscopic evaluation. Samples were collected from recreational landings on the central Oregon coast.

ODFW efforts continue to evaluate length- and age-at-maturity for kelp greenling in Oregon waters. A recent review of available maturity samples revealed a critical data gap for kelp greenling less than 25 centimeters. In 2013, efforts to collect fish through fishing, beach seining and trapping have yielded new samples in the appropriate size range that are currently being processed. Additional sampling efforts are anticipated in 2014.

Regulations

Management and regulation changes over time dramatically impact the context in which fishery-dependent data is viewed. ODFW has compiled information on regulation and major management changes over time for both commercial and recreational groundfish fisheries in a database format. The SSO database contains a table with all relevant sport regulations from 2001-2010. These are available to assessors upon request.

New Black Rockfish Assessment Data

All of the Oregon data sources utilized in the 2007 assessment are available with updated information. This includes additional catch, biological (length, weight and age) and tagging data. Additionally, black rockfish landings are estimated in the commercial historical reconstruction (1892 – 1986). More details on how the historical catch estimates were developed are available in Karnowski et al. 2014.

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Tables

Table 1: Number of species composition samples taken by market category for longline and hook and line gear types, and number with China, copper and quillback rockfishes from 1980 – 2013.

<table>
<tr><th rowspan="2">Year</th><th colspan="2">n samples taken</th><th colspan="3">n samples with species</th></tr>
<tr><th>Other Rockfish (410)</th><th>Nearshore Rockfish (401)</th><th>China Rockfish</th><th>Copper Rockfish</th><th>Quillback Rockfish</th></tr>
<tr><td>1980</td><td>0</td><td rowspan="20">NA</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1981</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1982</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1983</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1984</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1985</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1986</td><td>6</td><td>2</td><td>1</td><td>1</td></tr>
<tr><td>1987</td><td>8</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1988</td><td>26</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1989</td><td>26</td><td>0</td><td>0</td><td>0</td></tr>
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<tr><td>1991</td><td>17</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td>1992</td><td>109</td><td>14</td><td>6</td><td>13</td></tr>
<tr><td>1993</td><td>113</td><td>13</td><td>9</td><td>19</td></tr>
<tr><td>1994</td><td>99</td><td>29</td><td>15</td><td>20</td></tr>
<tr><td>1995</td><td>35</td><td>14</td><td>3</td><td>4</td></tr>
<tr><td>1996</td><td>51</td><td>18</td><td>6</td><td>12</td></tr>
<tr><td>1997</td><td>65</td><td>34</td><td>13</td><td>28</td></tr>
<tr><td>1998</td><td>83</td><td>63</td><td>29</td><td>37</td></tr>
<tr><td>1999</td><td>133</td><td>101</td><td>48</td><td>73</td></tr>
<tr><td>2000</td><td rowspan="8">NA</td><td>176</td><td>152</td><td>32</td><td>42</td></tr>
<tr><td>2001</td><td>238</td><td>213</td><td>57</td><td>71</td></tr>
<tr><td>2002</td><td>363</td><td>321</td><td>32</td><td>52</td></tr>
<tr><td>2003</td><td>236</td><td>220</td><td>27</td><td>26</td></tr>
<tr><td>2004</td><td>207</td><td>174</td><td>30</td><td>49</td></tr>
<tr><td>2005</td><td>96</td><td>75</td><td>9</td><td>13</td></tr>
<tr><td>2006</td><td>145</td><td>112</td><td>19</td><td>30</td></tr>
<tr><td>2007</td><td>142</td><td>123</td><td>25</td><td>34</td></tr>
<tr><td>2008</td><td rowspan="6" colspan="2">Nearshore groundfish coded to species on fish tickets; species composition samples used to estimate sorting contamination</td><td>44</td><td>14</td><td>23</td></tr>
<tr><td>2009</td><td>103</td><td>12</td><td>32</td></tr>
<tr><td>2010</td><td>151</td><td>26</td><td>34</td></tr>
<tr><td>2011</td><td>40</td><td>47</td><td>85</td></tr>
<tr><td>2012</td><td>0</td><td>2</td><td>5</td></tr>
<tr><td>2013</td><td>2</td><td>2</td><td>3</td></tr>
</table>

Table 2: Aggregated WCGOP data for China, copper, and quillback rockfishes and kelp greenling. Data are from 2004-2012 (all years available). (Data downloaded from: http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm#obs)

Species Name	Average Annual Observed Catch (mt)	Average Annual Observed Discarded Catch (mt)	Average Annual Percent Discarded
China Rockfish	0.57	0.04	6.8%
Copper Rockfish	0.08	0.00	4.2%
Quillback Rockfish	0.11	0.01	13.1%
Kelp Greenling	1.64	0.27	16.0%

Table 3: Number of length samples from commercial market samples for China, copper and quillback rockfishes, and kelp greenling.

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
	102	0	0	0
1996	118	0	0	0
1998	138	0	4	165
1999	130	10	25	192
2000	1232	85	200	1442
2001	2054	92	214	2898
2002	1592	28	59	3870
2003	994	40	49	1696
2004	701	53	134	2561
2005	217	11	20	1639
2006	438	41	140	1993
2007	724	32	127	2068
2008	376	19	55	1539
2009	430	15	64	1146
2010	529	42	69	1829
2011	997	80	191	2524
2012	603	59	151	1597
2013	688	63	214	2382
Total	**12063**	**670**	**1716**	**29541**

Table 4: Number of weight samples from commercial market samples for China, copper and quillback rockfishes, and kelp greenling.

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
1995	92	0	0	0
1996	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	1	4	20	6
2001	70	9	8	3
2002	533	21	45	474
2003	369	28	18	247
2004	591	53	65	1152
2005	206	11	20	578
2006	428	38	73	1456
2007	712	31	127	2068
2008	363	19	54	1539
2009	423	12	59	1123
2010	513	34	63	1821
2011	992	80	191	2506
2012	594	45	129	1569
2013	676	61	211	2325
Total	**6563**	**446**	**1083**	**16867**

Table 5: ODFW market sample age structures for China, copper and quillback rockfishes and kelp greenling (1995-2013).

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp greenling
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	1	0	0	0
2001	72	0	0	0
2002	125	1	3	0
2003	185	9	9	41
2004	58	27	63	0
2005	16	0	1	0
2006	30	1	63	0
2007	40	2	2	17
2008	34	1	10	19
2009	80	1	17	35
2010	67	6	14	49
2011	309	18	97	90
2012	153	11	102	100
2013	268	31	117	151
Total	**1438**	**108**	**498**	**502**

Table 6: ODFW number and percent aged from market samples for China and quillback rockfishes (note that other samples for all species have been aged through special projects not included here). No age structures from market samples have been aged for copper rockfish or kelp greenling.

