Pacific Coast Groundfish Fishery 2019–20 Harvest Specifications, Yelloweye Rebuilding Plan Revisions, and Management Measures

Environmental Assessment/MSA Analysis/Regulatory Impact Review/
Regulatory Flexibility Act Analysis

DRAFT

August 2018

Lead Agency:	National Marine Fisheries Service, West Coast Region National Oceanic and Atmospheric Administration
Responsible Official:	Barry A. Thom, Regional Administrator National Marine Fisheries Service

For further information contact: Keeley Kent, National Marine Fisheries Service

7600 Sand Point Way NE, Seattle, WA 98115

206-526-4655

[Intentionally blank]

Table of Contents

List of Tables

List of Figures

Acronyms and Abbreviations

ABC	Acceptable biological catch
ACL	Annual catch limit
ACS	American Community Survey
ACT	Annual catch target
AFSC	Alaska Fisheries Science Center
AM	Accountability measure
APA	Administrative Procedures Act
B_0	Biomass, unfished
BIOP	Biological opinion
BRA	Bycatch reduction area
BRD	Bycatch reduction device
CalCOFI	California Cooperative Oceanic Fisheries Investigations
CA/OR/WA	California, Oregon, and Washington
CCA	Cowcod Conservation Area
CCE	California Current Ecosystem
CCIEA	California Current Integrated Ecosystem Assessment
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CP	Catcher-processor
CPFV	Commercial passenger fishing vessel
CPS	Coastal pelagic species
CPUE	Catch per unit of effort
CRFS	California Recreational Fisheries Survey
CV	Coefficient of variation
CZMA	Coastal Zone Management Act
DB-SRA	Depletion-based stock reduction analysis
DCAC	Depletion-corrected average catch
DEIS	Draft Environmental Impact Statement
DO	Dissolved oxygen
DPS	Distinct population segment
DTL	Daily trip limit (fishery)
DTS	Dover sole, thornyheads, and sablefish
E	Exploitation
EA	Environmental Assessment
EC	Ecosystem component
EDC	Economic Data Collection (Program)
EEZ	Exclusive Economic Zone
EFH	Essential fish habitat
EFHRC	Essential Fish Habitat Review Committee
EFP	Exempted fishing permit
EIS	Environmental Impact Statement
ENSO	El Niño Southern Oscillation
EO	Executive Order
ESA	Endangered Species Act
ESU	Evolutionary significant unit
EwE	Ecopath with Ecosim
F	Fishing mortality
FEIS	Final Environmental Impact Statement

FEP	Fishery Ecosystem Plan
FM	Fathom or fathoms
FMP	Fishery Management Plan
GAP	Groundfish Advisory Subpanel
GCA	Groundfish Conservation Area
GIS	Geographic information system
GMT	Groundfish Management Team
h	Stock-recruitment steepness parameter
HA	Hectares
HAPC	Habitat Areas of Particular Concern
HCR	Harvest control rule
HG	Harvest guideline
HMS	Highly Migratory Species
IBQ	Individual bycatch quota
ID	Identification
IEA	Integrated Ecosystem Assessment
IFQ	Individual fishing quota
IOPAC	Input-output model for Pacific Coast fisheries
IPCC	Intergovernmental Panel on Climate Change
ITS	Incidental take statement
IUCN	International Union for the Conservation of Nature
LE	Limited entry
LEFG	Limited entry fixed gear
LOF	List of Fisheries
M	Instantaneous rate of natural mortality
MBTA	Migratory Bird Treaty Act
MEI	Multivariate ENSO Index
MFMT	Maximum Fishing Mortality Threshold
MHHW	Mean higher high water level
MMPA	Marine Mammal Protection Act
MPA	Marine Protected Area
MRFSS	Marine Recreational Fisheries Statistical Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act, Magnuson-Stevens Act
MSE	Management strategy evaluation
MSST	Minimum Stock Size Threshold
MSY	Maximum sustainable yield
MT	Metric ton
MTC	Mean temperature of catch
MTL	Mean trophic level
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NID	Negligible Impact Determination
NMFS	National Marine Fisheries Service
NMNU	Non-market and non-use
NOI	Notice of Intent
NORPAC	North Pacific Database Program
NPGO	North Pacific Gyre Oscillation
NWFSC	Northwest Fisheries Science Center
OA	Open access
ODFW	Oregon Department of Fish and Wildlife

OFL	Overfishing limit
OFS	Overfished species
ORBS	Ocean Recreational Boat Survey
OY	Optimum yield
P*	Overfishing probability
PacFIN	Pacific Fisheries Information Network
PBR	Potential biological removal
PCGW	Pacific Coast Groundfish and Endangered Species Workgroup
PDO	Pacific Decadal Oscillation
PMFC	Pacific Fishery Management Council (used in references)
POP	Pacific ocean perch
PR	Private/rental boats
PRD	NMFS Protected Resources Division
PSA	Productivity-susceptibility analysis
QP	Quota pounds
QS	Quota share
QSM	Quota species monitoring
Rec	Recreational
RecFIN	Recreational Fisheries Information Network
RBS	Rougheye/blackspotted/shortraker (rockfish complex)
RCA	Rockfish Conservation Area
RCG	Rockfish, cabezon, and greenling
RES	Research
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SCWC	South and Central Washington Coast
SFD	Sustained Fisheries Division
SPID	Species identification code
SPR	Spawning potential ratio
SSC	Scientific and Statistical Committee
STAR	Stock Assessment Review
SWFSC	Southwest Fisheries Science Center
TAC	Total allowable catch
TCEY	Total constant exploitation yield
USFWS	United States Fish and Wildlife Service
V	Vulnerability
VMS	Vessel monitoring system
WCGOP	West Coast Groundfish Observer Program
WCR	West Coast Region
WDFW	Washington Department of Fish and Wildlife
WOC	Washington, Oregon, and California
XDB-SRA	Extended Depletion-based Stock Reduction Analysis
YOY	Young-of-the-year
YRCA	Yelloweye rockfish Conservation Area

Chapter 1 Introduction

Preface

The National Marine Fisheries Service (NMFS) and the Pacific Fishery Management Council (Council) adopt annual groundfish harvest specifications, adjust existing (routine) management measures for the groundfish fisheries, and implement new management measures to provide additional tools for fishery management.

NMFS and the Council have prepared this consolidated document for the 2019–20 biennial period. It fulfills all of the requirements for NEPA, MSA, EO 12866, and the RFA for the Pacific Coast Groundfish Fishery 2019–20 Harvest Specifications and Management Measures. This consolidated document provides assessments of the environmental impacts of an action and its reasonable alternatives (the EA), how the action meets the requirements of the MSA (MSA analysis), the economic benefits and costs of the action alternatives, as well as their distribution (the RIR), and the impacts of the action on directly regulated small entities (the IRFA). This EA/MSA analysis/RIR/IRFA addresses the statutory requirements of the MSA, the National Environmental Policy Act (NEPA), Presidential Executive Order 12866, and the Regulatory Flexibility Act.

Under NEPA, the longer-term framework and environmental impacts were disclosed in the Harvest Specifications and Management Measures for 2015-2016 and Biennial Periods Thereafter Final Environmental Impact Statement (EIS) (PFMC and NMFS 2015, hereafter, "the 2015 EIS"). The framework established a process by which NEPA documents for subsequent biennial periods would evaluate changes from the default harvest policies and environmental impacts that fell outside the range of impacts evaluated in the 2015 EIS. In December 2016, NMFS published a Final Environmental Assessment for the 2017–18 period (NMFS 2016, hereafter, "the 2016 EA") that looked only at proposed changes to default harvest control rules and new management measures.

NMFS and the Council support their MSA decisions with an intensive public process that includes meetings, public comments, and release of analytical documents. Details of these processes can be found in Section 1.4. For the 2019–20 period, the Council and NMFS prepared this consolidated document.

The Policy and Procedure for Compliance with the NEPA and Related Authorities[1] recognizes that the advantages of preparing consolidated documents:

> "The CEQ regulations require that, to the fullest extent possible, draft NEPA documents should be prepared concurrently with and integrated with environmental impact analyses and related surveys and studies required by other federal statutes (p.22). Additionally, the CEQ regulations allow agencies to combine an environmental document prepared in compliance with NEPA with any other agency document to reduce duplication and paperwork. 40 C.F.R. 1506.4. Thus, the decision maker may combine a NEPA document with related plans, rules, or amendments as a single consolidated document. ... The consolidated document must contain and clearly identify the required sections of the NEPA document and must stand on its own as an analytical document which fully informs decision makers and the public of the environmental effects of the proposal

[1] http://www.nepa.noaa.gov/docs/NOAA-NAO-216-6A-Companion-Manual-03012018.pdf

and those of the reasonable alternatives." (Companion Manual for NOAA Administrative Order 216-6A).

Table 1-1 Directory of Statutory and Executive elements in the Consolidated Document for the Pacific Groundfish Fishery 2019–20 Harvest Specifications, Yelloweye Rebuilding Revisions, and Management Measures

Element	Location
Mandatory elements of a NEPA Environmental Assessment (40 CFR § 1508.9(b) and NOAA Companion Manual for NOAA Administrative Order 216-6A)	
Purpose and Need	Section 1.1
Proposed Action	Section 1.1
Alternatives	Section 2.1 Harvest Specification Alternatives Section 2.2 Management Measure Alternatives
Environmental Effects (Direct, Indirect and Cumulative)	Chapter 4 – Summary of Direct and Indirect Effects Appendices A, B, and C – Detailed Discussion of Direct and Indirect Effects Chapter 5 – Cumulative Effects
Listing of Agencies and Persons Consulted	Chapter 9
Finding of No Significant Impact (FONSI)	Appendix E *Only available with the Final EA after public review and comment on the Draft EA*
Optional elements of a NEPA Environmental Assessment	
Scoping and Public Input	Section 1.4
Affected Environment	Chapter 3 Resources analyzed 3.2 Groundfish 3.3 Essential Fish Habitat 3.4 Protected Species 3.5 Socioeconomic Appendix A.1 Baseline – 2017 Regulations
References	Chapter 10
Elements satisfying other statutory and executive requirements	
Regulatory Impact Review	Chapter 6
Initial Regulatory Flexibility Analysis	Chapter 7
Magnuson-Stevens Act National Standards	Chapter 8

1.1 Proposed Action, Purpose and Need

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), National Marine Fisheries Service's (NMFS's) proposed actions consist of the following:

1. The adoption of 2019–20 harvest specifications
2. Revisions to the yelloweye rockfish rebuilding plan
3. Adjustments to existing (routine) management measures and implementation of new management measures

The purpose of these actions are 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 actions are needed to respond to new scientific information and information about the needs of fishing communities, to provide additional tools to ensure that annual catch limits (ACLs) and other federal harvest guidelines (HGs) are not exceeded, and to afford additional fishing opportunities where warranted.

The proposed action will be implemented through federal rulemaking.

1.2 Tiered NEPA Analysis

NEPA regulations at 40 CFR 1508.28 define "tiering" as "the coverage of general matters in broad environmental impact statements (such as national program or policy documents) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements), incorporating by reference the general discussion and concentrating solely on the issues specific to the statement subsequently prepared." In 2015, NMFS published the Harvest Specifications and Management Measures for 2015-2016 and Biennial Periods Thereafter Final Environmental Impact Statement (EIS) (PFMC and NMFS 2015, hereafter, "the 2015 EIS"). This EIS analyzed the impacts of both the proposed action of implementing harvest specifications and management measures for the 2015–16 biennial period and the long-term impacts of the harvest policy framework used to set biennial harvest specifications and the range of management measures necessary to control catch consistent with harvest specifications. The proposed action included Amendment 24 to the Pacific Coast Groundfish Fishery Management Plan (PCGFMP), which articulates a decision framework around "default harvest specifications" intended to streamline decision making for future biennial periods. PCGFMP section 5.1 describes how biennial harvest specifications are set and defines default harvest specifications as the application of the best scientific information available to the harvest control rule (HCR) from the previous biennial period. The default represents the continuation of the existing policy. Unless the Council takes deliberate action to adopt a new HCR, the existing rule "rolls over" as the basis for harvest specifications in the subsequent biennial period. This decision making framework is intended to complement the tiering concept; the impacts of a range of policies (HCRs) were analyzed in the 2015 EIS (adopted 2015–16 harvest control rules represent defaults for future biennial periods). NEPA documents for subsequent biennial periods evaluate changes from default harvest policies and environmental impacts outside the range of impacts evaluated in the 2015 EIS. 2019–20 is the second biennial period since preparation of the 2015 EIS and this EA also takes into account the actions and related impact analyses in the EA prepared for the 2017–18 biennial period (NMFS 2016, hereafter, "the 2016 EA").[2]

1.2.1 Tiered Analysis of Harvest Specifications

The 2015 EIS evaluated the impacts of setting harvest specifications and management measures over the long term by modeling a range of harvest policies over a 10-year period to 2024. The long-term analysis in the 2015 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 HCRs and related harvest specifications.[3] In addition to alternative HCRs, the 2015 EIS analysis encompassed alternative states of

[2] The 2016 EA evaluated setting alternative harvest control rules and harvest specifications for big skate, widow rockfish, darkblotched rockfish, and Pacific ocean perch (POP), establishing five new management measures for the 2017–18 biennial period and beyond, revising federal regulations at 50 CFR 660, Subparts C through G, accordingly, and implementing Amendment 27 to the Groundfish FMP.

[3] For the purposes of the 2015 EIS analysis it was assumed that the full projected annual catch limits (ACLs) were harvested so that ACLs were comparable to total catches over the projection period.

nature that captured the key axes of uncertainty in the stock assessments used as the basis for projections. (Alternative states of nature represent a likelihood distribution centered on the base case as the most probable state of nature.) There are two scenarios under which information or an action is considered new or a departure from what is contained in the 2015 EIS (as updated by the 2016 EA) and is therefore analyzed in this document:

- The Council proposes changing an HCR. This constitutes a change in the action and under NEPA, requires an analysis of alternatives. Such a change may or may not result in a catch level that is within the range analyzed in the 2015 EIS. If outside of the range, then the effects of the catch are disclosed in this tiered document.
- Updated harvest specifications result in the catch level of a stock that is outside of the range analyzed in the 2015 EIS (under the assumption that all of the ACL is caught). ACLs may fall outside the analyzed range because of a change in stock status or other new scientific information rather than a result of a change in the HCR. This represents a change in baseline conditions anticipated in the 2015 EIS. The stock specific effects of these ACLs are discussed in Section 3.2.2.

1.2.2 Tiered Analysis of Management Measures

As discussed in the PCGFMP, management measures are classified as either "routine" or "new" and the accompanying level of analysis differs between these two categories. If the environmental impacts of changes to measures classified as routine were previously analyzed in the 2015 EIS then this EA tiers from that analysis. New management measures, by definition, have not been previously analyzed so this EA presents more detailed impact analysis in all cases.

PCGFMP sections 6.1 and 6.2 describe the processes for establishing and adjusting management measures including the classification of routine measures. Routine management measures are those that the Council determines are likely to be adjusted on an annual or more frequent basis. The Council may classify measures as routine through either the biennial management process or a rulemaking process. In order for a measure to be classified as routine, the Council must find that the measure is appropriate to address the issue at hand and may require further adjustment to achieve its purpose with accuracy and the need for the measures, their impacts, and the rationale for their use has been analyzed prior to their initial implementation as routine measures. Once a management measure has been classified as routine and it has been adequately analyzed consistent with applicable law prior to a decision to adjust it, the measure may be modified (or "adjusted") through a simplified rulemaking process. Routine measures are, in the main, mechanisms to control catch so that annual catch limits (ACLs) are not exceeded and include modifications to commercial and recreational trip limits, bag limits, and season dates. For this reason they require regular adjustment at the outset of the biennial period to align with ACL changes and during the biennial period (as "inseason actions"), because the conduct of the fishery and resulting harvest cannot be perfectly forecast.

By implication, new management measures are those that have not already been classified as routine including those that the Council does not intend to regularly adjust.

1.3 Description of the Management Area

The management area for this action is the Exclusive Economic Zone (EEZ)—defined as 3–200 nautical miles from state baselines along the coasts of Washington, Oregon, and California—and communities that engage in fishing in waters off these states. PCGFMP Figure 3-1 depicts this management area and is incorporated by reference.

1.4 Scoping and Public Input

To evaluate the level of NEPA analysis needed for the 2019–20 harvest specifications and management measures, NMFS examined whether the 2019–20 harvest specifications and routine management measure adjustments proposed by the Council and their anticipated impacts were within the range of impacts described in the long-term analysis established in the 2015 EIS. If a harvest specification or management measure adjustment was within the previously analyzed range, and the anticipated impacts were covered in the 2015 EIS, then NMFS determined it would not need further NEPA analysis for 2019–20. If the harvest specification or management was determined not to be within the analyzed range, or if the impacts had not been analyzed, NMFS evaluated the appropriate level of additional NEPA analysis needed. All of the routine management measure adjustments (i.e., modifications to commercial and recreational trip limits, bag limits, and season dates) and their anticipated impacts for 2019–20 were determined to be within the range analyzed in the 2015 EIS action. Four proposed changes to harvest control rules were determined to need further NEPA analysis because they were outside of the range of possible harvest specifications analyzed in the 2015 EIS, and the impacts of the changes were not analyzed in the 2015 EIS. The new preferred management measures were also determined to need further NEPA analysis because they have not been implemented previously.

The FMP lays out a five meeting process for determining biennial harvest specifications. The following table shows the meetings and what was decided when for the 2019–20 cycle. At each meeting, public input in the development process of the 2019–20 harvest specifications and management measures was invited. Council meetings are noticed in the **Federal Register** and meetings are broadcast live.

Meeting	**Decisions**
June 2017	1. Final process and schedule for developing groundfish harvest specifications and management measures for 2019–20. 2. Update assessments and catch reports as recommended by the SSC. 3. Data requests recommended by the SSC (e.g., sigmas, stocks for catch-only updates, impact projection review model schedule, etc.).
September 2017	1. Stock assessments for the six species subject to summer STAR panels. 2. Final preferred alternatives (FPAs) for OFLs recommended by the SSC. 3. FPA sigma values recommended by the SSC. 4. A range of P* values, including some preliminary preferred alternatives (PPA) P* values. 5. A range of acceptable biological catches (ABCs), including PPA ABCs levels. 6. Preliminary range of new management measures.
November 2017	1. Rebuilding analyses prepared for overfished species, stock assessments approved for further review, and new impact projection models recommended by the SSC.

Meeting	Decisions
	2. FPA for P* values. 3. FPA for ABCs. 4. PPA for non-overfished species ACLs. 5. A range of overfished species ACLs and PPA ACLs. 6. A tentative range of two-year allocation alternatives. 7. Final range of new management measures for detailed analysis. 8. Preliminary selection of exempted fishing permits for 2019–20.
March 2018	1. Range of new management measures for salmon mitigation measures
April 2018	1. FPA for ACLs. 2. PPA for management measures from the range adopted at the November Council meeting. 3. PPA for two-year allocations.
June 2018	1. Corrections to the FPA for harvest specifications for yelloweye rockfish. 2. Final exempted fishing permits for 2019–20. 3. FPA for allocations. 4. FPA for management measures.