Year	Number Aged		Percent Aged	
	China Rockfish	Quillback Rockfish	China Rockfish	Quillback Rockfish
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	63	0	88	0
2002	121	2	97	67
2003	181	9	98	100
2004	55	63	95	100
2005	14	1	88	100
2006	29	63	97	100
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
Total	**463**	**138**	**32**	**28**

Table 7: Available sources of recreational catch estimates including basis for RecFIN estimates

<table>
<tr><th></th><th colspan="2">Available catch estimates by sampling program</th><th colspan="2">Basis for RecFIN estimates</th></tr>
<tr><th>Year</th><th>ORBS</th><th>MRFSS</th><th>Ocean boat fishing modes</th><th>Shore and estuary fishing modes</th></tr>
<tr><td>1979</td><td rowspan="11">Catch estimates for ocean boat fishing modes , not expanded for unsampled ports and times</td><td>None</td><td>None</td><td>None</td></tr>
<tr><td>1980</td><td rowspan="10">Catch estimates for all fishing modes</td><td rowspan="10">MRFSS</td><td rowspan="10">MRFSS</td></tr>
<tr><td>1981</td></tr>
<tr><td>1982</td></tr>
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<tr><td>1984</td></tr>
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<tr><td>1987</td></tr>
<tr><td>1988</td></tr>
<tr><td>1989</td></tr>
<tr><td>1990</td><td rowspan="25">Catch estimates for ocean boat fishing modes , expanded for unsampled ports and times</td><td rowspan="3">Program suspended, no catch estimates</td><td rowspan="3">None</td><td rowspan="3">None</td></tr>
<tr><td>1991</td></tr>
<tr><td>1992</td></tr>
<tr><td>1993</td><td rowspan="11">Catch estimates for all fishing modes</td><td rowspan="22">ORBS</td><td rowspan="11">MRFSS</td></tr>
<tr><td>1994</td></tr>
<tr><td>1995</td></tr>
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<tr><td>2002</td></tr>
<tr><td>2003</td></tr>
<tr><td>2004</td><td rowspan="11">Program terminated, no estimates</td><td rowspan="2">SEBS</td></tr>
<tr><td>2005</td></tr>
<tr><td>2006</td><td rowspan="9">None</td></tr>
<tr><td>2007</td></tr>
<tr><td>2008</td></tr>
<tr><td>2009</td></tr>
<tr><td>2010</td></tr>
<tr><td>2011</td></tr>
<tr><td>2012</td></tr>
<tr><td>2013</td></tr>
<tr><td>2014</td></tr>
</table>

Table 8: Number of interviews (e.g. encounters) with recorded discarded fish for China, copper, and quillback rockfishes and kelp greenling from ORBS (2001-2014)

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
2001	16	7	2	104
2002	7	8	5	75
2003	20	12	8	159
2004	26	18	10	192
2005	92	66	44	484
2006	68	54	42	274
2007	59	46	45	213
2008	94	45	34	319
2009	72	33	18	453
2010	68	40	25	639
2011	101	59	35	552
2012	85	38	61	567
2013	119	59	69	703
Total	**832**	**501**	**403**	**4803**

Table 9: Observed encounters in the SSO program for China, copper, and quillback rockfishes and kelp greenling (Monk et al. 2013).

Species	Number Retained	Number Discarded	Drifts Encountered	Percent of Drifts Encountered
China Rockfish	325	19	296	2.4
Copper Rockfish	245	15	228	1.9
Quillback Rockfish	394	9	331	2.7
Kelp Greenling	757	73	700	5.8

Table 10: Number of length and weight samples from ORBS for China, copper, and quillback rockfishes and kelp greenling (2001-2014).

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
2001	373	196	321	515
2002	644	641	757	1280
2003	685	518	875	1365
2004	395	325	500	1098
2005	619	696	931	1559
2006	713	758	1033	1353
2007	899	796	1074	1313
2008	907	834	1115	1832
2009	653	569	824	1820
2010	742	790	918	2572
2011	886	864	1044	2490
2012	846	944	1240	2429
2013	792	570	752	2305
Total	**9174**	**8523**	**11421**	**22075**

Table 11: Collected ODFW recreational age structures for china, copper and quillback rockfishes and kelp greenling (1998-2013). Collections for 2013 are preliminary.

Species	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
1998	1	13	23	6
1999	12	5	13	43
2000	6	4	2	20
2001	101	37	107	79
2005	56	56	91	179
2006	192	194	340	387
2007	264	264	311	335
2008	269	270	365	471
2009	183	183	245	519
2010	175	175	374	547
2011	237	237	337	696
2012	208	208	475	671
2013	146	187	279	555
Total	**1850**	**1833**	**2962**	**4508**

Table 12: ODFW Aged samples from recreational fishery for china, copper and quillback rockfishes and kelp greenling (1998-2012).

Species	1998	1999	2000	2001	2005	2006	2007	2008	2009	2010	2011	2012	Total
China Rockfish	1	12	6	1	55	188	0	0	0	0	0	0	**263**
Copper Rockfish	0	0	0	0	55	188	0	0	0	0	0	0	**243**
Quillback Rockfish	0	0	0	0	91	340	0	356	0	0	0	0	**787**
Kelp Greenling	2	7	0	6	147	382	335	470	260	274	348	335	**2566**

Table 13: Percent of collected recreational samples that have been aged for china, copper and quillback rockfishes and kelp greenling (1998-2012; excludes preliminary collections in 2013).

Species	1998	1999	2000	2001	2005	2006	2007	2008	2009	2010	2011	2012	Total
China Rockfish	100	100	100	1.0	98.2	97.9	0.0	0.0	0.0	0.0	0.0	0.0	**15.4**
Copper Rockfish	0.0	0.0	0.0	0.0	98.2	96.9	0.0	0.0	0.0	0.0	0.0	0.0	**14.8**
Quillback Rockfish	0.0	0.0	0.0	0.0	100	100	0.0	97.5	0.0	0.0	0.0	0.0	**29.3**
Kelp Greenling	33.3	16.3	0.0	7.6	82.1	98.7	100	99.8	50.1	50.1	50.0	49.9	**64.9**

Table 14: ODFW special project and research length samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	1	0
	1999	43	0	12	0
	2000	84	0	6	0
	2001	52	0	101	0
	2002	90	187	0	0
	2003	254	187	0	45
	2004	289	117	0	6
	2005	149	71	0	1
	2006	131	24	0	0
	2007	1	220	0	7
	2008	203	170	0	0
	2009	5	92	0	0
	2010	20	96	0	0
	2011	47	0	0	0
	2012	30	0	0	0
	2013	10	0	0	0
	Total	**1408**	**1164**	**120**	**59**
Copper Rockfish	1998	0	0	13	0
	1999	0	0	5	0
	2000	1	3	4	0
	2001	8	1	37	0
	2002	0	222	2	4
	2003	14	170	3	35
	2004	11	193	28	8
	2005	23	170	0	1
	2006	4	319	0	0
	2007	0	272	0	0
	2008	43	192	0	0
	2009	1	137	0	0
	2010	0	75	0	0
	2011	3	0	0	0
	2012	1	0	0	0
	2013	0	0	0	0
	Total	**109**	**1754**	**92**	**48**

Table 14 Continued: ODFW special project and research length samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	23	0
	1999	6	0	13	0
	2000	15	25	2	0
	2001	2	24	107	3
	2002	0	167	0	5
	2003	9	219	4	61
	2004	21	149	0	8
	2005	67	155	0	2
	2006	34	187	0	0
	2007	961	122	0	15
	2008	62	97	0	0
	2009	0	109	0	0
	2010	2	0	0	0
	2011	0	0	0	0
	2012	2	0	2	0
	2013	0	0	0	0
	Total	**1181**	**1254**	**151**	**94**
Kelp Greenling	1998	0	0	5	0
	1999	14	0	43	0
	2000	15	0	20	0
	2001	31	0	79	0
	2002	8	0	30	0
	2003	142	170	6	25
	2004	567	167	0	44
	2005	248	218	0	6
	2006	279	182	4	0
	2007	112	227	2	26
	2008	1146	182	0	0
	2009	255	95	0	0
	2010	910	168	0	0
	2011	552	0	0	0
	2012	1198	0	0	0
	2013	345	0	0	0
	Total	**5822**	**1409**	**189**	**101**

Table 15: ODFW special project and research weight samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	0	0
	1999	1	0	0	0
	2000	82	0	0	0
	2001	45	0	0	0
	2002	90	0	0	0
	2003	250	0	0	0
	2004	289	0	0	1
	2005	149	0	0	0
	2006	127	0	0	0
	2007	1	0	0	0
	2008	1	0	0	0
	2009	5	0	0	0
	2010	20	0	0	0
	2011	47	0	0	0
	2012	30	0	0	0
	2013	10	0	0	0
	Total	**1147**	**0**	**0**	**1**
Copper Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	1	0	0	0
	2001	8	0	0	0
	2002	0	0	0	0
	2003	14	0	0	0
	2004	11	0	0	1
	2005	23	0	0	0
	2006	4	0	0	0
	2007	0	0	0	0
	2008	1	0	0	0
	2009	1	0	0	0
	2010	0	0	0	0
	2011	3	0	0	0
	2012	1	0	0	0
	2013	0	0	0	0
	Total	**67**	**0**	**0**	**1**

Table 15 Continued: ODFW special project and research weight samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	14	0	0	0
	2001	2	0	0	0
	2002	0	0	0	0
	2003	9	0	0	0
	2004	40	0	0	0
	2005	67	0	0	0
	2006	15	0	0	0
	2007	0	0	0	0
	2008	6	0	0	0
	2009	0	0	0	0
	2010	2	0	0	0
	2011	0	0	0	0
	2012	2	0	0	0
	2013	0	0	0	0
	Total	**157**	**0**	**0**	**0**
Kelp Greenling	1998	0	0	0	0
	1999	5	0	0	0
	2000	15	0	0	0
	2001	21	0	0	0
	2002	16	0	0	0
	2003	53	0	0	0
	2004	1111	0	0	21
	2005	248	0	0	0
	2006	263	0	0	0
	2007	112	0	0	0
	2008	947	0	0	0
	2009	161	0	0	0
	2010	910	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	Total	**3862**	**0**	**0**	**21**

Table 16: ODFW special project and research age structure samples (aged and un-aged) by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	1	0
	1999	0	0	12	0
	2000	81	0	6	0
	2001	43	0	101	0
	2002	90	187	0	0
	2003	246	187	0	47
	2004	287	118	0	6
	2005	149	95	0	1
	2006	131	111	0	0
	2007	1	220	0	7
	2008	203	170	0	0
	2009	5	92	0	0
	2010	20	96	0	0
	2011	47	0	0	0
	2012	30	0	0	0
	2013	10	0	0	0
	Total	**1343**	**1276**	**120**	**61**
Copper Rockfish	1998	0	0	13	0
	1999	0	0	5	0
	2000	1	0	4	0
	2001	8	1	37	0
	2002	0	222	0	4
	2003	14	170	2	35
	2004	11	194	0	8
	2005	23	171	0	1
	2006	4	320	2	0
	2007	0	272	0	0
	2008	43	165	1	0
	2009	1	137	0	0
	2010	0	75	0	0
	2011	3	0	0	0
	2012	1	0	0	0
	2013	0	0	28	0
	Total	**109**	**1727**	**92**	**48**

Table 16 Continued: ODFW special project and research age structure samples (aged and un-aged) by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	23	0
	1999	0	0	13	0
	2000	9	25	2	0
	2001	2	24	107	3
	2002	0	167	0	5
	2003	7	219	4	61
	2004	21	149	0	8
	2005	67	155	0	2
	2006	15	187	0	0
	2007	0	122	0	15
	2008	62	97	0	0
	2009	0	109	0	0
	2010	2	0	0	0
	2011	0	0	0	0
	2012	2	0	0	0
	2013	0	0	2	0
	Total	**187**	**1254**	**151**	**94**
Kelp Greenling	1998	0	0	5	0
	1999	0	0	43	0
	2000	15	0	20	0
	2001	20	0	79	0
	2002	8	0	0	0
	2003	35	170	1	25
	2004	565	167	0	44
	2005	248	218	30	6
	2006	279	184	9	0
	2007	112	227	2	26
	2008	1146	184	0	0
	2009	254	95	0	0
	2010	910	168	0	0
	2011	552	0	0	0
	2012	1178	0	0	0
	2013	345	0	0	0
	Total	**5667**	**1413**	**189**	**101**

Table 17: ODFW special project and research aged structures by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	1	0
	1999	0	0	12	0
	2000	81	0	6	0
	2001	39	0	1	0
	2002	89	184	0	0
	2003	167	186	0	47
	2004	276	115	0	2
	2005	0	71	0	1
	2006	0	111	0	0
	2007	0	220	0	7
	2008	0	0	0	0
	2009	0	0	0	0
	2010	0	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	Total	**652**	**887**	**20**	**57**
Copper Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	0	3	0	0
	2001	0	1	0	0
	2002	0	222	0	4
	2003	0	170	2	35
	2004	0	194	0	8
	2005	0	170	0	1
	2006	0	318	0	0
	2007	0	273	0	0
	2008	0	25	0	0
	2009	0	26	0	0
	2010	0	21	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	Total	**0**	**1423**	**2**	**48**

Table 17 Continued: ODFW special project and research aged structures by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	9	25	0	0
	2001	2	24	0	3
	2002	0	167	0	5
	2003	0	217	4	61
	2004	19	149	0	8
	2005	0	155	0	2
	2006	0	187	0	0
	2007	0	122	0	15
	2008	0	96	0	0
	2009	0	53	0	0
	2010	0	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	Total	**30**	**1195**	**4**	**94**
Kelp Greenling	1998	0	0	2	0
	1999	0	0	7	0
	2000	14	0	0	0
	2001	20	0	6	0
	2002	2	0	0	0
	2003	33	94	1	19
	2004	261	65	0	0
	2005	0	96	0	6
	2006	274	100	0	0
	2007	25	227	2	0
	2008	0	131	0	0
	2009	52	0	0	0
	2010	0	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	Total	**681**	**713**	**18**	**25**

Table 18: ODFW special project and research percent of structures aged by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	100	0
	1999	0	0	100	0
	2000	100	0	100	0
	2001	91	0	<0.5	0
	2002	99	98	0	0
	2003	68	99	0	100
	2004	96	97	0	33
	2005	<0.5	75	0	100
	2006	<0.5	100	0	0
	2007	<0.5	100	0	100
	2008	<0.5	<0.5	0	0
	2009	<0.5	<0.5	0	0
	2010	<0.5	<0.5	0	0
	2011	<0.5	0	0	0
	2012	<0.5	0	0	0
	2013	<0.5	0	0	0
	Total	**49**	**70**	**17**	**93**
Copper Rockfish	1998	0	0	<0.5	0
	1999	0	0	<0.5	0
	2000	<0.5	0	<0.5	0
	2001	<0.5	100	<0.5	0
	2002	0	100	0	100
	2003	<0.5	100	100	100
	2004	<0.5	100	0	100
	2005	<0.5	99	0	100
	2006	<0.5	99	<0.5	0
	2007	0	100	0	0
	2008	<0.5	15	<0.5	0
	2009	<0.5	19	0	0
	2010	0	28	0	0
	2011	<0.5	0	0	0
	2012	<0.5	0	0	0
	2013	0	0	<0.5	0
	Total	**<0.5**	**82**	**<0.5**	**100**