Chapter 2 Alternatives

Two sets of alternatives are analyzed in this EA: 1) changes to HCRs and yelloweye rockfish rebuilding plan parameters, and harvest specifications, and 2) changes in management measures related to harvest specifications and for other purposes including changes to the composition of stock complexes.

2.1 Harvest Specification Alternatives

At the national level, National Standard 1 Guidelines at 50 CFR 600.310 define harvest specifications and what must be taken into account when specifying them. PCGFMP Chapter 4 describes the framework for biennial specifications. The overfishing limit (OFL), acceptable biological catch (ABC), and the annual catch limit (ACL) for each stock is re-estimated and specified. The best scientific information available for these specifications encompasses new stock assessments, changes in Scientific and Statistical Committee (SSC)-endorsed stock categories, or changes in SSC-endorsed sigma values (i.e., biomass variances used to estimate the uncertainty in estimating OFLs). Any revised or new HCRs adopted by the Council and used to determine specifications for the subject biennial period become the new default for future biennial management cycles.

Updated harvest specifications for 2019 and 2020 based on default HCRs reflect the application of the best scientific information available to current harvest management policies. These are termed default harvest specifications. The Council considered alternatives to the default HCRs for the following stocks:

1. Yelloweye rockfish
2. California Scorpionfish S. of 34°27’ N. lat.
3. Lingcod N. of 40°10’ N lat.
4. Lingcod S. of 40°10’ N lat.

2.1.1 Default Harvest Specifications (No Action)

Default harvest specifications would be implemented. As discussed above, default harvest specifications are computed by applying the best scientific information available to current, default HCRs for all groundfish stocks. Table 2-1 lists the default harvest specifications for the 2019–20 biennial period and describes the default HCRs upon which they are based.

Table 2-1. 2019 and 2020 harvest specifications (overfishing limits (OFLs in mt), acceptable biological catches (ABCs in mt), and annual catch limits (ACLs in mt)) under default harvest control rules for determining these specifications, for West Coast groundfish stocks and stock complexes (overfished/rebuilding stocks in CAPS; stocks with new assessments in bold; component stocks in stock complexes in italics).

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
REBUILDING STOCKS							
COWCOD S. of 40º10'	74	67	10	76	68	10	ABCs sum of Con. and Mont. area ABCs, ACLs projected from 2013 rebuilding analysis (SPR = 82.7% (F = 0.007)) + Mont. area ABC contrib., ACT = 4 mt
COWCOD (Conception)	*61*	*56*	*NA*	*62*	*57*	*NA*	*ABC (P* = 0.45)*
COWCOD (Monterey)	*13.3*	*11.1*	*NA*	*13.3*	*11.1*	*NA*	*ABC (P* = 0.45)*
YELLOWEYE ROCKFISH	**81**	**74**	**29**	**84**	**77**	**30**	**ABC (P* = 0.4), ACL (SPR = 76.0%)**
NON-OVERFISHED STOCKS							
Arrowtooth Flounder	**18,696**	**15,574**	**15,574**	**15,306**	**12,750**	**12,750**	**ACL = ABC (P* = 0.4)**
Big skate	541	494	494	541	494	494	ACL = ABC (P* = 0.45)
Black Rockfish (CA)	344	329	329	341	326	326	ACL = ABC (P* = 0.45)
Black Rockfish (OR)	565	516	516	561	512	512	ACL = ABC (P* = 0.45)
Black Rockfish (WA)	312	298	298	311	297	297	ACL = ABC (P* = 0.45)
Bocaccio S. of 40º10'	**2,194**	**2,097**	**2,097**	**2,104**	**2,011**	**2,011**	**ACL = ABC (P* = 0.45)**
Cabezon (CA)	154	147	147	153	146	146	ACL = ABC (P* = 0.45)
Cabezon (OR)	49	47	47	49	47	47	ACL = ABC (P* = 0.45)
California scorpionfish	**337**	**313**	**150**	**331**	**307**	**150**	**ABC (P* = 0.45); 150 mt constant catch ACL.**
Canary Rockfish	1,517	1,450	1,450	1,431	1,368	1,368	ACL = ABC (P* = 0.45)
Chilipepper S. of 40º10'	2,652	2,536	2,536	2,521	2,410	2,410	ACL = ABC (P* = 0.45)
Darkblotched Rockfish	**800**	**765**	**765**	**853**	**815**	**815**	**ACL = ABC (P* = 0.45)**
Dover Sole	91,102	87,094	50,000	92,048	87,998	50,000	ABC (P* 0.45), ACL = 50,000 mt annually
English Sole	11,052	10,090	10,090	11,101	10,135	10,135	ACL = ABC (P* = 0.45)
Lingcod N. of 40°10'	**5,110**	**4,872**	**4,859**	**4,770**	**4,549**	**4,533**	**ACL = ABC (P* = 0.45 in OR & WA; P* = 0.40 in CA) w/ 40-10 adj. for the CA contribution to the ABC and ACL. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.**
Lingcod S. of 40°10'	**1,143**	**1,043**	**996**	**983**	**898**	**839**	**ACL = ABC (P* = 0.40) w/ 40-10 adj. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.**
Longnose skate	2,499	2,389	2,000	2,474	2,365	2,000	ABC (P* = 0.45), ACL = 2,000 mt annually
Longspine Thornyhead N. of 34°27'	4,112	3,425	2,603	3,901	3,250	2,470	ACL = 76% of coastwide ABC (P* = 0.4)
Longspine Thornyhead S. of 34°27'			822			780	ACL = 24% of coastwide ABC (P* = 0.4)
Pacific Cod	3,200	2,221	1,600	3,200	2,221	1,600	ABC (P* = 0.4), ACL = 50% of OFL
Pacific Ocean Perch N. of 40°10' N lat.	**4,753**	**4,340**	**4,340**	**4,632**	**4,229**	**4,229**	**ACL = ABC (P* = 0.45)**
Petrale Sole	3,042	2,908	2,908	2,976	2,845	2,845	ACL = ABC (P* = 0.45)
Sablefish N. of 36°	8,489	7,750	5,606	8,648	7,896	5,723	ACL: 40-10 rule applied to 73.8% of coastwide ABC (P* = 0.4)
Sablefish S. of 36°			1,990			2,032	ACL: 40-10 rule applied to 26.2% of coastwide ABC (P* = 0.4)
Shortbelly	6,950	5,789	500	6,950	5,789	500	ABC (P* = 0.4), ACL = 500 mt annually
Shortspine Thornyhead N. of 34°27'	3,089	2,573	1,683	3,063	2,551	1,669	ACL = 65.4% of coastwide ABC (P* = 0.4)

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Shortspine Thornyhead S. of 34°27'			890			883	ACL = 34.6% of coastwide ABC (P* = 0.4)
Spiny dogfish	2,486	2,071	2,071	2,472	2,059	2,059	ACL = ABC (P* = 0.4)
Splitnose S. of 40º10'	1,831	1,750	1,750	1,810	1,731	1,731	ACL = ABC (P* = 0.45)
Starry flounder	652	452	452	652	452	452	Est. MSY from E.J.'s DBSRA analysis
Widow Rockfish	12,375	11,831	11,831	11,714	11,199	11,199	ACL = ABC (P* = 0.45)
Yellowtail N. of 40º10'	**6,568**	**5,997**	**5,997**	**6,261**	**5,716**	**5,716**	**ACL = ABC (P* = 0.45)**
STOCK COMPLEXES							
Nearshore Rockfish North	203	183	183	200	180	180	Sum of component species specifications
Black and yellow	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Blue/Deacon (CA)	***31.0***	***28.1***	***28.1***	***32.4***	***29.3***	***29.3***	***ACL = ABC (P* = 0.45)***
Blue/Deacon (OR)	***112.3***	***101.5***	***101.5***	***108.8***	***98.4***	***98.4***	***ACL = ABC (P* = 0.45)***
Blue/Deacon (WA)	*8.7*	*7.3*	*7.3*	*8.4*	*7.0*	*7.0*	*ACL = ABC (P* = 0.45)*
Brown	*2.1*	*1.9*	*1.9*	*2.1*	*1.9*	*1.9*	*ACL = ABC (P* = 0.45)*
Calico	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
China	*28.6*	*26.1*	*26.1*	*27.9*	*25.5*	*25.5*	*ACL = ABC (P* = 0.45)*
Copper	*11.9*	*10.9*	*10.9*	*12.2*	*11.2*	*11.2*	*ACL = ABC (P* = 0.45)*
Gopher	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Grass	*0.7*	*0.5*	*0.5*	*0.7*	*0.5*	*0.5*	*ACL = ABC (P* = 0.45)*
Kelp	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Olive	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*ACL = ABC (P* = 0.45)*
Quillback	*7.4*	*6.2*	*6.2*	*7.4*	*6.2*	*6.2*	*ACL = ABC (P* = 0.45)*
Treefish	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*ACL = ABC (P* = 0.45)*
Shelf Rockfish North	2,309	2,054	2,054	2,302	2,048	2,048	Sum of component species specifications
Bronzespotted	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Bocaccio	*284.0*	*236.9*	*236.9*	*284.0*	*236.9*	*236.9*	*ACL = ABC (P* = 0.45)*
Chameleon	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Chilipepper	*199.6*	*190.9*	*190.9*	*189.8*	*181.4*	*181.4*	*ACL = ABC (P* = 0.45)*
Cowcod	*0.4*	*0.3*	*0.3*	*0.4*	*0.3*	*0.3*	*ACL = ABC (P* = 0.45)*
Flag	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Freckled	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Greenblotched	*1.3*	*1.1*	*1.1*	*1.3*	*1.1*	*1.1*	*ACL = ABC (P* = 0.45)*
Greenspotted 40°10' to 42° N. lat.	*9.3*	*8.5*	*8.2*	*9.3*	*8.5*	*8.2*	*ACL: 40-10 rule applied to 22.2% of northern model (CA N of 34°27' N lat.) ABC (P* = 0.45)*
Greenspotted N. of 42 N. lat. (OR & WA)	*6.1*	*5.1*	*5.1*	*6.1*	*5.1*	*5.1*	*ACL = ABC (P* = 0.45)*
Greenstriped	*1,311.4*	*1,197.3*	*1,197.3*	*1,314.8*	*1,200.4*	*1,200.4*	*ACL = ABC (P* = 0.45)*
Halfbanded	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Harlequin	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Honeycomb	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Mexican	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Pink	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Pinkrose	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Puget Sound	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Pygmy	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Redstripe	*269.9*	*225.1*	*225.1*	*269.9*	*225.1*	*225.1*	*ACL = ABC (P* = 0.45)*
Rosethorn	*12.9*	*10.8*	*10.8*	*12.9*	*10.8*	*10.8*	*ACL = ABC (P* = 0.45)*
Rosy	*3.0*	*2.5*	*2.5*	*3.0*	*2.5*	*2.5*	*ACL = ABC (P* = 0.45)*
Silvergray	*159.4*	*133.0*	*133.0*	*159.4*	*133.0*	*133.0*	*ACL = ABC (P* = 0.45)*
Speckled	*0.2*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Squarespot	*0.2*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Starry	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Stripetail	*40.4*	*33.7*	*33.7*	*40.4*	*33.7*	*33.7*	*ACL = ABC (P* = 0.45)*
Swordspine	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Tiger	*1.0*	*0.8*	*0.8*	*1.0*	*0.8*	*0.8*	*ACL = ABC (P* = 0.45)*
Vermilion	*9.7*	*8.1*	*8.1*	*9.7*	*8.1*	*8.1*	*ACL = ABC (P* = 0.45)*
Slope Rockfish North	1,887	1,746	1,746	1,873	1,732	1,732	Sum of component species specifications
Aurora (assuming sigma = 0.39)	*17.5*	*16.7*	*16.7*	*17.5*	*16.7*	*16.7*	*ACL = ABC (P* = 0.45)*
Bank	*17.2*	*14.4*	*14.4*	*17.2*	*14.4*	*14.4*	*ACL = ABC (P* = 0.45)*
Blackgill	*4.7*	*3.9*	*3.9*	*4.7*	*3.9*	*3.9*	*ACL = ABC (P* = 0.45)*
Redbanded	*45.3*	*37.7*	*37.7*	*45.3*	*37.7*	*37.7*	*ACL = ABC (P* = 0.45)*
Rougheye/Blackspotted	*217.6*	*198.6*	*198.6*	*219.5*	*200.4*	*200.4*	*ACL = ABC (P* = 0.45)*
Sharpchin	*352.8*	*322.1*	*322.1*	*348.0*	*317.7*	*317.7*	*ACL = ABC (P* = 0.45)*
Shortraker	*18.7*	*15.6*	*15.6*	*18.7*	*15.6*	*15.6*	*ACL = ABC (P* = 0.45)*
Splitnose	*1,021.0*	*976.1*	*976.1*	*1,009.6*	*965.1*	*965.1*	*ACL = ABC (P* = 0.45)*
Yellowmouth	*192.4*	*160.5*	*160.5*	*192.4*	*160.5*	*160.5*	*ACL = ABC (P* = 0.45)*
Nearshore Rockfish South	1,300	1,145	1,142	1,322	1,165	1,163	Sum of component species specifications
Shallow Nearshore Species	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Black and yellow	*27.5*	*23.0*	*23.0*	*27.5*	*23.0*	*23.0*	*ACL = ABC (P* = 0.45)*
China	*14.3*	*13.1*	*10.8*	*14.8*	*13.5*	*11.5*	*ABC (P* = 0.45) with 40-10 adjustment for the ACL*
Gopher (N of Pt. Conception)	*101.0*	*84.2*	*84.2*	*101.0*	*84.2*	*84.2*	*ACL = ABC (P* = 0.45)*
Gopher (S of Pt. Conception)	*25.6*	*21.4*	*21.4*	*25.6*	*21.4*	*21.4*	*ACL = ABC (P* = 0.45)*
Grass	*59.6*	*49.7*	*49.7*	*59.6*	*49.7*	*49.7*	*ACL = ABC (P* = 0.45)*
Kelp	*27.7*	*23.1*	*23.1*	*27.7*	*23.1*	*23.1*	*ACL = ABC (P* = 0.45)*
Deeper Nearshore Species	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Blue/Deacon (N. of 34°27' N lat.)	***278.8***	***252.6***	***252.6***	***291.5***	***264.1***	***264.1***	***ACL = ABC (P* = 0.45)***

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Blue/Deacon (S. of 34°27' N lat.)	*21.8*	*18.2*	*18.2*	*21.8*	*18.2*	*18.2*	*ACL = ABC (P* = 0.45)*
Brown	*177.9*	*162.4*	*162.4*	*181.9*	*166.1*	*166.1*	*ACL = ABC (P* = 0.45)*
Calico	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Copper	*322.1*	*294.1*	*294.1*	*327.3*	*298.8*	*298.8*	*ACL = ABC (P* = 0.45)*
Olive	*224.6*	*187.4*	*187.4*	*224.6*	*187.4*	*187.4*	*ACL = ABC (P* = 0.45)*
Quillback	*5.4*	*4.5*	*4.5*	*5.4*	*4.5*	*4.5*	*ACL = ABC (P* = 0.45)*
Treefish	*13.2*	*11.0*	*11.0*	*13.2*	*11.0*	*11.0*	*ACL = ABC (P* = 0.45)*
Shelf Rockfish South	1,919	1,625	1,625	1,919	1,626	1,625	Sum of component species specifications
Bronzespotted	*3.6*	*3.0*	*3.0*	*3.6*	*3.0*	*3.0*	*ACL = ABC (P* = 0.45)*
Chameleon	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Flag	*23.4*	*19.5*	*19.5*	*23.4*	*19.5*	*19.5*	*ACL = ABC (P* = 0.45)*
Freckled	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Greenblotched	*23.1*	*19.3*	*19.3*	*23.1*	*19.3*	*19.3*	*ACL = ABC (P* = 0.45)*
Greenspotted	*78.3*	*71.5*	*70.9*	*78.1*	*71.3*	*70.7*	*ACL: 40-10 rule applied to77.8% of northern model (CA N of 34°27' N lat.) ABC plus the southern model ABC (P* = 0.45)*
Greenstriped	*240.6*	*219.6*	*219.6*	*241.2*	*220.2*	*220.2*	*ACL = ABC (P* = 0.45)*
Halfbanded	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Harlequin	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Honeycomb	*9.9*	*8.2*	*8.2*	*9.9*	*8.2*	*8.2*	*ACL = ABC (P* = 0.45)*
Mexican	*5.1*	*4.2*	*4.2*	*5.1*	*4.2*	*4.2*	*ACL = ABC (P* = 0.45)*
Pink	*2.5*	*2.1*	*2.1*	*2.5*	*2.1*	*2.1*	*ACL = ABC (P* = 0.45)*
Pinkrose	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Pygmy	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Redstripe	*0.5*	*0.4*	*0.4*	*0.5*	*0.4*	*0.4*	*ACL = ABC (P* = 0.45)*
Rosethorn	*2.1*	*1.8*	*1.8*	*2.1*	*1.8*	*1.8*	*ACL = ABC (P* = 0.45)*
Rosy	*44.5*	*37.1*	*37.1*	*44.5*	*37.1*	*37.1*	*ACL = ABC (P* = 0.45)*
Silvergray	*0.5*	*0.4*	*0.4*	*0.5*	*0.4*	*0.4*	*ACL = ABC (P* = 0.45)*
Speckled	*39.4*	*32.8*	*32.8*	*39.4*	*32.8*	*32.8*	*ACL = ABC (P* = 0.45)*
Squarespot	*11.1*	*9.2*	*9.2*	*11.1*	*9.2*	*9.2*	*ACL = ABC (P* = 0.45)*
Starry	*62.6*	*52.2*	*52.2*	*62.6*	*52.2*	*52.2*	*ACL = ABC (P* = 0.45)*
Stripetail	*23.6*	*19.7*	*19.7*	*23.6*	*19.7*	*19.7*	*ACL = ABC (P* = 0.45)*
Swordspine	*14.2*	*11.9*	*11.9*	*14.2*	*11.9*	*11.9*	*ACL = ABC (P* = 0.45)*
Tiger	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Vermilion	*269.3*	*224.6*	*224.6*	*269.3*	*224.6*	*224.6*	*ACL = ABC (P* = 0.45)*
Yellowtail	*1,064.4*	*887.7*	*887.7*	*1,064.4*	*887.7*	*887.7*	*ACL = ABC (P* = 0.45)*
Slope Rockfish South	856	744	744	855	743	743	Sum of component species specifications
Aurora	*74.6*	*71.0*	*71.0*	*74.6*	*71.0*	*71.0*	*ACL = ABC (P* = 0.45)*
Bank	*503.2*	*419.7*	*419.7*	*503.2*	*419.7*	*419.7*	*ACL = ABC (P* = 0.45)*

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Blackgill	***174.0***	***158.9***	***158.9***	***174.0***	***158.9***	***158.9***	***ACL = ABC (P* = 0.45)***
Pacific ocean perch	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Redbanded	*10.4*	*8.7*	*8.7*	*10.4*	*8.7*	*8.7*	*ACL = ABC (P* = 0.45)*
Rougheye/Blackspotted	*4.4*	*4.1*	*4.1*	*4.5*	*4.1*	*4.1*	*ACL = ABC (P* = 0.45)*
Sharpchin	*88.2*	*80.5*	*80.5*	*87.0*	*79.4*	*79.4*	*ACL = ABC (P* = 0.45)*
Shortraker	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Yellowmouth	*0.8*	*0.7*	*0.7*	*0.8*	*0.7*	*0.7*	*ACL = ABC (P* = 0.45)*
Other Flatfish	8,750	6,498	6,498	8,202	6,041	6,041	Sum of component species specifications
Butter sole	*4.6*	*3.2*	*3.2*	*4.6*	*3.2*	*3.2*	*ACL = ABC (P* = 0.4)*
Curlfin sole	*8.2*	*5.7*	*5.7*	*8.2*	*5.7*	*5.7*	*ACL = ABC (P* = 0.4)*
Flathead sole	*35.0*	*24.3*	*24.3*	*35.0*	*24.3*	*24.3*	*ACL = ABC (P* = 0.4)*
Pacific sanddab	*4,801.0*	*3,331.9*	*3,331.9*	*4,801.0*	*3,331.9*	*3,331.9*	*ACL = ABC (P* = 0.4)*
Rex sole	*3,061*	*2,550*	*2,550*	*2,513*	*2,093*	*2,093*	*ACL = ABC (P* = 0.4)*
Rock sole	*66.7*	*46.3*	*46.3*	*66.7*	*46.3*	*46.3*	*ACL = ABC (P* = 0.4)*
Sand sole	*773.2*	*536.6*	*536.6*	*773.2*	*536.6*	*536.6*	*ACL = ABC (P* = 0.4)*
Other Fish	480	420	420	465	406	406	Sum of component species specifications
Cabezon (WA)	*5.5*	*4.6*	*4.6*	*5.4*	*4.5*	*4.5*	*ACL = ABC (P* = 0.45)*
Kelp greenling (CA)	*118.9*	*99.2*	*99.2*	*118.9*	*99.2*	*99.2*	*ACL = ABC (P* = 0.45)*
Kelp greenling (OR)	*180.9*	*171.1*	*171.1*	*166.5*	*157.5*	*157.5*	*ACL = ABC (P* = 0.45)*
Kelp greenling (WA)	*7.1*	*5.9*	*5.9*	*7.1*	*5.9*	*5.9*	*ACL = ABC (P* = 0.45)*
Leopard shark	*167.1*	*139.4*	*139.4*	*167.1*	*139.4*	*139.4*	*ACL = ABC (P* = 0.45)*

2.1.2 The Preferred Alternative

The Council's and NMFS's preferred harvest specification alternative is described in section 2.2.1 as part of the "integrated alternatives," which combine the harvest specifications with necessary routine management measures as the basis for evaluating management performance. For most stocks the Council only considered the default harvest specifications; for four stocks the Council considered alternative harvest specifications. The alternative harvest specifications compared to the No Action under default HCRs are shown in Table 2-2 and Table 2-3. Table 2-3 also displays the preferred harvest specifications with the preferred restructured stock complexes described in section 2.2.2.2. The range of alternatives considered by the Council for these stocks are discussed below in Sections 2.1.3 through 2.1.5.

Table 2-2. Alternative 2019 and 2020 harvest specifications (in mt) for select groundfish stocks selected for detailed analysis.

Stock	Alternative	2019			2020			Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
CA Scorpionfish S. of 34°27' N lat.	No Action	337	313	150	331	307	150	150 mt constant catch ACL
	Alt. 1 (Preferred)	337	313	313	331	307	307	ACL = ABC (P* = 0.45)
Lingcod N. of 40°10' N lat.	No Action	5,110	4,872	4,859	4,770	4,549	4,533	ACL = ABC (P* = 0.45 in OR & WA; P* = 0.4 in CA) w/ 40-10 adj. for the CA contribution to the ABC and ACL. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Lingcod S. of 40°10' N lat.		1,143	1,043	996	983	898	839	ACL = ABC (P* = 0.4) w/ 40-10 adj. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Lingcod N. of 40°10' N lat.	Alt. 1 (Preferred)	5,110	4,885	4,871	4,768	4,558	4,541	ACL = ABC (P* = 0.45) w/ 40-10 adj. for the CA contribution to the ABC and ACL. Assumes 40% and 75% ACL attainment for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Lingcod S. of 40°10' N lat.		1,143	1,093	1,039	977	934	869	ACL = ABC (P* = 0.45) w/ 40-10 adj. Assumes 40% and 75% ACL attainment for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Yelloweye rockfish	No Action	81	74	29	84	77	30	ABC (P* = 0.4), ACL (SPR = 76.0%); median time to rebuild = 2027
	Alt. 1	81	74	39	84	77	40	ABC (P* = 0.4), ACL (SPR = 70.0%); median time to rebuild = 2028
	Alt. 2 (Preferred)	81	74	48	84	77	49	ABC (P* = 0.4), ACL (SPR = 65.0%); median time to rebuild = 2029

Table 2-3. 2019 and 2020 harvest specifications (overfishing limits (OFLs in mt), acceptable biological catches (ABCs in mt), and annual catch limits (ACLs in mt)) under preferred harvest control rules and stock complex restructuring for determining these specifications, for West Coast groundfish stocks and stock complexes (overfished/rebuilding stocks in CAPS; stocks with new assessments in bold; component stocks in stock complexes in italics).

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
REBUILDING STOCKS							
COWCOD S. of 40º10'	74	67	10	76	68	10	ABCs sum of Con. and Mont. area ABCs, ACLs projected from 2013 rebuilding analysis (SPR = 82.7% (F = 0.007)) + Mont. area ABC contrib., ACT = 4 mt
COWCOD (Conception)	*61*	*56*	*NA*	*62*	*57*	*NA*	*ABC (P* = 0.45)*
COWCOD (Monterey)	*13.3*	*11.1*	*NA*	*13.3*	*11.1*	*NA*	*ABC (P* = 0.45)*
YELLOWEYE ROCKFISH	**82**	**74**	**48**	**84**	**77**	**49**	**ABC (P* = 0.4), ACL (SPR = 65.0%)**
NON-OVERFISHED STOCKS							
Arrowtooth Flounder	**18,696**	**15,574**	**15,574**	**15,306**	**12,750**	**12,750**	**ACL = ABC (P* = 0.4)**
Big skate	541	494	494	541	494	494	ACL = ABC (P* = 0.45)
Black Rockfish (CA)	344	329	329	341	326	326	ACL = ABC (P* = 0.45)
Black Rockfish (WA)	312	298	298	311	297	297	ACL = ABC (P* = 0.45)
Bocaccio S. of 40º10'	**2,194**	**2,097**	**2,097**	**2,104**	**2,011**	**2,011**	**ACL = ABC (P* = 0.45)**
Cabezon (CA)	154	147	147	153	146	146	ACL = ABC (P* = 0.45)
California scorpionfish	**337**	**313**	**313**	**331**	**307**	**307**	**ACL = ABC (P* = 0.45)**
Canary Rockfish	1,517	1,450	1,450	1,431	1,368	1,368	ACL = ABC (P* = 0.45)
Chilipepper S. of 40º10'	2,652	2,536	2,536	2,521	2,410	2,410	ACL = ABC (P* = 0.45)
Darkblotched Rockfish	**800**	**765**	**765**	**853**	**815**	**815**	**ACL = ABC (P* = 0.45)**
Dover Sole	91,102	87,094	50,000	92,048	87,998	50,000	ABC (P* 0.45), ACL = 50,000 mt annually
English Sole	11,052	10,090	10,090	11,101	10,135	10,135	ACL = ABC (P* = 0.45)
Lingcod N. of 40º10'	**5,110**	**4,885**	**4,871**	**4,768**	**4,558**	**4,541**	**ACL = ABC (P* = 0.45) w/ 40-10 adj. for the CA contribution to the ABC and ACL. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.**
Lingcod S. of 40º10'	**1,143**	**1,093**	**1,039**	**977**	**934**	**869**	**ACL = ABC (P* = 0.45) w/ 40-10 adj. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.**
Longnose skate	2,499	2,389	2,000	2,474	2,365	2,000	ABC (P* = 0.45), ACL = 2,000 mt annually
Longspine Thornyhead N. of 34°27'	4,112	3,425	2,603	3,901	3,250	2,470	ACL = 76% of coastwide ABC (P* = 0.4)
Longspine Thornyhead S. of 34°27'			822			780	ACL = 24% of coastwide ABC (P* = 0.4)
Pacific Cod	3,200	2,221	1,600	3,200	2,221	1,600	ABC (P* = 0.4), ACL = 50% of OFL
Pacific Ocean Perch N. of 40°10' N lat.	**4,753**	**4,340**	**4,340**	**4,632**	**4,229**	**4,229**	**ACL = ABC (P* = 0.45)**
Petrale Sole	3,042	2,908	2,908	2,976	2,845	2,845	ACL = ABC (P* = 0.45)
Sablefish N. of 36°	8,489	7,750	5,606	8,648	7,896	5,723	ACL: 40-10 rule applied to 73.8% of coastwide ABC (P* = 0.4)
Sablefish S. of 36°			1,990			2,032	ACL: 40-10 rule applied to 26.2% of coastwide ABC (P* = 0.4)
Shortbelly	6,950	5,789	500	6,950	5,789	500	ABC (P* = 0.4), ACL = 500 mt annually
Shortspine Thornyhead N. of 34°27'	3,089	2,573	1,683	3,063	2,551	1,669	ACL = 65.4% of coastwide ABC (P* = 0.4)
Shortspine Thornyhead S. of 34°27'			890			883	ACL = 34.6% of coastwide ABC (P* = 0.4)

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Spiny dogfish	2,486	2,071	2,071	2,472	2,059	2,059	ACL = ABC (P* = 0.4)
Splitnose S. of 40º10'	1,831	1,750	1,750	1,810	1,731	1,731	ACL = ABC (P* = 0.45)
Starry flounder	652	452	452	652	452	452	Est. MSY from E.J.'s DBSRA analysis
Widow Rockfish	12,375	11,831	11,831	11,714	11,199	11,199	ACL = ABC (P* = 0.45)
Yellowtail N. of 40º10'	**6,568**	**5,997**	**5,997**	**6,261**	**5,716**	**5,716**	**ACL = ABC (P* = 0.45)**
STOCK COMPLEXES							
Nearshore Rockfish North	91	81	81	92	82	82	Sum of component species specifications
Black and yellow	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Blue/Deacon (CA)	***31.0***	***28.1***	***28.1***	***32.4***	***29.3***	***29.3***	***ACL = ABC (P* = 0.45)***
Blue/Deacon (WA)	*8.7*	*7.3*	*7.3*	*8.4*	*7.0*	*7.0*	*ACL = ABC (P* = 0.45)*
Brown	*2.1*	*1.9*	*1.9*	*2.1*	*1.9*	*1.9*	*ACL = ABC (P* = 0.45)*
Calico	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
China	*28.6*	*26.1*	*26.1*	*27.9*	*25.5*	*25.5*	*ACL = ABC (P* = 0.45)*
Copper	*11.9*	*10.9*	*10.9*	*12.2*	*11.2*	*11.2*	*ACL = ABC (P* = 0.45)*
Gopher	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Grass	*0.7*	*0.5*	*0.5*	*0.7*	*0.5*	*0.5*	*ACL = ABC (P* = 0.45)*
Kelp	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Olive	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*ACL = ABC (P* = 0.45)*
Quillback	*7.4*	*6.2*	*6.2*	*7.4*	*6.2*	*6.2*	*ACL = ABC (P* = 0.45)*
Treefish	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*ACL = ABC (P* = 0.45)*
Oregon Black/Blue/Deacon Rockfish	677	617	617	670	611	611	Sum of component species specifications
Black Rockfish (OR)	*565.0*	*515.8*	*515.8*	*561.0*	*512.2*	*512.2*	*ACL = ABC (P* = 0.45)*
Blue/Deacon (OR)	***112.3***	***101.5***	***101.5***	***108.8***	***98.4***	***98.4***	***ACL = ABC (P* = 0.45)***
Shelf Rockfish North	2,309	2,054	2,054	2,302	2,048	2,048	Sum of component species specifications
Bronzespotted	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Bocaccio	*284.0*	*236.9*	*236.9*	*284.0*	*236.9*	*236.9*	*ACL = ABC (P* = 0.45)*
Chameleon	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Chilipepper	*199.6*	*190.9*	*190.9*	*189.8*	*181.4*	*181.4*	*ACL = ABC (P* = 0.45)*
Cowcod	*0.4*	*0.3*	*0.3*	*0.4*	*0.3*	*0.3*	*ACL = ABC (P* = 0.45)*
Flag	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Freckled	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Greenblotched	*1.3*	*1.1*	*1.1*	*1.3*	*1.1*	*1.1*	*ACL = ABC (P* = 0.45)*
Greenspotted 40°10' to 42° N. lat.	*9.3*	*8.5*	*8.2*	*9.3*	*8.5*	*8.2*	*ACL: 40-10 rule applied to 22.2% of northern model (CA N of 34°27' N lat.) ABC (P* = 0.45)*
Greenspotted N. of 42 N. lat. (OR & WA)	*6.1*	*5.1*	*5.1*	*6.1*	*5.1*	*5.1*	*ACL = ABC (P* = 0.45)*
Greenstriped	*1,311.4*	*1,197.3*	*1,197.3*	*1,314.8*	*1,200.4*	*1,200.4*	*ACL = ABC (P* = 0.45)*

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Halfbanded	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Harlequin	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Honeycomb	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Mexican	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Pink	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Pinkrose	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Puget Sound	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Pygmy	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Redstripe	*269.9*	*225.1*	*225.1*	*269.9*	*225.1*	*225.1*	*ACL = ABC (P* = 0.45)*
Rosethorn	*12.9*	*10.8*	*10.8*	*12.9*	*10.8*	*10.8*	*ACL = ABC (P* = 0.45)*
Rosy	*3.0*	*2.5*	*2.5*	*3.0*	*2.5*	*2.5*	*ACL = ABC (P* = 0.45)*
Silvergray	*159.4*	*133.0*	*133.0*	*159.4*	*133.0*	*133.0*	*ACL = ABC (P* = 0.45)*
Speckled	*0.2*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Squarespot	*0.2*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Starry	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Stripetail	*40.4*	*33.7*	*33.7*	*40.4*	*33.7*	*33.7*	*ACL = ABC (P* = 0.45)*
Swordspine	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Tiger	*1.0*	*0.8*	*0.8*	*1.0*	*0.8*	*0.8*	*ACL = ABC (P* = 0.45)*
Vermilion	*9.7*	*8.1*	*8.1*	*9.7*	*8.1*	*8.1*	*ACL = ABC (P* = 0.45)*
Slope Rockfish North	1,887	1,746	1,746	1,873	1,732	1,732	Sum of component species specifications
Aurora (assuming sigma = 0.39)	*17.5*	*16.7*	*16.7*	*17.5*	*16.7*	*16.7*	*ACL = ABC (P* = 0.45)*
Bank	*17.2*	*14.4*	*14.4*	*17.2*	*14.4*	*14.4*	*ACL = ABC (P* = 0.45)*
Blackgill	*4.7*	*3.9*	*3.9*	*4.7*	*3.9*	*3.9*	*ACL = ABC (P* = 0.45)*
Redbanded	*45.3*	*37.7*	*37.7*	*45.3*	*37.7*	*37.7*	*ACL = ABC (P* = 0.45)*
Rougheye/Blackspotted	*217.6*	*198.6*	*198.6*	*219.5*	*200.4*	*200.4*	*ACL = ABC (P* = 0.45)*
Sharpchin	*352.8*	*322.1*	*322.1*	*348.0*	*317.7*	*317.7*	*ACL = ABC (P* = 0.45)*
Shortraker	*18.7*	*15.6*	*15.6*	*18.7*	*15.6*	*15.6*	*ACL = ABC (P* = 0.45)*
Splitnose	*1,021.0*	*976.1*	*976.1*	*1,009.6*	*965.1*	*965.1*	*ACL = ABC (P* = 0.45)*
Yellowmouth	*192.4*	*160.5*	*160.5*	*192.4*	*160.5*	*160.5*	*ACL = ABC (P* = 0.45)*
Nearshore Rockfish South	1,300	1,145	1,142	1,322	1,165	1,163	Sum of component species specifications
Shallow Nearshore Species	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Black and yellow	*27.5*	*23.0*	*23.0*	*27.5*	*23.0*	*23.0*	*ACL = ABC (P* = 0.45)*
China	*14.3*	*13.1*	*10.8*	*14.8*	*13.5*	*11.5*	*ABC (P* = 0.45) with 40-10 adjustment for the ACL*
Gopher (N of Pt. Conception)	*101.0*	*84.2*	*84.2*	*101.0*	*84.2*	*84.2*	*ACL = ABC (P* = 0.45)*
Gopher (S of Pt. Conception)	*25.6*	*21.4*	*21.4*	*25.6*	*21.4*	*21.4*	*ACL = ABC (P* = 0.45)*
Grass	*59.6*	*49.7*	*49.7*	*59.6*	*49.7*	*49.7*	*ACL = ABC (P* = 0.45)*