Table 18 Continued: ODFW special project and research percent of structures aged by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Kelp Greenling	1998	0	0	40	0
	1999	0	0	16	0
	2000	93	0	<0.5	0
	2001	100	0	8	0
	2002	25	0	0	0
	2003	94	55	100	76
	2004	46	39	0	<0.5
	2005	<0.5	44	<0.5	100
	2006	98	54	<0.5	0
	2007	22	100	100	<0.5
	2008	<0.5	71	0	0
	2009	20	<0.5	0	0
	2010	<0.5	<0.5	0	0
	2011	<0.5	0	0	0
	2012	<0.5	0	0	0
	2013	<0.5	0	0	0
	Total	**12**	**50**	**10**	**25**
Quillback Rockfish	1998	0	0	<0.5	0
	1999	0	0	<0.5	0
	2000	100	100	<0.5	0
	2001	100	100	<0.5	100
	2002	0	100	0	100
	2003	<0.5	99	100	100
	2004	90	100	0	100
	2005	<0.5	100	0	100
	2006	<0.5	100	0	0
	2007	0	100	0	100
	2008	<0.5	99	0	0
	2009	0	49	0	0
	2010	<0.5	0	0	0
	2011	0	0	0	0
	2012	<0.5	0	0	0
	2013	0	0	<0.5	0
	Total	**16**	**95**	**<0.5**	**100**

Agenda Item F.8.b
Supplemental CPSMT Report
June 2014

COASTAL PELAGIC SPECIES MANAGEMENT TEAM REPORT ON INITIAL STOCK ASSESSMENT PLANS AND TERMS OF REFERENCE (TOR) FOR GROUNDFISH AND COASTAL PELAGIC SPECIES

The Coastal Pelagic Species Management Team (CPSMT) reviewed the recommended changes to the Groundfish/CPS Stock Assessment Terms of Reference (Attachment 5, Agenda Item F.8.a), and supports the changes listed.

The CPSMT recognizes that catch-only projections do not include data other than recent catch and that factors such as recruitment are relevant in adequately projecting stock biomass. The CPSMT requests clarification of expectations for catch-only population projections with regards to recruitment assumptions, and is willing to work with the Scientific and Statistical Committee (SSC) and CPS Stock Assessment Teams (STAT) to develop appropriate guidelines in the Terms of Reference.

The CPSMT agrees with CPS STAT members that a proposed change to the deadline for CPS stock assessment drafts to three weeks ahead of Stock Assessment Review Panel review meetings is unnecessary for CPS assessments. The draft groundfish stock assessments go through a pre-review process, necessitating the three-week deadline. This rationale does not apply to CPS assessments, given the smaller number of assessments and STAT members, as compared to groundfish.

PFMC
06/23/14

GROUNDFISH ADVISORY SUBPANEL REPORT ON INITIAL STOCK ASSESSMENT PLANS & TERMS OF REFERENCE (TOR) FOR GROUNDFISH AND COASTAL PELAGIC SPECIES

The Groundfish Advisory Subpanel (GAP) discussed with Dr. Ian Taylor stock assessment planning for 2015 and wishes to recommend the following for Council consideration.

Full Assessments

The GAP agrees with the Science and Statistical Committee's (SSC) recommendations and supports doing full assessments for the following stocks in 2015:

Black rockfish
Bocaccio
Canary rockfish
Darkblotched rockfish
Widow rockfish
China rockfish

Black rockfish is a very important stock for the nearshore sectors and the 2007 assessment is now considered out of date.

The 2013 bocaccio assessment projected the stock would be rebuilt at the start of 2015. The SSC recommends a full assessment be conducted in 2015 to confirm that prediction.

Canary rockfish is a very important stock coastwide for all groundfish sectors, and the last full assessment was conducted in 2007. The Northwest Fisheries Science Center also invested a considerable amount of effort this winter organizing the data that would inform a new assessment.

The 2013 darkblotched assessment projected the stock would be rebuilt at the start of 2015. The SSC recommends a full assessment be conducted in 2015 to confirm that prediction.

The 2011 widow rockfish assessment was highly uncertain and there were many issues that could not be resolved in the 2011 assessment review process (the 2011 assessment was further reviewed at the September 2011 mop-up panel). The GAP supports increasing midwater trawl fishing opportunities for widow and yellowtail rockfish and a new, fully vetted assessment will reduce risks and likely increase available yields for future fishing opportunities.

The GAP recommends conducting a full assessment of China rockfish in 2015. There were many issues in the data-moderate assessment for the population north of 40º10' N. lat. and the GAP recommends a full assessment that would allow the incorporation of composition data and a more thorough vetting of data and modeling issues than could be done in a very busy 2013 data-moderate assessment review panel.

The GAP also recommends conducting a new full assessment for cowcod. There is great uncertainty in the recent 2013 assessment and new data, including a new remotely operated vehicle (ROV) survey in the Cowcod Conservation Areas, may better inform a cowcod assessment.

The GAP recommends conducting a full assessment for kelp greenling. This is an important species for the nearshore fishing sectors. Further, the 2005 assessment of the Oregon population of kelp greenling is now considered flawed, given the Marine Recreational Fisheries Statistical Survey catch data informing the assessment and other data issues discussed during the 2005 assessment review process.

Data-Moderate Assessments

The GAP recommends conducting data-moderate stock assessments for the following four species:

Arrowtooth flounder
Bank rockfish
Quillback rockfish
Blue rockfish

Arrowtooth flounder was last assessed in 2007 and that assessment is now considered out of date. The biomass projections from that assessment, which were largely influenced by the strong 1999 year class, predicted a steep decline despite evidence in the trawl survey and in trawl catches that stock abundance is increasing at a great rate. Projected overfishing limits (OFLs) from the 2007 assessment are now getting so low that annual quotas for arrowtooth are changing trawl fishery distribution to avoid arrowtooth effectively turning this abundant stock into a constraining species.

Bank rockfish was last assessed in 2000 and is so out of date that data-poor methods (DB-SRA) are used to determine OFLs. With the Council action to reduce targeting of blackgill rockfish in southern California, this is an increasingly important target stock and should use more robust methods to determine status and OFLs.

Quillback rockfish is now one of the most vulnerable unassessed stocks to potential overfishing according to the Groundfish Management Team's Productivity and Susceptibility Assessment. This is an important stock for nearshore fisheries north of 40º10' N lat. and should be assessed.

Blue rockfish was last assessed in 2007, and that assessment is now considered out of date. The stock is an important one for nearshore fisheries off California and Oregon, and should be assessed.