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Kelp	*27.7*	*23.1*	*23.1*	*27.7*	*23.1*	*23.1*	*ACL = ABC (P* = 0.45)*
Deeper Nearshore Species	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Blue/Deacon (N. of 34°27' N lat.)	***278.8***	***252.6***	***252.6***	***291.5***	***264.1***	***264.1***	***ACL = ABC (P* = 0.45)***
Blue/Deacon (S. of 34°27' N lat.)	*21.8*	*18.2*	*18.2*	*21.8*	*18.2*	*18.2*	*ACL = ABC (P* = 0.45)*
Brown	*177.9*	*162.4*	*162.4*	*181.9*	*166.1*	*166.1*	*ACL = ABC (P* = 0.45)*
Calico	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Copper	*322.1*	*294.1*	*294.1*	*327.3*	*298.8*	*298.8*	*ACL = ABC (P* = 0.45)*
Olive	*224.6*	*187.4*	*187.4*	*224.6*	*187.4*	*187.4*	*ACL = ABC (P* = 0.45)*
Quillback	*5.4*	*4.5*	*4.5*	*5.4*	*4.5*	*4.5*	*ACL = ABC (P* = 0.45)*
Treefish	*13.2*	*11.0*	*11.0*	*13.2*	*11.0*	*11.0*	*ACL = ABC (P* = 0.45)*
Shelf Rockfish South	1,919	1,625	1,625	1,919	1,626	1,625	Sum of component species specifications
Bronzespotted	*3.6*	*3.0*	*3.0*	*3.6*	*3.0*	*3.0*	*ACL = ABC (P* = 0.45)*
Chameleon	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Flag	*23.4*	*19.5*	*19.5*	*23.4*	*19.5*	*19.5*	*ACL = ABC (P* = 0.45)*
Freckled	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Greenblotched	*23.1*	*19.3*	*19.3*	*23.1*	*19.3*	*19.3*	*ACL = ABC (P* = 0.45)*
Greenspotted	*78.3*	*71.5*	*70.9*	*78.1*	*71.3*	*70.7*	*ACL: 40-10 rule applied to77.8% of northern model (CA N of 34°27' N lat.) ABC plus the southern model ABC (P* = 0.45)*
Greenstriped	*240.6*	*219.6*	*219.6*	*241.2*	*220.2*	*220.2*	*ACL = ABC (P* = 0.45)*
Halfbanded	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Harlequin	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Honeycomb	*9.9*	*8.2*	*8.2*	*9.9*	*8.2*	*8.2*	*ACL = ABC (P* = 0.45)*
Mexican	*5.1*	*4.2*	*4.2*	*5.1*	*4.2*	*4.2*	*ACL = ABC (P* = 0.45)*
Pink	*2.5*	*2.1*	*2.1*	*2.5*	*2.1*	*2.1*	*ACL = ABC (P* = 0.45)*
Pinkrose	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Pygmy	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Redstripe	*0.5*	*0.4*	*0.4*	*0.5*	*0.4*	*0.4*	*ACL = ABC (P* = 0.45)*
Rosethorn	*2.1*	*1.8*	*1.8*	*2.1*	*1.8*	*1.8*	*ACL = ABC (P* = 0.45)*
Rosy	*44.5*	*37.1*	*37.1*	*44.5*	*37.1*	*37.1*	*ACL = ABC (P* = 0.45)*
Silvergray	*0.5*	*0.4*	*0.4*	*0.5*	*0.4*	*0.4*	*ACL = ABC (P* = 0.45)*
Speckled	*39.4*	*32.8*	*32.8*	*39.4*	*32.8*	*32.8*	*ACL = ABC (P* = 0.45)*
Squarespot	*11.1*	*9.2*	*9.2*	*11.1*	*9.2*	*9.2*	*ACL = ABC (P* = 0.45)*
Starry	*62.6*	*52.2*	*52.2*	*62.6*	*52.2*	*52.2*	*ACL = ABC (P* = 0.45)*
Stripetail	*23.6*	*19.7*	*19.7*	*23.6*	*19.7*	*19.7*	*ACL = ABC (P* = 0.45)*
Swordspine	*14.2*	*11.9*	*11.9*	*14.2*	*11.9*	*11.9*	*ACL = ABC (P* = 0.45)*
Tiger	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*ACL = ABC (P* = 0.45)*
Vermilion	*269.3*	*224.6*	*224.6*	*269.3*	*224.6*	*224.6*	*ACL = ABC (P* = 0.45)*

Stock or Stock complex	2019			2020			Harvest Control Rule
	OFL	ABC	ACL	OFL	ABC	ACL	
Yellowtail	*1,064.4*	*887.7*	*887.7*	*1,064.4*	*887.7*	*887.7*	*ACL = ABC (P* = 0.45)*
Slope Rockfish South	856	744	744	855	743	743	Sum of component species specifications
Aurora	*74.6*	*71.0*	*71.0*	*74.6*	*71.0*	*71.0*	*ACL = ABC (P* = 0.45)*
Bank	*503.2*	*419.7*	*419.7*	*503.2*	*419.7*	*419.7*	*ACL = ABC (P* = 0.45)*
Blackgill	***174.0***	***158.9***	***158.9***	***174.0***	***158.9***	***158.9***	***ACL = ABC (P* = 0.45)***
Pacific ocean perch	-	-	-	-	-	-	*ACL = ABC (P* = 0.45)*
Redbanded	*10.4*	*8.7*	*8.7*	*10.4*	*8.7*	*8.7*	*ACL = ABC (P* = 0.45)*
Rougheye/Blackspotted	*4.4*	*4.1*	*4.1*	*4.5*	*4.1*	*4.1*	*ACL = ABC (P* = 0.45)*
Sharpchin	*88.2*	*80.5*	*80.5*	*87.0*	*79.4*	*79.4*	*ACL = ABC (P* = 0.45)*
Shortraker	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*ACL = ABC (P* = 0.45)*
Yellowmouth	*0.8*	*0.7*	*0.7*	*0.8*	*0.7*	*0.7*	*ACL = ABC (P* = 0.45)*
Other Flatfish	8,750	6,498	6,498	8,202	6,041	6,041	Sum of component species specifications
Butter sole	*4.6*	*3.2*	*3.2*	*4.6*	*3.2*	*3.2*	*ACL = ABC (P* = 0.4)*
Curlfin sole	*8.2*	*5.7*	*5.7*	*8.2*	*5.7*	*5.7*	*ACL = ABC (P* = 0.4)*
Flathead sole	*35.0*	*24.3*	*24.3*	*35.0*	*24.3*	*24.3*	*ACL = ABC (P* = 0.4)*
Pacific sanddab	*4,801.0*	*3,331.9*	*3,331.9*	*4,801.0*	*3,331.9*	*3,331.9*	*ACL = ABC (P* = 0.4)*
Rex sole	*3,061*	*2,550*	*2,550*	*2,513*	*2,093*	*2,093*	*ACL = ABC (P* = 0.4)*
Rock sole	*66.7*	*46.3*	*46.3*	*66.7*	*46.3*	*46.3*	*ACL = ABC (P* = 0.4)*
Sand sole	*773.2*	*536.6*	*536.6*	*773.2*	*536.6*	*536.6*	*ACL = ABC (P* = 0.4)*
Oregon Cabezon/Kelp Greenling	230	218	218	216	204	204	Sum of component species specifications
Cabezon (OR)	*49.0*	*46.8*	*46.8*	*49.0*	*46.8*	*46.8*	*ACL = ABC (P* = 0.45)*
Kelp greenling (OR)	*180.9*	*171.1*	*171.1*	*166.5*	*157.5*	*157.5*	*ACL = ABC (P* = 0.45)*
Washington Cabezon/Kelp Greenling	13	11	11	12	10	10	Sum of component species specifications
Cabezon (WA)	*5.5*	*4.6*	*4.6*	*5.4*	*4.5*	*4.5*	*ACL = ABC (P* = 0.45)*
Kelp greenling (WA)	*7.1*	*5.9*	*5.9*	*7.1*	*5.9*	*5.9*	*ACL = ABC (P* = 0.45)*
Other Fish	286	239	239	286	239	239	Sum of component species specifications
Kelp greenling (CA)	*118.9*	*99.2*	*99.2*	*118.9*	*99.2*	*99.2*	*ACL = ABC (P* = 0.45)*
Leopard shark	*167.1*	*139.4*	*139.4*	*167.1*	*139.4*	*139.4*	*ACL = ABC (P* = 0.45)*

2.1.3 Alternative Harvest Specifications and Rebuilding Plan Parameters for Yelloweye Rockfish

Yelloweye rockfish was declared overfished in 2002 and has been managed under a stock rebuilding plan since that time. The Council considered two alternatives to the default HCR for yelloweye rockfish based on the most recent stock assessment and rebuilding analysis. For all alternative HCRs, the P* value (a Council determined metric of risk tolerance used in calculating the reduction from the OFL to the ABC) remains 0.4 as under the default. Two alternative HCRs were considered (Table 2-2):

1. Change the spawning potential ratio (SPR) scaled exploitation rate to 70 percent from the current rate of 76 percent. This increases 2019–20 ACLs by 10 mt compared to ACLs under the default HCR.
2. Change the SPR harvest rate to 65 percent. This increases the 2019 ACL by 18 mt and the 2020 ACL by 19 mt compared to ACLs under the default HCR.

According to the yelloweye rockfish rebuilding analysis (Gertseva and Cope 2017a), the minimum time to rebuild ($T_{F=0}$ beginning in 2019) is 2026. The median year to rebuild (i.e., the year for which there is a 50% probability that the stock is rebuilt) under the Alternative 1 HCR is 2028 and under the Alternative 2 HCR is 2029. To revise the rebuilding plan, the Council would need to demonstrate that the No Action ACL does not adequately meet "the needs of fishing communities" and that the increased yield under either Alternative 1 or Alternative 2 justifies the likelihood that achieving the biomass target would be delayed further than the median rebuilding year of 2027 under No Action. The analyses in section 4.2.1.3 and Appendix B discuss uncertainties associated with these estimates and the risk that the rebuilding objective would not be met.

The Council's preferred alternative is to modify the yelloweye rockfish rebuilding plan by adopting the Alternative 2 HCR (SPR of 65 percent) with a target rebuilding year of 2029. The preferred 2019–20 management measures for non-trawl sectors are designed with sector-specific Annual Catch Targets (ACTs) based on projected impacts and yelloweye rockfish allocations under the Alternative 1 HCR (SPR of 70 percent) (Table 2-4). Appendix B provides an analysis of the proposed changes to the yelloweye rockfish rebuilding plan.

Table 2-4. Preferred sector-specific 2019 and 2020 non-trawl harvest guidelines and annual catch targets of yelloweye rockfish.

	2019		2020	
	HG (mt)	ACT (mt)	HG (mt)	ACT (mt)
Non-Nearshore	2.0	1.6	2.1	1.7
Nearshore	6.0	4.7	6.2	4.9
Washington Recreational	10.0	7.8	10.2	8.1
Oregon Recreational	8.9	7.0	9.1	7.2
California Recreational	11.6	9.1	11.9	9.4

2.1.4 Alternative Harvest Specifications for California Scorpionfish S. 34°27' N. Lat.

The Council considered one action alternative for changes to the HCR for California scorpionfish in addition to the no action alternative. The Council chose an alternative HCR under which the ACL is set equal to the ABC using a P* value of 0.45 as its preferred alternative. The resulting 2019–20 ACLs would increase to 313 mt and 307 mt respectively (Table 2-2).

2.1.5 Alternative Harvest Specifications for Lingcod N. of 40°10' N Lat. and Lingcod S. of 40°10' N Lat.

The Council considered one action alternative for changes to the HCR for lingcod in addition to the no action alternative. The Council selected an ACL equal to the ABC with the P* value increased from 0.4 to 0.45 as its Preferred Alternative, reflecting greater confidence in the current stock assessment. The 40-10 adjustment is applied to the portion of the northern stock off California (i.e., between 42° and 40°10' N lat.) and the whole of the southern stock south of 40°10' N lat. The 2019 and 2020 ACLs for the northern stock are 4,871 mt and 4,541 mt, respectively; an increase of 13 mt and 8 mt by year relative to the No Action alternative. The 2019 and 2020 ACLs for the southern stock are 1,039 mt and 869 mt, respectively; an increase of 43 mt and 30 mt by year relative to the No Action alternative.

2.2 Management Measure Alternatives

PCGFMP section 6.2 describes management measure rulemaking stemming from the biennial harvest specifications process. "During the biennial specifications process the Council may propose: (1) management measures to be classified as routine the first time these measures are used; or (2) adjustments to measures previously classified as routine…; 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."

2.2.1 Integrated Alternatives

Integrated alternatives incorporate harvest specifications and management measures into discrete packages in order to facilitate evaluation of environmental impacts. Routine management measures include the allocation of harvest opportunity between commercial and recreational groundfish fisheries, among commercial fishery sectors, and, for the purpose of managing recreational fisheries, among the three West Coast states. Many of these allocations are specified in the PCGFMP, while others are specified as part of the biennial management process. Before these allocations are made, amounts may be deducted from ACLs to account for catches in tribal fisheries, incidental open access (OA) fisheries[4], research activities, and exempted fishing permits (EFPs). Routine management measures are mainly used to regulate catch in reference to the harvest specifications for each stock or stock complex. Four integrated alternatives are evaluated in Appendix A to this document:

Default Harvest Specifications (No Action): Default harvest specifications (Table 2-1) are implemented for all stocks and stock complexes. Routine management measures are adjusted accordingly as described in Section 1.2.2.

Council-Preferred Alternative: At its June 2018 meeting, the Council chose the Alternative 2 harvest specifications for yelloweye rockfish, California scorpionfish, and lingcod north and south of 40°10' N lat.

Action Alternative 1: Default harvest specifications would be implemented for all stocks except for the four stocks discussed in Sections 2.1.3 through 2.1.5. These alternative harvest specifications (see Table 2-2) would be implemented:

1. Yelloweye rockfish: The HCR is modified by specifying ACLs based on a SPR harvest rate of 70 percent.

[4] Incidental open access fisheries are those fisheries targeting non-groundfish species that incidentally harvest groundfish.

2. California Scorpionfish S. 34°27’ N. lat.: The HCR is modified by setting the ACL equal to the ABC using a P* value of 0.45.
3. Lingcod N. of 40°10’ N lat. and Lingcod S. of 40°10’ N lat.: The HCR is modified by increasing the P* value from 0.4 to 0.45 for the portion of the stock assessed in waters off California[5].

Action Alternative 2: Default harvest specifications would be implemented for all stocks except for the four stocks discussed in Sections 2.1.3 through 2.1.5. These alternative harvest specifications (see Table 2-2) would be implemented:

4. Yelloweye rockfish: The HCR is modified by specifying ACLs based on a SPR harvest rate of 65 percent.
5. California Scorpionfish S. 34°27’ N. lat.: The HCR is modified by setting the ACL equal to the ABC using a P* value of 0.45 (same as Alternative 1).
1. Lingcod N. of 40°10’ N lat. and Lingcod S. of 40°10’ N lat.: The HCR is modified by increasing the P* value from 0.4 to 0.45 for the portion of the stock assessed in waters off California (same as Alternative 1).

Under No Action, Alternative 1, and the preferred Alternative 2, routine management measures are adjusted according to harvest specifications.

The integrated alternatives are described in detail in Appendix A, where the effects of alternative harvest specifications are analyzed.

2.2.2 New Management Measures Analyzed in this EA

As noted above, all new management measures under consideration are incorporated into each of the action alternatives to facilitate analysis. After considering a long list of new management measures to implement as part of the rulemaking for this biennial process, the Council decided to move forward with consideration of the measures described below. (A supplemental analysis of these actions is provided in Appendix C.)

Those management measures chosen as preferred by the Council are indicated in each section below.

2.2.2.1 Salmon Mitigation Measures (Appendix C, section C.1)

In December 2017, NMFS completed an Endangered Species Act (ESA) consultation on the continued implementation of the PCGFMP and published a Biological Opinion (BiOp). The Incidental Take Statement (ITS) includes six reasonable and prudent measures (RPMs) that require the Council and NMFS to take certain actions to address Chinook and coho salmon bycatch in U.S. West Coast groundfish fisheries. Three of the terms and conditions that implement the RPMs were required to be considered within the 2019–20 biennial process. The Council chose the following measures to address these requirements as part of its preferred alternative. Detailed analysis of potential measures may be found in Appendix C, section C.1. As described in Appendix C, the Council considered a wider range of measures but determined that only the following measures should be implemented as part of the biennial process. The Council will begin considering additional salmon bycatch mitigation measures, as guided by the ITS, at its November 2018 meeting.

[5] The current HCRs set the ACL equal to the ABC for both stocks and the 40-10 precautionary reduction is applied to the portion of the northern stock off California (i.e., between 42° and 40°10’ N lat.) and the whole of the southern stock.

Whiting Ocean Salmon Conservation Zone

The ITS directs the Council to review the existing mechanisms in the PCGFMP and related regulations for avoiding and reducing salmon bycatch, including the effectiveness of the Ocean Salmon Conservation Zone (OSCZ) and Bycatch Reduction Areas (BRAs).

The OSCZ prohibits all whiting fishing and consists of all waters shoreward of a boundary line approximating the 100 fathom (183 m) depth contour if the whiting sectors, including tribal, are projected to attain, or exceed, the 11,000 Chinook salmon threshold (50 CFR 660.131(c)(3)). At that point, the Regional Administrator for NMFS West Coast Region would implement the OSCZ through automatic action authority. The Council selected an option to eliminate the OSCZ as part of its preferred alternative, because it determined this measure is ineffective. The no action alternative would maintain the OSCZ.

200 Fathom Bycatch Reduction Area

As part of its preferred alternative, the Council recommended adding a 200 fathom depth contour to the BRAs available through routine inseason action for vessels using midwater trawl gear in both the whiting and non-whiting sectors. BRAs are depth-based management provisions used to close depths shallower than a specified depth contour to vessels using midwater gear to minimize impacts to groundfish, or any prohibited or protected species, such as salmon. BRAs are currently available (no action) at 75, 100, and 150 fm for controlling catch of groundfish through routine action for all vessels using midwater trawls or through automatic action if NMFS projects that the Pacific whiting sector will exceed a non-whiting groundfish allocation before attaining its whiting allocation. This measure is designed to control catch of groundfish and non-groundfish, including salmon.

Columbia River and Klamath River Salmon Conservation Zone prohibitions

Term & Condition 2e of the 2017 ITS states that "NMFS and the Council shall implement regulations within 2 years of issuance of this opinion to prohibit the following within the nearshore Klamath and Columbia River Salmon Conservation Zones:

1. Bottom trawling (except with a selective flatfish trawl gear), and
2. All non-whiting midwater trawling."

As part of its preferred alternative, the Council recommends prohibiting all midwater trawling within the Klamath River Salmon Conservation Zone and Columbia River Salmon Conservation Zone year-round; and prohibiting the use of all bottom trawl gear except selective flatfish trawl inside the Klamath River Salmon Conservation Zone and Columbia River Salmon Conservation Zone.

Under current regulations at 50 CFR 660.130(c)(1) and (c)(2), vessels using midwater trawl gear in the Pacific whiting primary season are prohibited from fishing in these areas. The preferred alternative would extend the area prohibition to vessels using midwater trawl gear to target rockfish, including widow rockfish and yellowtail rockfish, a reemerging fishery following the rebuilding of widow rockfish in 2012. No action would limit the prohibition to vessels using midwater trawl gear to target whiting. Additionally, the preferred alternative would maintain protection for these areas that are currently included under a blanket requirement for SFFT gear shoreward of the trawl RCA north of 40°10' N. lat. at 50 CFR 660.130(c)(2)(i). The blanket requirement is proposed to be removed under a separate action (the "trawl gear rule"). If the Council selected no action, then the protections for these two areas would be removed under the trawl gear rule. The Council's Preferred Alternative would reestablish the gear requirement for the CRSCZ and KRSCZ specifically.