Update Assessments

The GAP recommends conducting update assessments for the following species:

Petrale sole
Sablefish
Chilipepper rockfish

The 2013 petrale sole assessment projected the stock would be rebuilt by the start of 2014. The SSC recommends a 2015 assessment to confirm that result. Further, full assessments have been conducted in the last three consecutive assessment cycles for petrale sole, and the SSC recommends an update assessment to confirm its rebuilt status.

Sablefish is the most valuable stock to the west coast groundfish fishery on a per pound basis. The 2011 assessment was a very thorough one that predicted the 2008 and 2010 year classes recruiting into the fishery were above average. The SSC recommends the next assessment of sablefish could be an update, and the GAP recommends one be conducted to better estimate these incoming year classes.

The GAP recommends an update assessment of chilipepper rockfish be done since the 2007 assessment is now considered out of date. Further, the Southwest Fisheries Science Center expressed an interest in doing an update assessment of chilipepper and the GAP agrees.

Catch Reports

Lastly, the GAP is recommending providing catch reports for Pacific ocean perch and yelloweye rockfish in 2015 to evaluate management performance relative to staying within prescribed annual catch limits for these overfished stocks. The SSC recommended continuing to produce catch reports for these two stocks until data that can inform new assessments for these slow-growing stocks becomes available.

Summary of GAP Recommendations:

Full assessments:

1) **Black rockfish**
2) **Bocaccio**
3) **Canary rockfish**
4) **Darkblotched Rockfish**
5) **Widow rockfish**
6) **China rockfish**
7) **Cowcod**
8) **Kelp greenling**

Data moderate assessments:

1) **Arrowtooth flounder**
2) **Bank rockfish**
3) **Quillback rockfish**
4) **Blue rockfish**

Update assessments:

1) **Petrale sole**
2) **Sablefish**
3) **Chilipepper rockfish**

Catch reports:

1) **POP**
2) **Yelloweye rockfish**

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Agenda Item F.8.b
Supplemental GMT Report
June 2014

GROUNDFISH MANAGEMENT TEAM REPORT ON INITIAL STOCK ASSESSMENT PLANS AND TERMS OF REFERENCE (TOR) FOR GROUNDFISH AND COASTAL PELAGIC SPECIES

The Groundfish Management Team (GMT) considered issues pertaining to the planning of 2015 stock assessments, to inform the 2017-2018 management cycle.

The National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC) provided a report on prioritization of species in Agenda Item F.8.b, NWFSC Report. This report includes a mix of rebuilding species, species in need of updated assessments, and possible data reports. The report also discusses that if another data moderate stock assessment review (STAR) panel is done, that it cover fewer species than what was attempted in 2013.

Terms of Reference

It is the GMT's understanding that the Scientific and Statistical Committee (SSC) is going to review and comment on the terms of reference (TOR) documents over the summer, in time for inclusion in the September Council meeting advanced briefing book (Agenda Item F.8.b., Supplemental SSC Report). Therefore, the GMT is delaying our specific comments on the contents of the TORs until we are able to review the SSC's recommendations in September.

Data used in assessments

We would like to see at least an informal method developed for considering trans-boundary stocks across their entire range. For example, many of our rockfish stocks' ranges extend well up into British Columbia and Alaska or down into Mexico. Taking into account what is known about biomass and stock structure throughout a species' range could improve our assessments off the west coast.

Data-limited methods

The GMT discussed the need to explore available data in detail well in advance. In the last round of data-limited assessments we saw that if there is very little fishery-independent or fishery-dependent data, then any assessment model will result in low biomass estimates. Likewise, there were questions about stratification and the effect of management on stock dynamics that were not explored as thoroughly as they could have been prior to STAR Panels. The GMT suggests that we should be working with the Science Centers and the states to better explore this prior to the next round of assessments (i.e. meetings of GMT STAR representative with assessor well in advance of the Panel meeting).

Stocks to be assessed in 2015

The GMT understands that which stocks to assess is ultimately the decision of the NWFSC based on input from the Council, available resources, and other logistical factors. Given the limited time available at this meeting, we did not seek to recreate a full list of planned assessments or to prioritize any of our recommendations, but offer considerations on select species to inform prioritizing assessments. These recommendations are summarized in Table 1 below, along with the recommendations from the NWFSC report in Table 2 and Table 3. There are several concerns that have been raised with the data moderate assessments for nearshore species. The GMT suggests that China rockfish is a strong candidate for a full assessment. It is unclear whether there is enough data to move from a data moderate to a full assessment, but regardless, we would like to see one of the STAR panels dedicated to resolving the issues identified with China rockfish (i.e. even if it is still a data moderate assessment, similar to cowcod). Kelp greenling is another species that would benefit from a full assessment. While new data collection efforts off Washington will not provide information for this assessment cycle, there are also available data from Oregon (Agenda Item F.8.b, ODFW Report) for kelp greenling and other nearshore species. The GMT recommends that at least one STAR Panel be dedicated to China rockfish and kelp greenling.

The GMT discussed other nearshore species that might also be high priorities for assessment. While all nearshore species suffer from lack of a fishery-independent index, making full assessments difficult, some on the GMT would like to see quillback rockfish prioritized as a full assessment and gopher and olive rockfish prioritized at least for a data moderate assessment. Further, as mentioned above in the section on data-moderate methods, some on the GMT would like to see further exploration of all available catch per unit of effort data (e.g. California private boat data, Oregon commercial logbook data, etc.) particularly for nearshore species.

Some GMT members would also like to see sablefish prioritized as a full assessment. Sablefish is a valuable stock that has been in the precautionary zone for a considerable time. The Council has reduced its P* to try to speed recovery of the stock in addition to the 40-10 reductions to harvest. While the last sablefish assessment was one of the most thorough that has been done for the stock, it was conducted in 2011. There may be some risk of "wasting" a STAR Panel slot on what would essentially be an update, but some on the GMT argue that the stock is important enough and has been in the precautionary zone long enough to warrant a close look at the new data and assumptions going into the assessment.

Further, some on the GMT think that rougheye is a priority for full assessment. There were a number of issues identified in the last assessment, and major management changes are being implemented based on the estimated biomass compared to current catch. Staff at the Washington Department of Fish and Wildlife have also identified a number of otoliths that are newly available for ageing. There were a number of other data weighting questions that were identified for a workshop that did not happen. Some on the GMT would also like to see exploration of methods to split blackspotted rockfish out to raise this from a Category 2 to a Category 1 assessment.

Some on the GMT would like to explore whether there is information available for a data moderate assessment of shortraker rockfish. Likewise, there is some interest in looking at vermilion rockfish and exploring questions of stock structure and differentiating it from similar species (i.e. sunset rockfish). Current harvest specifications do not account for the fact that vermilion has been confused with a very similar looking species, sunset rockfish (*Sebastes crocotulus*) south of Point Conception. This continues to make assessment south of Conception challenging, but a new assessment focused on the area north of Point Conception could improve the harvest specification for vermilion.

It is our understanding that lingcod is prioritized by the Science Center in part because there may be students available to contribute to those assessments. The GMT disagrees that this is a priority given the higher priorities listed above. This stock has been recently assessed, is rebuilt, and depletion is well above 40 percent in both regions. Attainment has been well below the annual catch limit, making assessment a low priority from a management perspective. In addition, the Council is considering opening the lingcod fishery during the winter months for the first time in many years, beginning in January 2015 (under Agenda Item F.7). If the winter lingcod fishery is opened in 2015, very limited, if any, information will be available to inform how the change in fishing season might be affecting the lingcod stock if the assessment is done in 2015.