Automatic closure of sector(s) when threshold and Reserve is reached

The proposed action analyzed in the Salmon Biological Opinion identifies threshold Chinook salmon bycatch levels for the whiting fishery and all other groundfish fisheries combined[6] plus a Reserve of 3,500 Chinook salmon. Term & Condition 3c requires the Council and NMFS to develop regulations through the 2019–20 biennial harvest specifications and management measures process to create an automatic authority that would be used to close a sector (whiting or non-whiting) when that sector exceeds its Chinook salmon threshold bycatch amount plus the Reserve, or when one sector has been closed under the prior scenario and the other sector reaches its guideline[7]. No new authorities would be added under the no action alternative. As part of its preferred alternative, the Council proposes establishing two automatic authorities in regulations that would require NMFS to:

1. Close either sector (whiting or non-whiting) upon that sector having exceeded its Chinook salmon bycatch threshold and the reserve amount of 3,500, and
2. Close a sector (whiting or non-whiting) when one sector has been closed after exceeding its Chinook salmon bycatch threshold and the reserve amount of 3,500, and the second sector exceeds[8] its salmon bycatch threshold.

2.2.2.2 Updates to Rockfish Conservation Area Coordinates in California (Appendix C, section C.2)

This proposed management measure would modify the current (no action) Rockfish Conservation Area (RCA) boundaries in seven areas off California to correct areas of crossover or to better-align depth contours with actual depths. The current RCA lines specified in regulation at 50 CRF 660.71 – 660.73 are intended to approximate the isobaths throughout the extent of the RCAs. However, in some areas, the RCA line deviates too much from the isobath it is supposed to approximate and/or crosses another RCA line into an area that is either too shallow or deep for the depth that the RCA line is supposed to represent. This proposed measure would modify RCA lines to achieve better alignment with their corresponding isobaths and to correct a subset of crossovers.

The preferred alternative would modify the 75 fm depth contour at Santa Cruz Island in southern California. The 100 fm depth contour is proposed to be modified in the following areas: 1) Spanish Canyon in northern California, and 2) Delgada Canyon in northern California. The preferred alternative would also modify the 125 fm depth contour in the following areas: 1) Delgada Canyon in northern California, 2) Cordell Bank northwest of San Francisco, 3) Point Año Nuevo in central California, 4), San Miguel Island in southern California, and 5) Anacapa Island in southern California. Finally, the preferred

[6] The ITS only applies to those recreational fisheries of which salmon impacts are not attributed to preseason salmon modeling. The recreational fisheries not accounted for in preseason salmon modeling are those occurring outside of the open salmon seasons and the Oregon longleader fishery; any impacts from these fisheries must be attributed to the non-whiting threshold. In contrast, impacts from recreational fisheries during open salmon seasons are accounted for in preseason salmon modeling therefore any impacts from these fisheries are not attributed to the non-whiting threshold.

[7] "Sector" in this context refers to those sectors described as "whiting" and "non-whiting" in the 2017 Endangered Species Act Consultation on the impacts to salmon caused by the continued operation of the groundfish fishery. In this context, "whiting" includes commercial whiting targeting by the at-sea cooperatives and shoreside whiting. "Non-whiting" includes commercial groundfish bottom trawl and non-whiting midwater trawl, fixed gear fisheries, and recreational fisheries outside of the salmon season.

[8] The Biological Opinion states that the second sector will be closed upon reaching its salmon bycatch threshold, rather than exceeding. NMFS has determined that these two statements are functionally equivalent in how in-season monitoring and automatic action would proceed.

alternative would modify the 150 fm depth contour in the following areas: 1) San Miguel Island in southern California, and 2) Anacapa Island in southern California.

2.2.2.3 Stock complex Composition Restructuring (Appendix C, section C.3)

Stock complex changes are treated as a management measure and, like new management measures, are analyzed as a component of the integrated alternatives. Changes in the composition of stock complexes do not affect the underlying harvest specifications, because the stock complex ACL is simply the sum of the component stocks' specifications. Changes to the Nearshore Rockfish complex north of 40°10' N. lat. and the Other Fish complex are considered as part of the proposed action. Appendix C includes a detailed evaluation of these proposed changes.

Stock complex Proposal 1: Nearshore Rockfish complex North of 40°10' N. lat.

The Council considered two options for Oregon blue/deacon rockfish (BDR), either continue to manage within the Nearshore Rockfish complex North of 40°10' N. lat. (no action) or be removed from the complex and paired with Oregon black rockfish to form a new Oregon Black/BDR complex (Option 1). Note that blue and deacon rockfish are separate species, but are referred to collectively since they were assessed together and therefore have a joint harvest specification. Table 2-5 shows status quo harvest specifications and those resulting from the proposed reorganization.

The Council chose Option 1 as part of its preferred alternative.

Table 2-5. Harvest specifications under Stock complex Proposal 1.

Option	Stock or complex	2019			2020		
		OFL	ABC	ACL	OFL	ABC	ACL
No Action	Black RF (OR)	565	516	516	561	512	512
	Nearshore RF North complex	203	183	183	200	180	180
	BDR (OR)[a/]	*112.3*	*101.5*	*101.5*	*108.8*	*98.4*	*98.4*
Option 1	New Black RF/BDR complex (OR)	677	617	617	670	611	611
	Nearshore RF North complex	91	81	81	92	82	82

[a/] BDR specifications that contribute to the Nearshore Rockfish North complex specifications are shown in italics.

The Council also adopted black rockfish HGs to mitigate future overharvest of the stock. These HGs are 515.8 mt and 512.2 mt for 2019 and 2020, respectively, which are the ACL contributions of black rockfish to the new Oregon Black/Blue/Deacon Rockfish complex.

Stock complex Proposal 2: Other Fish complex

Three options (other than no action) are considered for changing the Other Fish complex:

- Option 1 is the Oregon Department of Fish and Wildlife (ODFW) proposal to remove Oregon kelp greenling from the Other Fish complex and pair it with Oregon Cabezon to form a new Oregon Kelp Greenling/Cabezon complex.
- Option 2 is the Washington Department of Fish and Wildlife (WDFW) proposal to remove Washington kelp greenling and Washington cabezon from the Other Fish complex and pair them to form a new Washington Kelp Greenling/Cabezon complex.
- Option 3 is a combination of Option 1 and Option 2 where both Oregon and Washington Kelp Greenling and Washington Cabezon are removed from the Other Fish complex to form two new

stock complexes: an Oregon Kelp Greenling/Cabezon complex and a Washington Kelp Greenling/Cabezon complex.

Table 2-6 shows the resulting harvest specifications resulting from each of the options.

The Council chose Option 3 as part of its preferred alternative.

Table 2-6. Harvest specifications under Stock complex Proposal 2.

Option	Stock or complex	2019			2020		
		OFL	**ABC**	**ACL**	**OFL**	**ABC**	**ACL**
No Action	Cabezon (OR)	49	47	47	49	47	47
	Other Fish	480	420	420	465	406	406
	Cabezon (WA)[a/]	*5.5*	*4.6*	*4.6*	*5.4*	*4.5*	*4.5*
	Kelp Greenling (CA)[a/]	*118.9*	*99.2*	*99.2*	*118.9*	*99.2*	*99.2*
	Kelp Greenling (OR[a/]	*180.9*	*171.1*	*171.1*	*166.5*	*157.5*	*157.5*
	Kelp Greenling (WA)[a/]	*7.1*	*5.9*	*5.9*	*7.1*	*5.9*	*5.9*
	Leopard Shark[a/]	*167.1*	*139.4*	*139.4*	*167.1*	*139.4*	*139.4*
Option 1	Other Fish	299	249	249	299	249	249
	Cabezon/K. Greenling (OR)	230	218	218	216	204	204
Option 2	Other Fish	467	410	410	453	3963	3963
	Cabezon/K. Greenling (WA)	13	11	11	13	10	10
Option 3	Other Fish	286	239	239	286	239	239
	Cabezon/K. Greenling (OR)	230	218	218	216	204	204
	Cabezon/K. Greenling (WA)	13	11	11	13	10	10

[a/] Specifications for the stocks contributing to the Other Fish complex specification are shown in italics.

The Council also adopted Oregon cabezon HGs to mitigate future overharvest of the stock. These HGs are 46.8 mt for 2019 and 2020, which are the ACL contributions of cabezon to the new Oregon Cabezon/Kelp Greenling complex.

2.2.2.4 Remove Automatic Authority Established in Conjunction with Amendment 21-3 for Darkblotched Rockfish and Pacific Ocean Perch in the At-Sea Sector (Appendix C, section C.4)

Through Amendment 21-3 to the PCGFMP, darkblotched rockfish and POP are now managed (no action) with sector-specific set asides as opposed to allocations. Previously, if an at-sea sector were projected to or had exceeded its allocation of darkblotched rockfish or Pacific ocean perch (POP) before attaining its whiting allocation, it would be closed via automatic action (e.g., MS sector in 2014). The buffer was established in the 2017–18 biennium to account for higher than expected incidental catch. NMFS has the automatic authority to close either at-sea sector if a sector were projected to exceed either the darkblotched rockfish or POP set-aside value plus the buffer. As part of the preferred alternative there would be no buffer amount for either species in the 2019–20 biennial period. Coupled with automatic action authority to close the fishery, the set asides alone would, in essence, function as allocations for the at-sea sectors. Under this new management measure, the Council is considering removing the automatic authority for these species so that they are managed like all other at-sea set-asides. By removing the automatic action authority, action is only taken when there is a risk of a harvest specification being exceeded, an unforeseen impact to another fishery may occur, or if other conservation concerns are

identified. In these cases, inseason action may be taken by the Council and NMFS under 50 CFR 660.60(c).

The Council chose to remove the automatic authority measure as part of its preferred alternative.

2.2.2.5 Lingcod and Sablefish Discard Mortality Rates in the Shorebased Individual Fishing Quota Program (Appendix C, section C.5)

This management measure would reduce the current (no action) 100 percent discard mortality rates (DMRs) used in quota pound (QP) catch accounting for lingcod and sablefish in the Shorebased Individual Fishing Quota (IFQ) Program sector to lower DMRs based on the best available estimates of bycatch mortality for trawl and fixed gear types used in this sector. These "survival credits" result in a shift from total catch accounting to total estimated catch mortality accounting for these species as far as debiting vessel QP accounts.

The Council chose to change the DMRs as part of its preferred alternative.

2.2.2.6 Modify Commercial Fixed Gear Depths and Recreational Fisheries inside the Western Cowcod Conservation Area (Appendix C, sections C.6 and C.7)

The Council analyzed two action alternatives in addition to the no action alternative to modify the allowable fishing depths for the commercial fixed gear fishery and the recreational fishery (considered separately) inside the western Cowcod Conservation Area (CCA) from the current limit (no action) of 20 fm. Fisheries are allowed shallower than the depth limit. Option 1 would modify the allowable depth to 30 fm and Option 2 would modify the allowable depth to 40 fm. Both options include adding new waypoints approximating 30 and 40 fm depth contours around Santa Barbara Island, San Nicolas Island, Tanner Bank, and Cortes Bank in the Western CCA.

The Council chose modifications of the Western CCA to allow fishing in depths shallower than 40 fm (Option 2) for recreational and commercial fixed gear fisheries as part of its preferred alternative.

2.2.2.7 Removal of Daily Vessel Quota Pound (QP) Limits (Appendix C, section C.8)

Unused QP vessel limits, also called ''daily vessel limits,'' apply to overfished stocks and cap the amount of overfished stocks' QPs any vessel account can have sitting available in their account on a given day, which is lower than the annual QP vessel limit. The Council and NMFS established daily vessel limits to prevent hoarding of available overfished stocks' QPs in any one vessel account (no action), since the Shorebased IFQ sector allocations of some overfished stocks are very low. The Council considered two action options for this management measure. Option 1 would have removed the limits for species that have been declared rebuilt (bocaccio (south); canary rockfish; darkblotched rockfish; POP), while Option 2 would remove the limits for all species (bocaccio (south); canary rockfish; cowcod (south); darkblotched rockfish; POP; yelloweye rockfish, and Pacific halibut).

The Council chose Option 2 to remove the daily vessel QP limits for all affected stocks as part of its preferred alternative.

2.2.2.8 Incidental Lingcod Retention Ratio in the Commercial Salmon Troll Fishery (Appendix C, section C.9)

This proposed management measure applies to the ocean salmon troll fishery north of 40°10' N lat. and would be an adjustment to the existing incidental allowance for landing lingcod subject to the number of Chinook landed. The alternatives under consideration are:

- No Action: Retain the current trip limit of one lingcod per 15 Chinook salmon, overall limit of 10 lingcod per trip
- Option 1: Adjust trip limit to one lingcod for every five Chinook salmon, retain overall 10 lingcod trip limit

Under each alternative, the trip limit of 10 lingcod would be retained and vessels would be subject to the OA lingcod limit for north of 40°10' N lat. This limit applies to salmon troll vessels fishing inside of the RCA. This is the Council's first re-evaluation of the ratio since it was first implemented in 2009. There was interest expressed among the Council and the public in adjusting the limit through inseason action at the March 2018 meeting. However, it was determined that the original analysis did not support inseason or routine adjustment.

This action would be expected to create the ability for the Council and NMFS to adjust this ratio through an inseason action, so long as the new ratio is within the bounds of what was analyzed here.

The Council choose Option 1 as part of its preferred alternative.

2.2.2.9 New Management Measures under Consideration by the Council but Not Further Analyzed in this EA

The following new management measures under consideration by the Council have been determined to have no environmental effects, or negligible effects, and are therefore not analyzed further in this EA. For each of these measures the rationale for determining no effects or negligible effects is provided below.

Pass Through of Quota Pounds Dedicated to the Adaptive Management Program Quota Share

Under the Amendment 20 trawl rationalization program, the shoreside IFQ program includes a set-aside of 10 percent of the non-whiting quota share (including halibut individual bycatch quota) for an adaptive management program. Each year, QP are issued for the adaptive management program quota share. If the Council were to implement an adaptive management program, the associated QP could be distributed to address adverse effects stemming from the catch share (IFQ) program including impacts to community stability, processor stability, conservation, or other as yet unidentified effects. These QPs could also be distributed in a way to help people not already in the fishery to participate. However, so far the Council has not set up an adaptive management program. Therefore, these QP have been distributed ("passed through") to quota shareholders on a pro rata basis in proportion to their holdings.

The Council is recommending amending Federal regulations to clarify that the adaptive management pass through continues until an alternative use of adaptive management program QP is implemented. This is an administrative measure that would not affect fishing opportunity and related catch and therefore would have no discernable environmental impacts.

The Council recommended NMFS implement this regulatory change.

2.2.2.10 Alternatives Considered but not Analyzed Further

The Council proposed but ultimately rejected from further analysis a management measure that would modify the seaward boundary of the non-trawl Rockfish Conservation Area (RCA) from the California/Oregon border (42° N. lat.) to about Cape Mendocino (40°10' N. lat.). The non-trawl RCAs are currently 30 fm to 100 fm; this action would have modified the seaward boundary from 100 fm to 75 fm and would only apply to non-trawl commercial fisheries. The Council considered yet rejected this management measure as part of the preferred alternative given workload concerns and the need to analyze higher priority management measures. The Council may consider this action in either a future biennial specifications process or as a separate rulemaking.

The Council also considered a management measure to resolve a discrepancy between the federal regulations and the CDFW regulations with regard to prohibiting retention of Dungeness crab caught in groundfish trawl gear. This action was not analyzed further due to workload concerns with the rest of the harvest specifications and management measures in this action. The Council may consider this action in either a future biennial specifications process or as a separate rulemaking.

2.2.2.11 Summary of the preferred alternative for management measures

As noted in the above sections, the following is a list of the new management measures the Council selected as part of its preferred alternative:

- Create a 200 fathom BRA for salmon bycatch mitigation
- Prohibit mid-water trawling in the CRSCZ and the KRSCZ
- Prohibit bottom trawling, except with SFFT, in the CRSCZ and the KRSCZ
- Remove the OSCZ
- Create three new stock complexes:
    - Oregon black/blue/deacon rockfish
    - Oregon cabezon/kelp greenling
    - Washington cabezon/kelp greenling
- Remove automatic authorities for set-aside management of darkblotched rockfish and Pacific ocean perch for at-sea sector
- Modify lingcod and sablefish DMRs for Shorebased IFQ Program
- Remove daily vessel limits for Shorebased IFQ Program
- Revise incidental lingcod retention ratio from 1:15 to 1:5 for salmon troll fishery
- Make administrative modifications to RCA lines off of California
- Modify depth restrictions with Western CCA for recreational and commercial vessels from 20 fm to 40 fm; create new waypoints for 30 fm and 40 fm lines around islands in the Western CCA

Chapter 3 Affected Environment

3.1 Environmental Components Affected by the Proposed Action

CEQ regulations at 40 CFR 1502.15 state that the EA "shall succinctly describe" the environmental components potentially affected by the proposed action. The level of detail "shall be commensurate with the importance of the impact." Describing the affected environment establishes the baseline conditions to which the proposed action (including the alternative of No Action) may be compared. As discussed in Chapter 1, this EA tiers from the 2015 EIS incorporating by reference the description of the affected environment and only presenting information about subsequent changes in baseline conditions. Furthermore, the 2018 Groundfish Stock Assessment and Fishery Evaluation (SAFE) (PFMC 2018) details the status of groundfish stocks, the fisheries and fishing communities, EFH, and factors affecting safety of life at sea. Information from the SAFE is incorporated by reference and summarized here as necessary. The 2015 EIS described these environmental components:

- Groundfish
- The socioeconomic environment including fishing communities
- Essential fish habitat
- The California Current ecosystem
- Protected species
- Non-groundfish species (other than protected species) caught in groundfish fisheries

The 2018 California Current Integrated Ecosystem Assessment Team, California Current Integrated Ecosystem Assessment (CCIEA) State of the California Current Report (Agenda Item F.1.a, NMFS Report 1, March 2018) characterizes the current status of the CCE. The 2015 EIS evaluated the effect of

groundfish fishery removals under different harvest polices on trophic composition and interactions (see section 4.5 in the 2015 EIS). Ongoing management of the fishery under biennial harvest specifications would not have discernable impacts different from those disclosed in that analysis given that this action does not change the overall groundfish catch composition, gear types used, or interactions with the CCE.

The species composition of non-groundfish species caught in groundfish fisheries is described in section 3.6 in the 2015 EIS. There have been no changes in harvest policies or fishery performance since that time that would be expected to result in a substantive change in the composition in incidentally caught non-groundfish.

Based on this information, scoping concluded that the proposed action will not engender substantially different effects on these two environmental components than what was disclosed in the 2015 EIS. Therefore, those environmental components are not further considered in this EA.

3.2 Groundfish Stocks

Section 3.2.1 describes the status and biology of the stocks—California scorpionfish south of 34°27’ N. lat., two lingcod stocks, and yelloweye rockfish—where the Council is considering changing the default HCR. Section 3.2.2 describes a change in the baseline condition of certain stocks whose future status under alternative harvest policies was evaluated in the 2015 EIS. Section 3.2.3 describes stocks that may be affected by proposed new management measures.

3.2.1 Stocks with Proposed Changes to the Default Harvest Control Rule

Section 1.1 in the 2018 Groundfish SAFE Document (PFMC 2018) describes the status and biology of stocks managed under the PCGFMP. Descriptions for stocks where the Council is considering changing the default HCR are incorporated by reference and summarized in the following sections.