Finally, the GMT would like to see catch reports expanded to provide the error (i.e. the standard deviation) around catch projections for rebuilding species.

Table 1. GMT suggestions on stock assessments that could be prioritized for 2015 and that differ from the NWFSC priorities.

Full	Update	Data Moderate	Data Report
kelp greenling [a]		gopher rockfish	
China rockfish [a]		olive rockfish	
quillback rockfish		shortraker rockfish	
sablefish		vermilion/ sunset rockfish	
rougheye/ blackspotted rockfish			

[a] recommended to happen at the same STAR panel

Table 2. Stocks that are higher priority-recommended in Agenda Item F.8.b., NWFSC Report

Full	Update	Data Moderate	Data Report
black rockfish (2 areas)	lingcod (2 areas)	China rockfish	POP
bocaccio	petrale sole		yelloweye rockfish
canary rockfish	sablefish		
darkblotched rockfish			
widow rockfish			

Table 3. Stocks that are lower priority-potential in Agenda Item F.8.b., NWFSC Report

Full	Update	Data Moderate	Data Report
chilipepper	chilipepper	arrowtooth flounder	cowcod
China rockfish	POP	bank rockfish	
cowcod		blue rockfish	
kelp greenling (OR)		CA scorpionfish	
lingcod (2 areas)		gopher rockfish	
POP		kelp greenling (OR)	
petrale sole		olive rockfish	
quillback (2 areas)		quillback rockfish	
sablefish			
yelloweye rockfish			

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Agenda Item F.8.b
Supplemental NWFSC PowerPoint
June 2014

NOAA FISHERIES

NW Fisheries
Science Center

Initial Stock Assessment Plans For 2015

Dr. James Hastie

Overview

- Four 'Full' STAR Panels
  - May not be able to do 8 different species, if some have several models for evaluation
  - Nearshore indices more difficult/complex than from surveys
- Up to 3 Updated assessments
- One STAR with Data-Moderate assessments for 3 species
  - Multiple regions and modeling platforms
- The SSC has suggested a new approach for an integrated suite of modeling alternatives for some species
- Options in Briefing Book have been narrowed to reflect SSC and GAP comments

Revised 2015 Stock Assessment Candidates

Species	Suggestions for 2015 Assessments				Most Recent Assessment and Current Status					PSA	Fleet rank (2008-2012): Comm. $		Fleet rank (2008-2012): Rec. mt			2012 catch as a % of		Surv. info
	Full	UpD	D-M	Dat Rpt	Cur Cat.	Last year	Type	Last Dep. N | S	Rbld?		All	H & L	All	CA	OR-WA	ABC *	OFL *	
arrowtooth fl.			x		2	2007	F	79%		1.21	8	48	52		26	21%	17%	
bank rf					2	2000	F			2.02	30	42	47	44		4%	3%	
black rf **x2**	X				1	2007	F	53% | 71%		1.94	6	3	1	1	1	53%	51%	
blue rf			x		2	2007	F	30%		2.01	33	17	4	9	5	33%	29%	
bocaccio	X				1	2013	U	31%	Y	1.93	42	26	7	5	13	20%	19%	
CA scorpionfish					1	2005	F	80%		1.41	36	20	5	4		65%	62%	
canary rf	X				1	2011	U	23%	Y	2.01	46	67	17	19	12	8%	7%	
chilipepper		x			1	2007	F	71%		1.35	14	27	30	29	39	17%	16%	
China rf **x2-3**	x		X		2	2013	D-M	37% | 66%		2.23	25	12	16	15	10	124%	104%	
cowcod	x			x	2	2013	F	34%	Y	2.13	73	56	45	42		11%	9%	
darkblotched rf	X				1	2013	F	36%	Y	1.92	22	24				22%	21%	
gopher rf					1	2005	F	97%		1.76	12	7	10	7		42%	39%	
kelp greenling **x2-3**	x		x		1	2005	F	49%		1.56	18	10	15	17	6	79%	59%	
lingcod **x2**		X			1	2009	Full	62% | 74%		1.55	7	5	2	2	2	28%	26%	
olive rf					3					1.87	47	31	13	13	31	21%	17%	
POP				X	1	2011	U	19%	Y	1.69	31	43				6%	6%	
petrale sole		X			1	2013	F	22%	Y	1.94	3	44	40	40	19	91%	87%	
quillback rf **x2-3**			x		3					2.22	35	18	20	28	7	169%	141%	
sablefish	x	X			1	2011	F	33%		1.64	1	1	42	48	15	66%	63%	
widow rf	X				1	2011	F	51%		2.05	28	41	33	32	17	6%	6%	
yelloweye rf				X	2	2011	F	21%	Y	2.00	61	45	27	33	11	25%	24%	

Key					
(green)	Higher Priority	X	Recommended	(pink)	Constraining (& not ranked in top-30)
(yellow)	Lower Priority	x	Potential	(orange)	From prior Data-Poor assessment

Conclusion

- Early identification of species for Full assessments is important for prioritizing ageing activities
- More consideration of workload and data availability will follow June Council guidance
- Work with SSC to scope out planning for Assessment & Review of nearshore species like China Rockfish
  - Where efforts to develop full models for all areas may not be successful
- Important for assessment authors to know how their species are likely to be managed (geographically)

Agenda Item F.8.b
Supplemental SSC Report
June 2014

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON INITIAL STOCK ASSESSMENT PLANS AND TERMS OF REFERENCE (TOR) FOR GROUNDFISH AND COASTAL PELAGIC SPECIES

The Scientific and Statistical Committee (SSC) reviewed the documents associated with stock assessment planning, focusing in particular on the Northwest Fisheries Science Center (NWFSC) Report (Agenda Item F.8.b, NWFSC Report) and the set of draft Terms of Reference documents for: the Groundfish and Coastal Pelagic Species Stock Assessment and Review Process (Agenda Item F.8.a, Attachment 2); Groundfish Rebuilding Analyses (Agenda Item F.8.a, Attachment 3); and the Methodology Review Process for Groundfish and Coastal Pelagic Species (Agenda Item F.8.a, Attachment 4).

Stock Assessment Planning

Dr. Owen Hamel (NWFSC) summarized the information in the NWFSC Report. The SSC is in general agreement with the NWFSC regarding which stocks should receive full or update assessments during 2015.

The SSC recommends the following stocks for full assessments:

- bocaccio rockfish (overfished and projected to be almost rebuilt);
- darkblotched rockfish (overfished and projected to be almost rebuilt);
- canary rockfish (overfished and not fully assessed since 2007);
- black rockfish (not fully assessed since 2007);
- widow rockfish (fully assessed in 2011 and subject to relatively high uncertainty); and
- China rockfish (never fully assessed, data-moderate assessment in 2013).

Given the STAR Panel process during 2015 could accommodate reviews of eight full stock assessments, it is reasonable to consider one or two additional stocks for full assessments. Only one additional full assessment could be reviewed if black rockfish is assessed as separate northern and southern stocks by separate stock assessment teams, as occurred in 2007. Otherwise, two additional full assessments could be reviewed.