3.2.1.1 California Scorpionfish S. 34°27' N. Lat.

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).

California scorpionfish were assessed in 2005 and 2017 (a catch only assessment update was conducted in 2015). The 2017 assessment (Monk, *et al.* 2018) defined the stock as bounded at Pt. Conception in the north to the U.S./Mexico border in the south although a substantial but unknown portion of the stock occurs in Mexican waters.

Figure 3-1 shows the historic trend in spawning depletion. Spawning biomass declined between 2000 and 2015 but shows subsequent signs of increase. Estimated 2017 depletion (the ratio of current spawning stock biomass to unfished spawning stock biomass) is 54.3 percent, which is above the B_{MSY} proxy target of 40 percent.

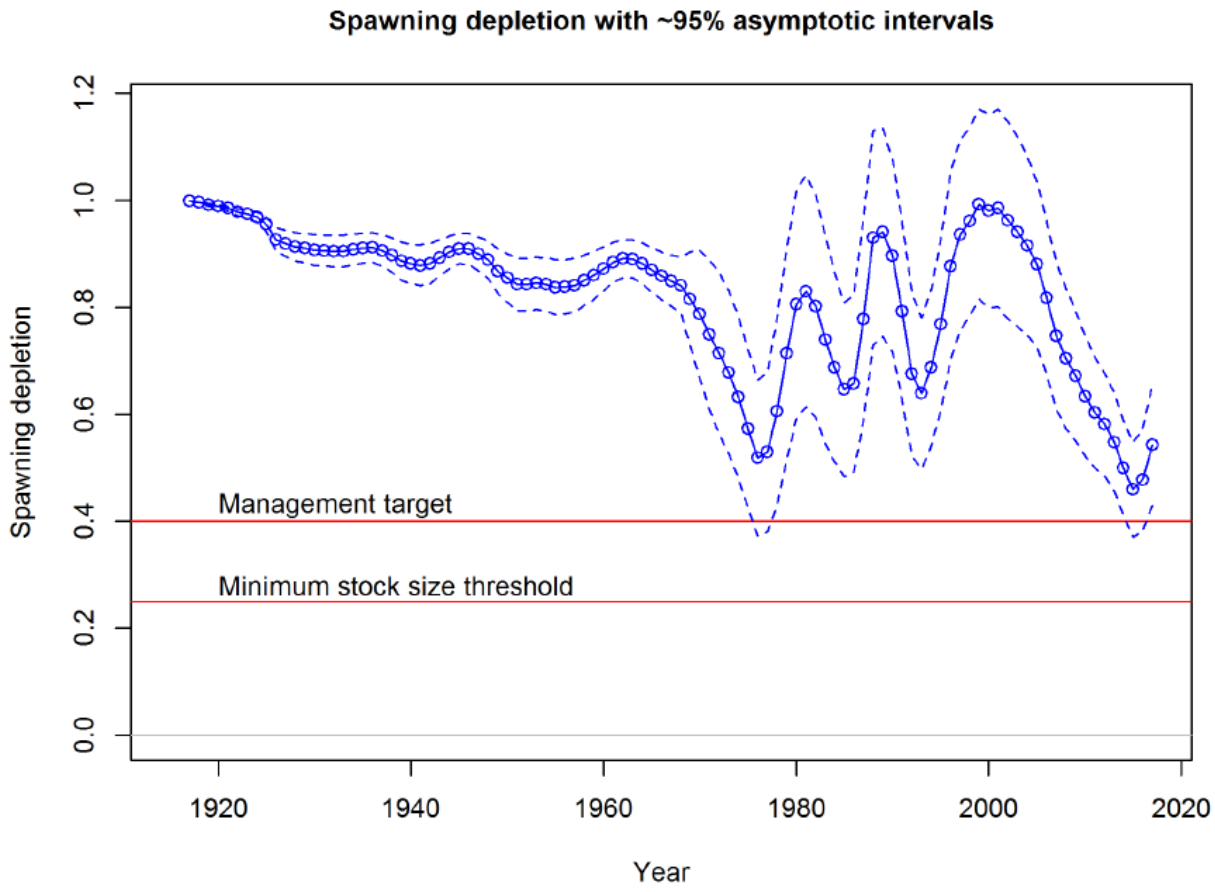

Figure 3-1. Estimated spawning depletion with approximate 95% asymptotic intervals. (Source: Monk, *et al.* 2018, Figure 98)

Since 2000, annual total landings of California scorpionfish have ranged between 57 and 199 mt. Commercial fisheries usually retain California scorpionfish when caught and the bycatch mortality rate in recreational fisheries is fairly low. According to the 2017 stock assessment, harvest rates over the last decade have been well below the overfishing level. Based on the results of the productivity-susceptibility assessment conducted by the Council's Groundfish Management Team (GMT), the stock is considered relatively productive and at low risk of overfishing.

3.2.1.2 Lingcod North of 40º10' N lat. and South of 40º10' N lat.

Lingcod (*Ophiodon elongatus*) is a top level predator living on the slopes of submerged banks 10 m to 70 m below the surface with seaweed, kelp, and eelgrass beds; they also favor channels with swift currents that flow around rocky reefs.

Lingcod range from Baja California, Mexico, to Kodiak Island in the Gulf of Alaska. The first two stock assessments, in 1997 and 1999 covered portions of the West Coast stock; based on these assessments, the lingcod stock was declared overfished in 1999. The rebuilding plan set a target year of 2009. Except for the first assessment, subsequent coastwide assessments (2000, 2003, 2005) modeled the population as two stocks north and south of the Columbia-Eureka International North Pacific Fishery Commission (INPFC) area demarcation at 43° N. lat. until 2009 when they were assessed north and south of 42° N lat. at the California-Oregon border. The 2003 assessment indicated the northern stock was rebuilt but the southern stock was still below the target biomass. Based on the 2005 assessment, which indicated the stock was

healthy in both assessment areas, the stock was declared rebuilt, ahead of the rebuilding plan target year of 2009. A catch-only update of the 2009 lingcod assessment was provided in 2015 (Agenda Item I.4, Attachment 6, November 2015) to inform harvest specifications in 2017 and beyond.

Separate ACLs are set for stocks north and south of 40°10' N. lat. Other management areas have been considered but determined too burdensome for the commercial groundfish fishery, because vessels must fish within one management area on any one trip.[9]

3.2.1.3 Yelloweye rockfish

The first yelloweye rockfish stock assessment on the U.S. West Coast, conducted in 2001, concluded that yelloweye rockfish was overfished. The yelloweye rockfish stock was subsequently fully assessed in 2002, 2006, 2009, and 2017 (update assessments were conducted in 2007 and 2011). The most recent full assessment estimated depletion at 28.4 percent at the start of 2017 (Gertseva and Cope 2017b). Figure 3-2 shows the historical trends in stock depletion based on the 2017 stock assessment.

Adult yelloweye rockfish prefer boulder areas in deep water (greater than 180 m), steep cliffs, and offshore pinnacles while juveniles prefer shallow-zone broken-rock habitat. This habitat preference affects their vulnerability to different types of fishing gear. Yelloweye rockfish are particularly vulnerable to hook-and-line gears but less so to small-footrope trawl gear, which cannot be fished in rocky or high relief areas of the seafloor. Management measures intended to reduce incidental catch of yelloweye rockfish include the non-trawl RCA and recreational depth closures. Since yelloweye rockfish are mostly encountered north of 36° N. lat., fisheries in Southern California are less likely to encounter them.

Based on fishing mortality rates estimates in the 2011 assessment, the stock was subject to overfishing from 1976 through 1999. Since then, the stock has been managed under a rebuilding plan. As shown in Figure 3-2, the stock has been recovering since rebuilding plan implementation and the biomass is above minimum stock size threshold (MSST)[10]; rebuilding plan management will continue until the stock reaches the target biomass.

[9] Lingcod were managed north and south of 42° N lat. in 2011 and 2012 to comport with the 2009 assessment areas. The management line was changed back to 40°10' N lat. in 2013 to avoid these commercial fishery impacts.

[10] Stocks managed under rebuilding plans are classified as "overfished" when depletion is below the MSST and "rebuilding" when depletion is above the MSST.

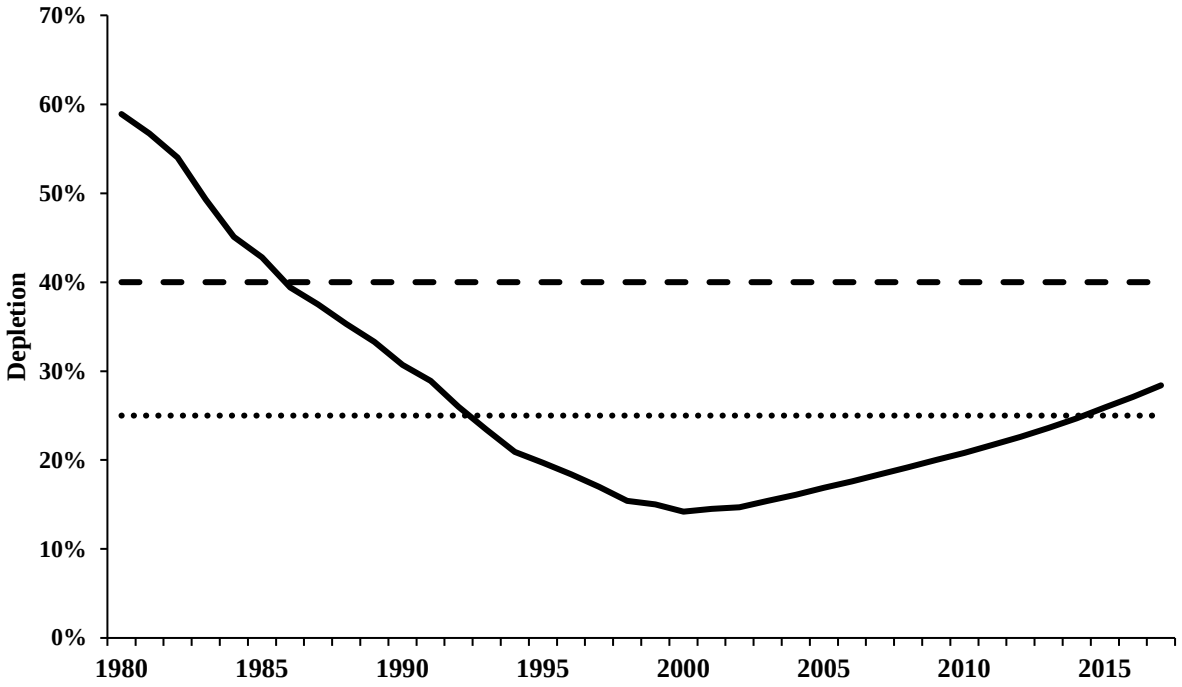

Figure 3-2. Relative depletion of yelloweye rockfish from 1980 to 2017 based on the 2017 stock assessment. (The dotted line represents the minimum stock size threshold and the dashed line represents the B_{MSY} proxy, the target biomass).

3.2.2 Stocks where the Default ACL is Outside the Range Analyzed in the 2015 EIS

In the 2015 EIS (section 4.8), the biological impacts of alternative harvest specification policies were evaluated over a 10-year period based on projections from then current stock assessments. The purpose of these projections was to evaluate the long-term implications of pursuing a particular harvest policy. Projections were run under three alternative "states of nature," which capture the principal source of uncertainty in the relevant stock assessment. Generally, these alternative estimates of a key parameter in the stock assessment produce a range of outcomes based on their representation of stock productivity. The high state of nature scenario represents the belief that the stock is relatively more productive (and thus able to produce higher yields) while the low state of nature represents a less productive or more pessimistic view of productivity (with lower yields). The third state of nature is the base case representing the most likely estimate of the parameter being varied across the projection scenarios. As noted in Chapter 1, new information about these stocks represent a change in baseline conditions, which are described below.

Table 3-1 shows the four stocks where the 2019–20 ACLs are outside the range analyzed in the 2015 EIS. For all stocks, the maximum catch was produced under the high state of nature and catches at the ABC level when p* = 0.45. The minimum catch was produced under the low state of nature when catches are at a constant level based either on average recorded catch in the recent past or the ACL applicable in 2014. Canary rockfish was the exception; for that stock catch was based on a constant harvest rate of SPR = 88.7 percent.

Table 3-1. Stocks where the proposed 2019–20 ACLs are outside the range analyzed in the 2015 EIS.

Stock	Maximum value of 2019–20 ACLs (mt)	Range of annual catches (mt) in the 2015–24 projection period	
		Minimum	Maximum
Bocaccio	2,097	150	1,700
Canary rockfish	1,450	0	1,361
Pacific ocean perch	4,340	59	1,828
Widow rockfish	11,831	247	4,900

According to the best scientific information available, none of these stocks are experiencing overfishing, are below the MSST, or managed under a rebuilding plan.

The default HCR used to determine 2019–20 harvest specifications for all these stocks is setting the ACL equal to the ABC based on P* = 0.45. The 2019–20 ACLs are based on the best scientific information available and are not projected to result in overfishing or an appreciable long-term risk of the stocks becoming overfished. These ACLs fall outside the range analyzed in the 2015 EIS because subsequent assessments changed the status and therefore, the projections for the stock.

3.2.2.1 Bocaccio South of 40°10' N lat.

An update of the 2015 full bocaccio assessment was conducted in 2017 (He and Field 2018) indicating the stock was rebuilt with an estimated depletion of 48.6 percent at the start of 2017. The improved status of bocaccio is due to the low exploitation rates observed since 2000 that were specified to foster rebuilding and several strong year classes (1999, 2010, and 2013) recruiting to the spawning population.

The 2017 bocaccio update assessment modeled productivity as was done in the full 2015 assessment by fixing steepness and estimating natural mortality. The stock-recruitment relationship for bocaccio is highly uncertain given the very large recruitment variability exhibited by the stock. Assumed steepness is the axis of greatest uncertainty in the assessment and alternative assumptions on steepness form the basis for the decision table (Table 3-2). The stock is projected to remain healthy in the next ten years under the default harvest control rule (ACL = ABC (σ = 0.36, P* = 0.45)) assuming the most plausible steepness under the base case assessment model, as well as under the high state of nature (Table 3-2 and Figure 3-3). The stock remains healthy in the next four years under the more pessimistic low state of nature model before declining below the B_{MSY} threshold in 2023. The stock is predicted to be at a 34.6 percent depletion by 2028 under the low state of nature model (Table 3-2 and Figure 3-3); however, this model is considered half as likely as the base case model and is not used to set harvest specifications.

Table 3-2. 10-year projections of bocaccio for alternate states of nature based on steepness (reproduced from He and Field (2018)).

			State of nature					
			Low state of nature (*h* = 0.545)		Base (*h*=0.718)		High state of nature (*h* = 0.845)	
Management decision	Year	Catch (mt)	Spawning output	Depletion	Spawning output	Depletion	Spawning output	Depletion
Average catch (2012–16)	2017	790	3.27	40.1%	3.60	48.6%	3.82	53.6%
	2018	741	3.54	43.3%	3.93	53.1%	4.19	58.8%

			State of nature					
			Low state of nature (*h* = 0.545)		Base (*h*=0.718)		High state of nature (*h* = 0.845)	
Management decision	**Year**	**Catch (mt)**	**Spawning output**	**Depletion**	**Spawning output**	**Depletion**	**Spawning output**	**Depletion**
	2019	142	3.65	44.7%	4.10	55.3%	4.38	61.4%
	2020	142	3.83	46.9%	4.31	58.1%	4.60	64.5%
	2021	142	4.04	49.5%	4.53	61.1%	4.82	67.5%
	2022	142	4.26	52.2%	4.75	64.1%	5.03	70.5%
	2023	142	4.49	55.0%	4.97	67.1%	5.23	73.3%
	2024	142	4.71	57.8%	5.18	69.9%	5.41	75.9%
	2025	142	4.94	60.5%	5.37	72.5%	5.59	78.3%
	2026	142	5.15	63.2%	5.56	75.0%	5.74	80.5%
	2027	142	5.36	65.7%	5.73	77.3%	5.88	82.5%
	2028	142	5.56	68.2%	5.88	79.4%	6.01	84.2%
Base model rebuilding SPR (0.777) catches	2017	790	3.27	40.1%	3.60	48.6%	3.82	53.6%
	2018	741	3.54	43.3%	3.93	53.1%	4.19	58.8%
	2019	764	3.65	44.7%	4.10	55.3%	4.38	61.4%
	2020	781	3.74	45.8%	4.22	56.9%	4.50	63.2%
	2021	803	3.84	47.1%	4.33	58.5%	4.62	64.8%
	2022	824	3.95	48.4%	4.44	60.0%	4.72	66.2%
	2023	843	4.06	49.7%	4.54	61.3%	4.80	67.3%
	2024	860	4.16	51.0%	4.63	62.5%	4.87	68.3%
	2025	875	4.26	52.2%	4.71	63.5%	4.93	69.1%
	2026	888	4.36	53.4%	4.78	64.5%	4.97	69.7%
	2027	899	4.45	54.5%	4.84	65.3%	5.02	70.3%
	2028	910	4.53	55.5%	4.90	66.1%	5.05	70.7%
Base model ACL catch (SPR=0.5 with P*=0.45 and sigma=0.36)	2017	790	3.27	40.1%	3.60	48.6%	3.82	53.6%
	2018	741	3.54	43.3%	3.93	53.1%	4.19	58.8%
	2019	2,097	3.65	44.7%	4.10	55.3%	4.38	61.4%
	2020	2,011	3.54	43.5%	4.02	54.3%	4.31	60.4%
	2021	1,978	3.45	42.3%	3.93	53.1%	4.22	59.2%
	2022	1,957	3.35	41.1%	3.84	51.8%	4.11	57.7%
	2023	1,939	3.25	39.9%	3.73	50.4%	4.00	56.1%
	2024	1,923	3.16	38.7%	3.63	49.0%	3.88	54.4%
	2025	1,909	3.07	37.6%	3.53	47.7%	3.76	52.8%
	2026	1,897	2.98	36.5%	3.44	46.4%	3.66	51.3%
	2027	1,887	2.90	35.5%	3.36	45.3%	3.56	50.0%
	2028	1,878	2.82	34.6%	3.28	44.2%	3.47	48.7%

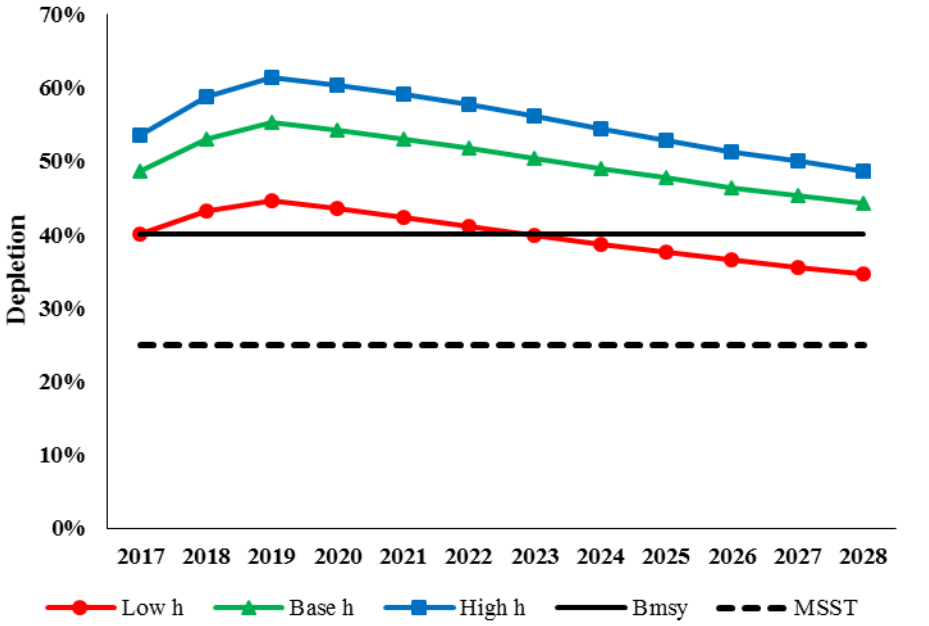

Figure 3-3. Predicted depletion trajectories of bocaccio assuming alternative catch streams applied to three states of nature where plausible values of steepness are assumed.

3.2.2.2 Canary Rockfish

A full assessment of canary rockfish was conducted in 2015 (Thorson and Wetzel 2015), which indicated the stock was rebuilt with a depletion of 56 percent at the start of 2015. A number of revisions were made to the data used for stock assessment, including: 1) a new method of index standardization for the Northwest Fisheries Science Center (NWFSC) trawl survey using a geo-statistical delta-generalized linear mixed model (GLMM) model, 2) a new steepness value (0.773) based on an updated meta-analysis of steepness, 3) a re-estimated relationship for maturity, 4) new ageing error tables, and 5) a re-estimated length-weight relationship. The primary factors driving the improvement in stock status were the use of a higher steepness value, the reduction in harvest due to management restrictions specified in the rebuilding plan, and above average recruitments in 2001–03, and in 2007 and 2010.

The sensitivity of the canary rockfish assessment model to assumed steepness is indicated in the decision table where plausible steepness values were assumed across a range of relatively low steepness (h = 0.6) to relatively high steepness (h = 0.946; Table 3-3). The stock is predicted to remain healthy through 2026 assuming full ACL/ABC attainment (σ = 0.36, P* = 0.45) under the most probable base case model and the high state of nature, but is predicted to drop below the B_{MSY} target in 2019 declining to a 32.1 percent depletion by 2026 under the low state of nature (Table 3-3 and Figure 3-4); however, this model is considered half as likely as the base case model and is not used to set harvest specifications. Removals modeled in the 2015 canary rockfish assessment ranged from a low of 216 mt (in 2018 under an ACL based on a 88.7 percent SPR harvest rate) to 1,714 mt (in 2017 under an ACL = ABC (σ = 0.36, P* = 0.45) HCR; Table 3-3).

Table 3-3. 10-year projections of canary rockfish for alternate states of nature based on steepness (reproduced from Thorson and Wetzel (2015)).

				State of nature					
				Low h = 0.60		Base case h = 0.773		High h = 0.946	
Relative probability of ln(SB_2015)				0.25		0.5		0.25	
Management decision	Year	OFL	Catch (mt)	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion
ACL = ABC (σ= 0.36, P* = 0.45)	2017	1793	1714	3259	42.8%	4261	56.9%	5019	67.7%
	2018	1596	1526	3135	41.2%	4152	55.4%	4901	66.1%
	2019	1480	1415	3017	39.6%	4041	53.9%	4784	64.6%
	2020	1408	1346	2895	38.0%	3918	52.3%	4653	62.8%
	2021	1357	1297	2771	36.4%	3788	50.6%	4510	60.9%
	2022	1318	1260	2656	34.9%	3661	48.9%	4367	58.9%
	2023	1288	1231	2565	33.7%	3553	47.4%	4242	57.2%
	2024	1266	1210	2501	32.8%	3471	46.3%	4143	55.9%
	2025	1249	1194	2462	32.3%	3414	45.6%	4071	54.9%
	2026	1234	1180	2445	32.1%	3379	45.1%	4021	54.3%
SPR = 88.7%	2017		217	3259	42.8%	4261	56.9%	5019	67.7%
	2018		216	3292	43.2%	4309	57.5%	5065	68.3%
	2019		218	3324	43.6%	4352	58.1%	5102	68.9%
	2020		223	3344	43.9%	4377	58.4%	5118	69.1%
	2021		229	3352	44.0%	4384	58.5%	5112	69.0%
	2022		236	3361	44.1%	4386	58.5%	5096	68.8%
	2023		242	3385	44.5%	4400	58.7%	5091	68.7%
	2024		248	3434	45.1%	4437	59.2%	5105	68.9%
	2025		253	3508	46.1%	4497	60.0%	5141	69.4%
	2026		258	3602	47.3%	4577	61.1%	5197	70.1%

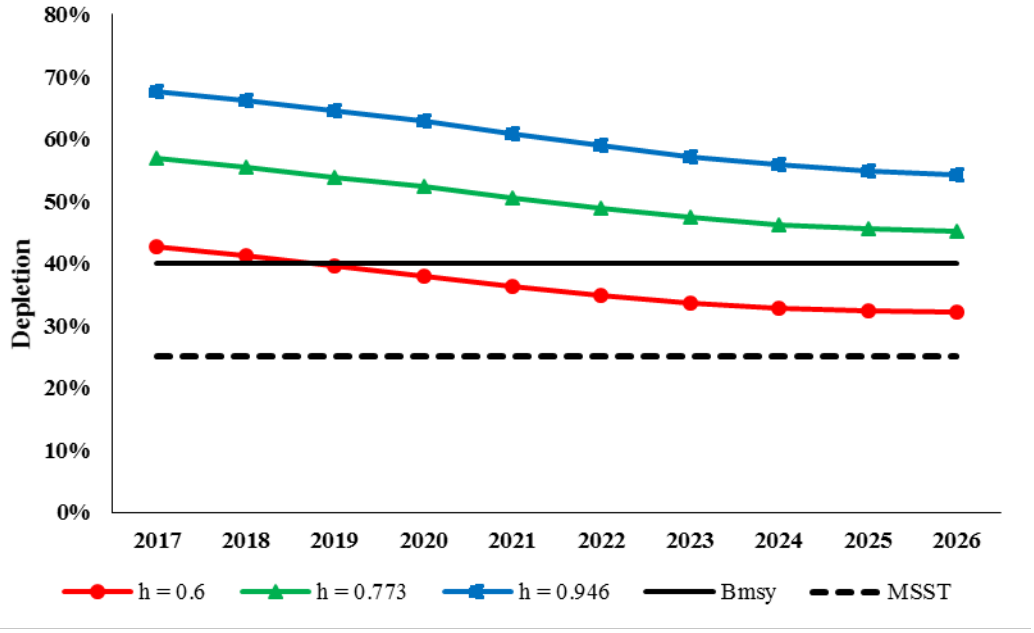

Figure 3-4. Predicted depletion trajectories of canary rockfish assuming full ABC/ACL attainment under the default harvest control rule (ACL = ABC (σ = 0.36; P* = 0.45)) applied to three states of nature where plausible values of steepness are assumed.

3.2.2.3 Pacific Ocean Perch North of 40°10' N lat.

A new Pacific ocean perch (POP) assessment indicated the West Coast stock was rebuilt with an estimated depletion of 76.6 percent at the start of 2017 (Wetzel, *et al.* 2017). The upturn in POP stock status was driven by exceptionally low exploitation since 2000 and strong recent recruitment. The 2008 year class recruited at an unprecedented large size and there is evidence of a strong 2013 year class as well. The last POP assessment was conducted in 2011 and that assessment indicated stock biomass was at a depletion of 19.1 percent at the start of 2011 (Hamel and Ono 2011).

The main productivity parameters in the 2017 POP assessment were fixed with the natural mortality rate (M = 0.054) based on a maximum age of 100 years and steepness (h = 0.5) based on an arithmetic mean of derived spawning outputs from a range of steepness values from 0.25 to 0.95 in 0.05 increments (assuming each steepness value was equally plausible). The resulting mean value of spawning output corresponded to a steepness of 0.5. Typically, when fixing steepness, the mean of the prior value from a meta-analysis of category-1 rockfish species (h = 0.72) is used. However, in this case, fixing steepness at the mean of the prior distribution led to an unrealistically low survey catchability. In contrast, the 2011 POP assessment was able to estimate steepness (h = 0.4). However, the ability to estimate steepness has disappeared given the newest input data. The SSC categorized the 2017 POP assessment as a category 2 assessment based on the extreme sensitivity of the model outputs to changes in model specifications.

The main axis of uncertainty in the 2017 POP assessment was the natural mortality rate. Predicted depletions under the default HCR (ACL = ABC (σ = 0.72; P* = 0.45)) indicate the stock will remain in a healthy state in the next 10 years across a plausible range of natural mortality rates (M = 0.04725 to 0.0595; Table 3-4, Figure 3-5). Annual catches modeled in the 2017 POP decision table ranged from 1,872 mt to 4,340 mt (Table 3-4).

Table 3-4. 10-year projections for alternate states of nature based on natural mortality of Pacific ocean perch (reproduced from Wetzel et al. (2017)).

Catch Basis	Year	Catch	States of Nature					
			M = 0.04725		M = 0.054		M = 0.0595	
			Spawning Output	Depletion	Spawning Output	Depletion	Spawning Output	Depletion
ABC	2019	4,340	3,944	62.9%	5,741	83.3%	7,505	96.8%
	2020	4,229	3,909	62.4%	5,745	83.4%	7,542	97.3%
	2021	4,108	3,858	61.6%	5,723	83.1%	7,546	97.3%
	2022	3,984	3,784	60.4%	5,666	82.2%	7,503	96.8%
	2023	3,862	3,695	59.0%	5,586	81.1%	7,427	95.8%
	2024	3,748	3,600	57.4%	5,494	79.7%	7,332	94.6%
	2025	3,644	3,502	55.9%	5,395	78.3%	7,226	93.2%
	2026	3,551	3,404	54.3%	5,292	76.8%	7,113	91.8%
	2027	3,467	3,308	52.8%	5,188	75.3%	6,996	90.3%
	2028	3,389	3,213	51.3%	5,084	73.8%	6,879	88.7%
SPR50%	2019	1,822	3,944	62.9%	5,741	83.3%	7,505	96.8%
	2020	1,822	4,022	64.2%	5,857	85.0%	7,654	98.7%
	2021	1,822	4,083	65.1%	5,946	86.3%	7,768	100.2%
	2022	1,822	4,117	65.7%	5,996	87.0%	7,830	101.0%
	2023	1,822	4,131	65.9%	6,016	87.3%	7,852	101.3%
	2024	1,822	4,133	65.9%	6,017	87.3%	7,848	101.2%
	2025	1,822	4,125	65.8%	6,004	87.1%	7,842	100.9%
	2026	1,822	4,110	65.6%	5,979	86.8%	7,786	100.4%
	2027	1,822	4,090	65.3%	5,947	86.3%	7,736	99.8%
	2028	1,822	4,067	64.9%	5,908	85.8%	7,679	99.1%

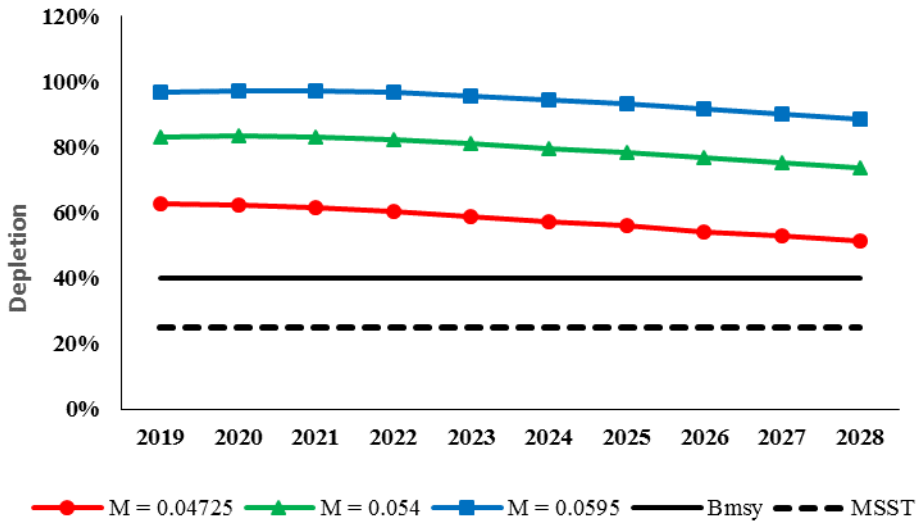

Figure 3-5. Predicted depletion trajectories of Pacific ocean perch assuming full ABC/ACL attainment under the default harvest control rule (ACL = ABC (σ = 0.72; P* = 0.45)) applied to three states of nature where plausible rates of natural mortality are assumed.

3.2.2.4 Widow Rockfish

A new full assessment of widow rockfish was conducted in 2015 (Hicks and Wetzel 2015), which indicated the stock was at 75.1 percent depletion at the start of 2015. A number of revisions were made to the data used for the 2015 stock assessment, including: 1) a new method of index standardization for the NWFSC trawl survey using a geo-statistical delta-GLMM model, 2) a new steepness value (0.798) based on an updated meta-analysis of steepness (the prior distribution on steepness in the meta-analysis was recalculated without the widow values), 3) a prior distribution developed for the natural mortality parameter from an analysis of a maximum age of 54 years, 4) updated methods of expanding fishery length and age composition, and survey conditional age at length, and 5) new ageing error tables. The SSC categorized the stock as a category 1 stock. The Council adopted a HCR for widow rockfish where the ACL equals the ABC under a P* of 0.45.

The state of nature models in the decision table in the 2015 widow rockfish assessment were based on different scales of the 2013 spawning population (Table 3-5). Removal scenarios ranged from a low catch of 2,000 mt annually to as high as a 13,508 mt ACL under the default HCR (ACL = ABC (σ = 0.36, P* = 0.45)). All three states of nature predicted the stock would remain healthy through 2026 under the high catch scenario with the low state of nature predicted to reach the 40% B_{MSY} target in 2026 (Table 3-5 and Figure 3-6).

Table 3-5. 10-year projections for alternate states of nature based on varying the scale of the 2013 spawning population of widow rockfish and under alternative harvest control rules (reproduced from Hicks and Wetzel, (2015).

				State of nature					
				Low		Base case		High	
Relative probability of ln(SB_2013)				0.25		0.5		0.25	
Management decision	Year	OFL	Catch (mt)	Spawning biomass (mt)	Depletion (%)	Spawning biomass (mt)	Depletion (%)	Spawning biomass (mt)	Depletion (%)
ACL = 2,000 mt	2017	14,130	2,000	53,178	64%	67,674	84%	79,081	98%
	2018	14,511	2,000	54,831	67%	69,856	87%	82,026	101%
	2019	14,746	2,000	56,417	68%	71,533	89%	83,858	103%
	2020	14,966	2,000	58,025	70%	72,892	90%	84,911	105%
	2021	15,132	2,000	59,510	72%	73,866	92%	85,270	105%
	2022	15,200	2,000	60,750	74%	74,413	92%	85,015	105%
	2023	15,179	2,000	61,745	75%	74,604	92%	84,317	104%
	2024	15,108	2,000	62,549	76%	74,556	92%	83,365	103%
	2025	15,017	2,000	63,222	77%	74,369	92%	82,306	101%
	2026	14,924	2,000	63,805	77%	74,110	92%	81,233	100%
ACL = ABC (σ = 0.36, P* = 0.45)	2017	14,130	13,508	53,178	64%	67,675	84%	79,081	98%
	2018	13,237	12,655	48,794	59%	63,900	79%	76,172	94%
	2019	12,375	11,830	45,047	55%	60,314	75%	72,826	90%
	2020	11,714	11,198	42,188	51%	57,284	71%	69,581	86%
	2021	11,181	10,689	39,951	48%	54,659	68%	66,465	82%
	2022	10,691	10,221	38,060	46%	52,260	65%	63,435	78%
	2023	10,235	9,784	36,431	44%	50,080	62%	60,578	75%
	2024	9,835	9,402	35,056	43%	48,173	60%	58,014	72%
	2025	9,502	9,083	33,908	41%	46,561	58%	55,803	69%
	2026	9,232	8,826	32,943	40%	45,225	56%	53,944	67%
ACL = ABC (σ = 0.36, P* = 0.25)	2017	14,130	11,078	53,178	64%	67,675	84%	79,081	98%
	2018	13,506	10,589	50,069	61%	65,158	81%	77,409	95%
	2019	12,855	10,078	47,348	57%	62,584	78%	75,058	93%
	2020	12,345	9,678	45,261	55%	60,313	75%	72,555	89%
	2021	11,918	9,344	43,598	53%	58,241	72%	69,970	86%
	2022	11,502	9,018	42,141	51%	56,241	70%	67,308	83%
	2023	11,096	8,699	40,839	50%	54,339	67%	64,692	80%
	2024	10,726	8,409	39,709	48%	52,615	65%	62,267	77%
	2025	10,409	8,160	38,752	47%	51,113	63%	60,117	74%
	2026	10,147	7,955	37,945	46%	49,838	62%	58,267	72%

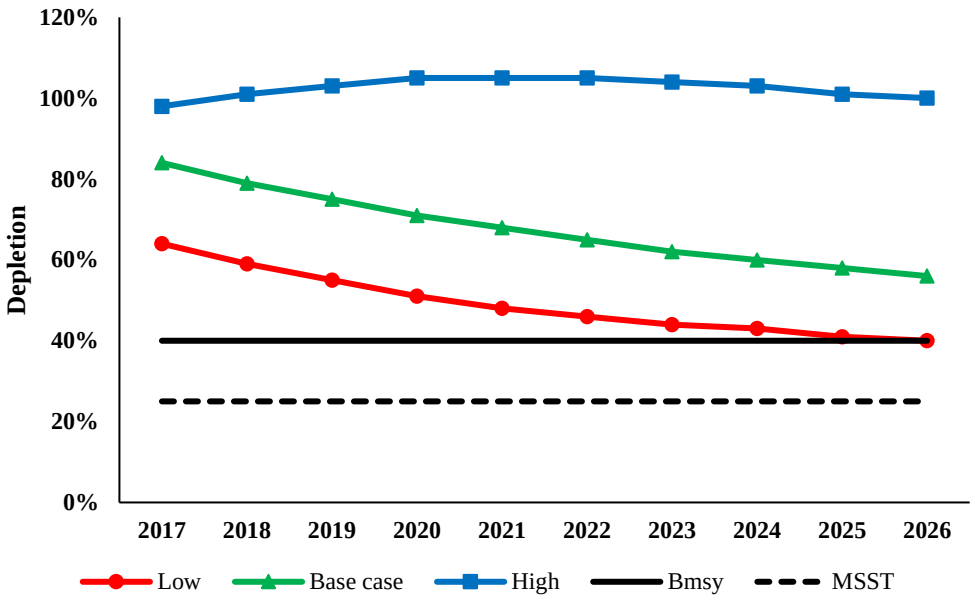

Figure 3-6. Predicted 10-year depletions for widow rockfish under three states of nature assuming full ACL attainment with the default harvest control rule (ACL = ABC (σ = 0.36, P* = 0.45)).