The NWFSC Report identifies 10 stocks that could be considered as lower priority candidates for full stock assessments during 2015 (chilipepper, China, quillback and yelloweye rockfish, cowcod, kelp greenling, lingcod, Pacific ocean perch, petrale sole, and sablefish). The SSC did not come to a strong unified opinion regarding which of these stocks should be given highest priority for a full assessment, other than China rockfish. However, there were arguments made in support of full assessments for sablefish, rougheye rockfish, yelloweye rockfish, and kelp greenling. The SSC notes that the last assessment for kelp greenling used a catch series that is now considered to be incorrect.

It is likely that a mix of methods will be needed to assess some stocks. For example, a full age-structured model could be applied to that geographic portion of a stock's range for which age-composition data are available, and a data-moderate assessment could be developed for the remaining geographic portion. Such an approach might be sensible for nearshore species such as

China rockfish or kelp greenling, for which reasonable age-composition data sets are available for Oregon and not for the other states. Species being assessed using multiple assessment methods should be reviewed at a single STAR Panel.

The SSC supports the NWFSC Report recommendation that petrale sole receive an update assessment during 2015. The SSC recommends that sablefish be an update assessment during 2015 if this stock does not receive a full assessment.

The SSC also supports the NWFSC Report recommendation that the data-moderate STAR Panel should review assessments for no more than four species. It is likely that each species will require assessment models for multiple geographic regions. Furthermore, each species and region will need to be assessed using the two types of data-moderate assessment models (XDB-SRA and exSSS).

Terms of Reference Documents

The SSC reviewed the set of draft Terms of Reference documents for the 2015-16 biennial cycle, Attachments 2-4. Attachment 2 includes revisions to make the Terms of Reference consistent with new National Standard 2 Guidelines regarding standards for peer review. Other than those changes, the draft Terms of Reference documents are essentially unmodified versions of the Terms of Reference approved by the Council during 2012 for the last stock assessment cycle. A number of changes to the draft Terms of Reference documents were suggested and discussed. The SSC's Groundfish and CPS Subcommittees will work during the summer to develop a set of revised Terms of Reference documents that indicate all the suggested changes. These revised documents will be available in the September Council Briefing Book for review by the Council and its advisory bodies.

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06/23/14

Agenda Item F.9
Situation Summary
June 2014

OMNIBUS REGULATION CHANGES PART II

Under Agenda Item F.3 the Council is slated to have developed an initial list of candidate management measures. During the Council meeting week other management measures candidates may have arisen, particularly under the Fixed Gear Sablefish Catch Share Program Review (Agenda Item F.6). Under this agenda item, the Council is slated to add to the list any additional candidates that may have arisen during the week and finalize the list of candidates. Additionally, the Council may wish to provide guidance with respect to those items on which it would like the most background information provided at the September Council meeting.

Council Task:

1. Finalize list of management measure candidates including those that may have arisen during the week.
2. Provide guidance of level of background detail desired for the September prioritization package.

Reference Materials:

None.

Agenda Order:

a. Agenda Item Overview — Jim Seger and Kelly Ames
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action**: Identify Management Measure Candidates and Provide Guidance on Analysis Needed for Final Prioritization at the September Council Meeting

PFMC
5/29/14

UPDATED COMPILATION OF POSSIBLE GROUNDFISH MANAGEMENT MEASURES FOR COUNCIL CONSIDERATION

This document provides the initial unprioritized list of potential management measure topics, updated based on Council action taken under F.3 and other agenda items at the June 2014 meeting. Items added to the list during the meeting are shaded.

Acronyms and abbreviations used in the following table:

COP – Council Operating Procedure
CP – Catcher Processor
IFQ – Individual Fishing Quota
LEFG – Limited Entry Fixed Gear
MS – Mothership
OA – Open Access
QP – Quota Pounds
QS – Quota Shares
Rec – Recreational
TOR – Terms of Reference
VMS – Vessel Monitoring System

Table 1. Unprioritized list of groundfish related workload items and initial candidate groundfish management measures grouped by category and sector.

	Sector	**Short Title**	
A. Items on Which Council Action Has Been Completed Which Still Entail Some Workload[1]			
1.	Trawl, Non-Trawl, Rec	2015-2016 Harvest Specifications and Management Measures and Amendment 24 (June 2014)	
2.	Trawl and Non-Trawl	Seabird Rule - Mandatory Streamers for vessels ≥ 55’	
3.	Trawl and Non-Trawl	Clarify Catch Accounting Rules for Amendment 21	
4.	Trawl and Non-Trawl	Fishery Declaration Enhancements	
5.	Trawl IFQ, MS, & CP	Cost Recovery Corrections	
6.	Trawl IFQ & MS	Electronic Monitoring Exempted Fishing Permits (if final in June 2014)	
7.	Trawl IFQ & MS	Pacific Dawn Lawsuit Appeal to District Court (Whiting Allocation)	
8.	Trawl IFQ & MS	Whiting Cleanup Rule, Including Maximized Retention Regulations	
9.	Trawl CP	Glacier Fish Co Lawsuit (Cost Recovery)	
10.	Trawl IFQ	Joint Registration and Prohibition of Processing IFQ Sablefish	
11.	Trawl IFQ	Move Shorebased Whiting Season Opening Dates	
12.	Trawl IFQ	Continue Adaptive Management Program Pass-Through	
13.	Trawl IFQ	Update eTicket for Web-based Submissions	
14.	Trawl IFQ	Rule for Forfeitures for Exceeding Aggregate NonWhiting Control Limit	
15.	LEFG	Revise Limited Entry Fixed Gear Permit Control Rule (If Recommended)	
16.	LEFG and OA	Require E-Tickets for Sablefish Landings (If Recommended)	
17.	LEFG and OA	Sablefish North of 36 Degrees - Allocation Correction	
18.	LEFG and OA	Logbooks for Fixed Gear	
19.	OA	Amendment 22 - Open Access License Limitation	

[1] This list includes actions anticipated at the June 2014 meeting. Workload primarily involves NMFS and Council staff, however GMT and state staffs may be involved. Several items in this category are also covered under Agenda Item F.1.b, NMFS Report.

	Sector	Short Title	
B. Immediate and Long-Term Commitments			
Currently on the Year at a Glance Schedule (See Agenda Item C.6.a, Attachment 1)			
20.	Trawl, Non-Trawl, Rec	Inseason Management (Sept 2014 and beyond, excluding March 2015)	
21.	Trawl, Non-Trawl, Rec	Adopt Final Stock Assessment Plan and TOR for 2015 (Sept 2014)	
22.	Trawl, Non-Trawl, Rec	Develop a COP for Groundfish Methodology Review Process (Sept and Nov 2014)	
23.	Trawl, Non-Trawl, Rec	Omnibus Regulations Changes (Sept and Nov 2014, Mar-June 2015)	
24.	Trawl, Non-Trawl, Rec	Essential Fish Habitat: Phase 3 of the 5 Year Review (Sept 2014)	
25.	Trawl, Non-Trawl, Rec	Amendment 25: Comprehensive Ecosystem-Based Amendment (Sept 2014 and Mar 2015)[2]	
26.	Trawl, Non-Trawl, Rec	2015 Pacific Halibut Catch Sharing Plan (Sept and Nov 2014)[3]	
27.	Trawl, Non-Trawl, Rec	2015 Incidental Regulations for Pacific Halibut (Mar and Apr 2015)3	
28.	Trawl, Non-trawl, Rec	Stock Assessments for 2017-2018 Biennium (June 2015)	
29.	Trawl, Non-Trawl, Rec	Start of the Process to Establish 2017-2018 Specifications and Regulations (June 2015)	
30.	Trawl IFQ & MS	Electronic Monitoring Regulations (Sept 2014, June 2015)	
31.	Non-Trawl	Discard mortality rates for nearshore fisheries (GMT - #1)	
Items on the Horizon			
32.	Trawl IFQ, MS, & CP	Five Year Review (Starts in 2016)	
33.	Trawl IFQ	QS/QP Control Rule - Safe Harbor for Risk Pools - post 5-year review	
34.	Trawl IFQ	Resolve Long-term Whiting Surplus Carryover Provision - post 5-year review	
C. Candidate Items for Prioritization in September			
35.	Trawl, Non-Trawl, Rec	Rebuilding Revision Rules (signal vs. noise)	
36.	Trawl, Non-Trawl, Rec	Further Consideration for Reorganizing Stock Complexes	
37.	Trawl and Non-Trawl	Groundfish Conservation Areas for Rougheye Rockfish	
38.	Trawl and Non-Trawl	New Dressed to Round Conversion Factors for Sablefish	
39.	Trawl and Non-Trawl	Increase VMS Ping Rates	
40.	Trawl and Non-Trawl (LE)	Eliminate Permit Size Endorsements	
41.	Trawl and Non-Trawl	Seabird Avoidance Devices for Vessels less than 55 feet	
42.	Trawl IFQ, MS & CP	Revise Length of Time Required for the Trawl Fleet to Retain Records	
43.	Trawl IFQ (& MS &CP?)	Fishery Declaration Enhancements (With Gear Stowed and Testing Gear)	
44.	Trawl IFQ, MS & CP	Year Round Whiting Season and Other Modifications	
45.	Trawl IFQ, MS & CP	Revise Regulations on At-Sea and Shoreside Flow Scales	

[2] Scheduled to occur under an Ecosystem agenda item but involves amending the groundfish Fishery Management Plan and groundfish staff.
[3] Scheduled to occur under a Pacific halibut agenda item but may involve groundfish considerations and/or staff that also work on groundfish.

	Sector	Short Title	
46.	Trawl IFQ	Gear Use - Multiple Gears Onboard and Use	
47.	Trawl IFQ and LE Pot	Remove Certain Area-Management Restrictions	
48.	Trawl IFQ	Remove Certain Restrictions on Trawl Gear Configuration	
49.	Trawl IFQ	Resolve Long-term Non-Whiting Surplus Carryover Provision	
50.	Trawl IFQ	Carryover when Management Units Change	
51.	Trawl IFQ	Allow Trading of Previous Year Quota Pounds in Current Year	
52.	Trawl IFQ	Widow Rockfish QS Reallocation	
53.	Trawl IFQ	Discard Survival Credit for Lingcod and Sablefish	
54.	Trawl IFQ	Require Posting of First Receiver Site Licenses	
55.	Trawl IFQ	Develop Criteria for Distributing Adaptive Management Program QP	
56.	LEFG	Cost Recovery for the Permit Stacking Program	
57.	LEFG and OA	Commercial Gear Restriction for Targeting Flatfish in CA	
58.	LEFG and OA	Retain Halibut in the Sablefish Fishery (South of Pt. Chehalis)	
59.	Recreational	50 fm Depth Restriction (WA and OR)	
60.	Recreational	Mid-water Sport Fishery (OR and CA)	
61.	Trawl, Non-Trawl, Rec	Consider ecosystem component species (GMT – #2 bullet 1)	
62.	Trawl, Non-Trawl, Rec	Analysis of Multi-Year Average Catch Policy (GMT – #2 bullet 2)	
63.	Non-trawl	Mortality Rates for Descending Devices in Rod-and-Reel Fishery (GMT –#2 bullet 3)	
64.	Trawl, Non-Trawl, Rec	Management Model Review and Refinement (GMT – #2 bullet 4)	
65.	Trawl	Allow Between Sector Transfer of Rockfish QS Allocated Equally to MS Vessel Permits (GAP – #1)	
66.	Trawl, Non-Trawl, Rec	Create 60-Mile Bank RCA Lines (GAP – #2)	
67.	Trawl, Non-Trawl	Correct Blackgill Allocation (GAP – #3)	
68.	Trawl, Non-Trawl, Rec	Defer Nearshore Management to Oregon and Washington (GAP – #4)	
69.	LE FG	Combine the Fixed Gear LE DTL Fishery and Tier Fishery (GAP – #5)	
70.	Trawl, Non-Trawl	Provide for Retrieval of Derelict Trawl Gear in RCAs (GAP – #6)	
71.	Trawl, Non-Trawl, Rec	Allow Between Season Transfer of Unneeded Overfished Species (GAP – #7)	
72.	LE FG	Require Permit Price Reporting for LE FG Permit Transfers (F6 – SSC)	
73.	LE FG	Convert Daily Trip Limits to a Tier Endorsement (F6 – GAP)	
74.	LE FG	Combine Longline and Fishpot into a Single Fixed Gear Limited Entry Gear Endorsements (F6 – GAP)	
75.	LE FG	Move the Seaward RCA Line Closer to Shore for Pot Vessels (F6 – GAP)	
76.	LE FG	Require All Fishpots be Returned to Shore at the End of Each Trip (F6 - Council)	

ENFORCEMENT CONSULTANTS REPORT ON OMNIBUS REGULATION CHANGES, PART II

The Enforcement Consultants (EC) has reviewed the documents pertaining to Agenda Item F.9 and discussed outcomes from Agenda Item F.3, Omnibus Regulation Changes, Part I, and has the following comments.

Regarding vessel monitoring system (VMS) ping rate, the EC recommends the Council task Council staff with researching technology options via available providers to address the questions raised by the Council at the April Council meeting, with regard to technology capabilities having potential to enhance VMS effectiveness in West Coast fisheries monitoring.

PFMC
06/24/14

Agenda Item F.9.b
Supplemental GAP Report
June 2014

GROUNDFISH ADVISORY PANEL REPORT ON OMNIBUS REGULATION CHANGES PART II

After contemplating Council action under agenda item F.3, the Groundfish Advisory Subpanel (GAP) has the following comments regarding consideration of Omnibus Regulations Changes Part II.

The GAP supports the Council motion that established a list of activities/actions that will be considered and prioritized in September.

During Council deliberation, the GAP was requested to provide clarification about GAP recommendation #7 from the Agenda Item F.3.b, Supplemental GAP Report: "Exploration of flexible regulations that allow the transfer of overfished species between sectors to prevent stranding target fish." The GAP request is specific to the within trawl use of choke species and is not intended to include discussion or promote changes to any of the existing allocations. The goal of this suggestion is to begin the conversation about how choke species can be better utilized and/or shared within the trawl sectors to ensure attainments of optimum yield for all target species. At this time, the GAP has no suggestions for the mechanics of how this could function, but believes it is a topic that warrants discussion and analysis.

PFMC
06/22/14