3.2.3 Stocks that may be affected by proposed new management measures

The following stocks or complexes may be affected by proposed new management measures. Stocks that are referenced in the previous two sections are not repeated here:

- Cabezon, Kelp Greenling, Black, Blue, and Deacon Rockfish (C.3)
- Darkblotched Rockfish (C.4)
- Lingcod and Sablefish (C.5)
- Minor Nearshore Rockfish, Shelf Rockfish South, Cowcod (C.6, C.7)
- Cowcod (C.8)

The 2015 EIS as updated by the 2016 EA and the SAFE documents provide the status and biology of these stocks, and is incorporated here by reference. Darkblotched rockfish and POP were declared rebuilt in 2017 and are now above B_{MSY}. Cowcod remains overfished and the status of the others remain the same in that they are not being overfished nor are they experiencing overfishing.

3.3 Essential Fish Habitat

The MSA (sec. 303(a)(7)) requires Councils to include in each FMP a description of EFH for all managed species and measures to minimize to the extent practicable adverse effects on such habitat caused by fishing. Section 3.3 in the 2015 EIS describes baseline conditions for groundfish EFH. 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. Groundfish HPACs cover estuaries, canopy kelp, seagrass, rocky reefs, and other areas of interest.

Chapter 7 in the PCGFMP describes groundfish EFH (Section 7.2) and HAPCs (Section 7.3), and is incorporated here by reference.

The 2015 EIS describes impacts of fishing gear on groundfish EFH; effects vary by gear and benthic substrate type, and is incorporated here by reference. Generally, bottom trawl gear has the largest effect on benthic habitat. Through Amendment 19 to the PCGFMP, various measures to mitigate these adverse effects have been implemented. The principal measure has been to close sensitive areas to specified gear types. 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 PCGFMP enumerates these areas.) A bottom trawl footprint closure, covering all areas deeper than 700 fm, was also instituted (described in FMP section 6.8.6).

The Council completed its review of its current groundfish EFH designation in April 2018 including measures to mitigate adverse impacts to EFH. This action will be considered further in Chapter 5, cumulative effects.

3.4 Protected Species

In accordance with section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. §§ 1531 et seq.), the responsible agency completes a biological opinion (BiOp) on the effects of the action on ESA-listed species. The following biological opinions address the take of ESA-listed species in the groundfish fishery:

- NMFS BiOp on Continuing Operation of the Pacific Coast Groundfish Fishery (NMFS 2012b). This BiOp indicated that the ongoing implementation of the groundfish fishery would not likely jeopardize non-salmonid marine species including eulachon, green sturgeon, humpback whales, Steller sea lions, and leatherback sea turtles. The BiOp also indicated that the Groundfish FMP fishery would not likely have an adverse effect on green sea turtles, olive ridley sea turtles, loggerhead sea turtles, sei whales, North Pacific right whales, blue whales, fin whales, sperm whales, Southern Resident killer whales, Guadalupe fur seals, or the critical habitat for Steller sea lions. The eastern distinct population segment (DPS) of Steller sea lions was delisted on November 4, 2013 (78 FR 66140); however, this delisting did not change the designation of the codified critical habitat for the eastern DPS of Steller sea lions. Section 3.5.2.2 in the 2015 EIS describes the Incidental Take Statement (ITS) from this BiOp. Pursuant to the terms and conditions in the incidental take statement attached to the BiOp the Council established the Endangered Species Act (ESA) Workgroup to evaluate the take of listed species (except for salmon) for each biennium and to make recommendations to the Council and NMFS on changes to groundfish management measures needed to address the take of listed species, as well as on reinitiation of ESA section 7 consultation. The ESA Workgroup met in February 2017 formulated recommendations based on its take evaluation. Workgroup recommendations are discussed below.
- United States Fish and Wildlife Service (USFWS) Biological Opinion Regarding the Effects of the Continued Operation of the Pacific Coast Groundfish Fishery as Governed by the Pacific Coast Groundfish Fishery Management Plan and Implementing Regulations at 50 CFR Part 660 by the National Marine Fisheries Service on California Least Tern (*Sterna antillaruin browni*), Southern Sea Otter (*Enhydra lutris nereis*), Bull trout (*Salvelinus confluentus*), Marbled Murrelet (*Brachyramphus marmoratus*), and Short-tailed Albatross (*Phoebastria albatrus*) (USFWS

2017). In its 2017 opinion, USFWS concurred with the determination NMFS made in its biological assessment that the proposed action, the ongoing implementation of the groundfish fishery, is not likely to adversely affect the marbled murrelet, California least tern, southern sea otter, bull trout, nor bull trout critical habitat. USFWS also concluded that implementation of the activities as described in the NMFS biological assessment would not jeopardize the continued existence of short-tailed albatross. Pursuant to the terms and conditions of USFWS 2017, the Council would propose and NMFS implement, within three years, regulations to employ streamer lines in the commercial longline fishery of the Pacific Coast Ground Fishery consistent with the Alaska streamer line regulations for federal waters, including the use of single streamer lines on boats 26–55 feet in length, OR set longlines after civil sunset. Council action and associated rulemaking is not part of this proposed action but the regulations would become effective during the 2019–20 biennial period.

- In the NMFS biological opinion for impacts to ESA-listed salmon species under implementation of the Pacific Coast Groundfish Management Plan (NMFS 2017) NMFS concluded that the action as defined by the Council (Appendix 1 to the BiOp), if conducted consistent with the terms of the ITS, is not likely to jeopardize the continued existence of the listed species that are subject of the opinion. Critical habitat is not present within the action area. The ITS includes non-discretionary reasonable and prudent measures (RPMs) and related terms and conditions (T&Cs) that must be applied to the proposed fisheries to provide an exemption from the prohibited acts outlined in section 9 of the ESA. Some of these terms and conditions are addressed through this proposed action and the supporting analyses in this EA.
- A reinitiated section 7 consultation is currently underway for the southern Distinct Population Segment (DPS) of eulachon. The southern DPS of eulachon was listed as threatened under the ESA in 2010.

Marine mammal species that are not listed under the ESA occur in the action area. The taking of marine mammals (whether or not listed under the ESA) is subject to the requirements of the Marine Mammal Protection Act of 1972, as amended (MMPA). The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. The MMPA was amended in 1994 to, among other things, establish a process for authorizing fisheries to incidentally take marine mammals. Under this Authorization Program all commercial fisheries must be categorized based on the relative frequency of incidental mortalities and serious injuries of marine mammals in the fishery:

- Category I designates fisheries with frequent mortalities and serious injuries incidental to commercial fishing;
- Category II designates fisheries with occasional mortalities and serious injuries;
- Category III designates fisheries with a remote likelihood or no known mortalities or serious injuries.

According to the 2018 List of Fisheries (83 FR 5349; February 7, 2018) the WA/OR/CA sablefish pot fishery is Category II because of takes of the CA/OR/WA humpback whale stock. All other federally managed Pacific Coast groundfish fisheries are Category III. The List of Fisheries identifies the following marine mammal stocks taken in the groundfish trawl fishery: California sea lion, U.S. Dall's porpoise, CA/OR/WA harbor seal, OR/WA coast northern fur seal, Eastern Pacific white-sided dolphin, CA/OR/WA Steller sea lion. The List of Fisheries identifies the following marine mammal stocks taken in the WA/OR/CA groundfish, bottomfish longline/set line fishery: CA/OR/WA offshore Bottlenose dolphin.

The Groundfish Endangered Species Workgroup (ESA Workgroup) met February 15–16, 2017 in Seattle, Washington. The Workgroup's objectives and duties are to recommend new analyses to improve bycatch

estimates, consider whether ITS amounts are appropriate, consider whether new information reveals effects not considered in the BiOps, and propose for Council consideration conservation and management measures to minimize bycatch of listed species, if needed, in the groundfish fishery. The ESA Workgroup made recommendations relative to the take of eulachon, short-tailed albatross (subsequently addressed through the USFWS BiOp), and humpback whale.

Based on the relevant BiOps and ESA Workgroup recommendations, this EA evaluates the impacts of the proposed action on eulachon, humpback whale, short-tailed albatross, and salmon. Information on status and biology is provided below.

3.4.1 Eulachon

The 2017 report on eulachon bycatch prepared by NMFS for review by the ESA Workgroup (Agenda Item F.5.a, NMFS Report 4, April 2017) summarizes life history and distribution. This information is incorporated by reference; in summary "Eulachon is an anadromous smelt (Family *Osmeridae*) that spawns in freshwater rivers, yet spends 95% of its life in the ocean over the continental shelf and most often at depths between 50 and 200 m. The southern Distinct Population Segment (DPS) of eulachon, which occurs in the northern California Current, is composed of numerous subpopulations that spawn from the Mad River in northern California to the Skeena River in British Columbia. The southern DPS of eulachon was listed as threatened under the ESA in 2010."

The following information comes from Agenda Item F.5.a, Groundfish Endangered Species Act Workgroup Report, April 2017.

Eulachon bycatch exceeded the estimation of take in the proposed action and ITS in 2011, 2013, and 2014. Bycatch in 2011 was 1,624 fish, with 1,268 fish caught in the catcher-processor sector, and the remaining take occurring in the bottom trawl, midwater trawl, shoreside whiting, and tribal and non-tribal mothership sectors. Bycatch in 2013 was 5,113 fish, with 4,139 fish caught in the shoreside whiting fishery, and the remaining fish caught in the bottom trawl, midwater trawl, non-tribal mothership, and catcher-processor sectors. Bycatch in 2014 was 3,075 fish, with 2,808 caught in the bottom trawl and non-whiting midwater groundfish fisheries, and 267 caught in the non-tribal mothership, and catcher-processor sectors. For 2015, bycatch of eulachon totaled 699 fish, with 643 of the total caught in the shoreside bottom and non-whiting midwater trawl fisheries.

The take estimate level of 1,004 fish was based on bycatch estimates from 2002–10, a time when eulachon abundance was severely depressed; abundance has subsequently increased. This may be one reason the estimate was exceeded in subsequent years. However, eulachon bycatch/take in groundfish fisheries is small relative to other fisheries.

With respect to eulachon, the ESA Workgroup recommended in its report[11] to the Council that the Council encourage NMFS to:

1. Complete the biological assessment as an initial step in developing a new BiOp.
2. Take into account the relative magnitude of fishery impacts on the eulachon resource when developing the [new] BiOp and associated ITS.
3. Consider a range in the ITS to account for considerable fluctuations in abundance while also recognizing recent increases.

[11] http://www.pcouncil.org/wp-content/uploads/2017/03/F5a_ESA_Workgroup_Rpt_3-17-2017_Apr2017BB.pdf

In 2016 NMFS reinitiated ESA section 7 consultation for eulachon. NMFS intends to complete the BiOp in 2018.

3.4.2 Humpback Whale

The 2017 NMFS bycatch report provided to the ESA Workgroup (Agenda Item F.5.a, NMFS Report 2, April 2017) is incorporated by reference here, although a summary of the species status and biology is presented below. Internal citations have been omitted; for sources refer to the report.

Humpback whales were listed worldwide as endangered under the ESA in 1970, and classified as a strategic stock and considered depleted under the MMPA. Based on a 2009 ESA status review, NMFS revised the listing status of the species by identifying 14 DPSs (81 FR 62259). Four DPSs occur in the North Pacific, identified by breeding location: Hawaii, Central America, Mexico, and Western North Pacific. Humpback whales off the Oregon, Washington, and California coast are from the Central America, Mexico, and Hawaii DPSs. Only the Mexico DPS and Central America DPS are listed, as threatened and endangered, respectively.

Breeding locations in the North Pacific are more geographically separated than feeding areas and include regions offshore of Hawaii, Central America; the West Coast of Mexico, and the Ogasawara and Okinawa Islands and the Philippines. Feeding areas in the North Pacific range from California, USA to Hokkaido, Japan, with most feeding occurring in coastal waters. Humpback whales in the North Pacific rarely move between these breeding regions. Strong fidelity to both feeding and breeding sites has been observed but movements are complex. Recent humpback whale abundance estimates for the entire North Pacific basin have ranged from 18,302 to 21,808 individuals; the latter estimate may still be an underestimate of actual humpback whale abundance.

Humpback whales face a variety of threats, including entrapment and entanglement in fishing gear, collisions with ships, acoustic disturbance, habitat degradation, and competition for resources with humans. Humpback whales may break through, carry away, or become entangled in fishing gear. Whales carrying gear may later die, become debilitated or seriously injured, or have normal functions impaired. Most entanglements, and subsequent mortality, is probably not recorded. Preliminary studies suggest that entanglement may be responsible for 3-4 percent of total mortality, especially among juveniles. The Hawaii DPS experiences a high rate of interaction with fishing gear (20-71 percent), with the highest rates recorded in southeast Alaska and northern British Columbia. Vessel collisions and entanglement in fishing gear pose the greatest threat to the Central America DPS. For the Mexico DPS fishery interactions are the most likely source of serious injury and mortality, followed by ship strikes. Pot and trap fisheries in general are the most commonly documented source of serious injury and mortality of humpback whales in U.S. West Coast waters.

The 2012 BiOp estimate of take for humpback whales is a five year average of one humpback whale injury or mortality per year, and up to three humpback whale injuries or mortalities in any single year. The take of humpback whales did not exceeded the take estimate during the 2011–15 time period under review by the ESA Workgroup. In fisheries managed under the PCGFMP, one humpback whale was observed taken in 2014 in the limited entry sablefish fishery on a vessel fishing with pot gear. Using observer data from the groundfish sector and a Bayesian approach to estimate bycatch, the bycatch rate calculated for the 2011–15 period was 0.002 whales/year. The fleet-wide estimated 5-year annual average for 2011–15 was 0.20 whales and the total estimated mean bycatch was 1.0 whale.

Based on its review of the bycatch/take estimate for the 2011–15 period, the ESA Workgroup did not make any management recommendations. However, it did express concern about the possibility that more entanglements occurred in 2016.

Although bycatch estimates are not available for 2016 and 2017, NMFS does report observed whale entanglements (NOAA Fisheries 2017; NOAA Fisheries 2018). Figure 3-7 shows confirmed whale entanglements by year and species.

In 2016, 71 separate cases of entangled whales were reported off the coasts of Washington, Oregon, and California, as well as in neighboring countries with gear from U.S. fisheries. This is the highest annual total for the West Coast of the United States since NOAA Fisheries started keeping records in 1982. NMFS confirmed 48 of the 71 cases via the documentation submitted, follow-up sightings, and entanglement response information provided to NOAA Fisheries' West Coast Marine Mammal Stranding Network. The majority of these reports, 54, were of humpback whales. Of the 48 confirmed entanglement cases, 29 were identified as associated with specific fisheries or gear type. Two humpback whales were reported from the sablefish trap fishery, which is managed under the PCGFMP; all other takes were from non-groundfish fisheries. Reported entanglements were concentrated in Central California from waters off San Francisco to Monterey Bay.

In 2017, a total of 31 whales were confirmed entangled off the costs of Washington, Oregon, and California and in Mexico with gear from U.S. fisheries. The highest concentration of these entanglements were off of California (26), however, the location where entangled animals are observed and reported does not necessarily reflect where and when an entanglement originated. Higher reporting rates in California may reflect higher sighting rates of whales off the coast of California even when the entanglement event may have originated elsewhere. The number of confirmed entanglements in 2017 was lower than the historic highs of 2015 (50) and 2016 (48), but still represents a significant increase compared to pre-2014 levels when the average was less than 10 confirmed entanglements per year. In comparison to the last several years, fewer humpback whale entanglements were reported and confirmed in 2017, but a larger number of gray whale entanglements was reported and confirmed. A total of 16 of those were confirmed to be humpback whales. In 2017, 14 of the 31 confirmed entanglement cases were identified as associated with specific fisheries or gear type. One of these was from the sablefish/coonstripe shrimp commercial trap fishery[12], while the rest were from non-groundfish fisheries.

Information on whale entanglements is also discussed in the 2018 California Current Ecosystem Status Report (Agenda Item F.1.a, NMFS Report 1, March 2018). These whale entanglements are coincident with anomalous warming of the California Current ecosystem in 2014 to 2016. It is possible oceanographic conditions brought whales closer to shore in recent years where they fed on abundant shoals of anchovy. This brought them into an area where they would be more vulnerable to fixed gear. In addition, a major harmful algal bloom event delayed opening of the Dungeness crab pot fishery. This may have increased the deployment of pot gear during a time of the year when humpback whales are abundant in nearshore waters. In 2017–18 oceanographic conditions are trending to average conditions. Humpback whale takes were lower in 2017 than in 2016 (Figure 3-7).

[12] Gear from both fisheries was involved in the same single entanglement.

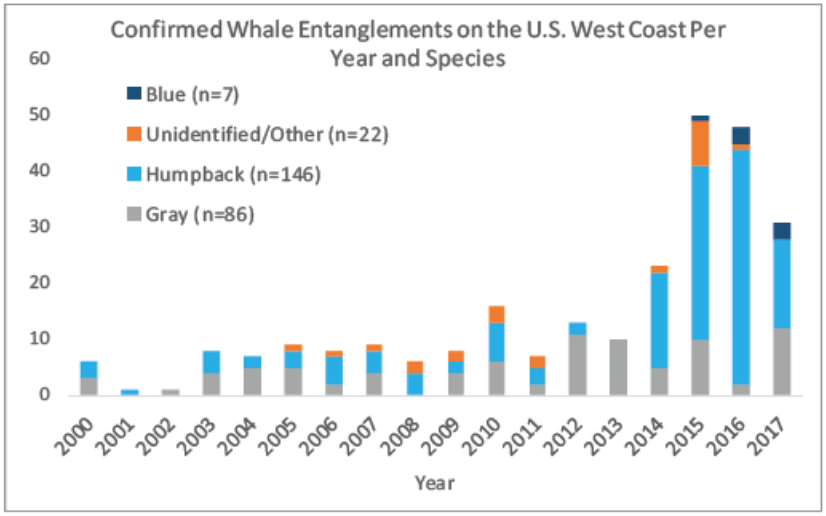

Figure 3-7. Confirmed U.S. West Coast whale entanglements by year and whale species, 2000–17. (Source: NOAA Fisheries 2018)

3.4.3 Short-Tailed Albatross

The 2017 NMFS bycatch report provided to the ESA Workgroup (Agenda Item F.5.a, NMFS Report 6, April 2017) is incorporated by reference with a summary of the species biology and life history given below. Section 3.2.5 in the 2016 EA also details the species' life history and status.

Short-tailed albatrosses are large, pelagic seabirds of the Order *Procellariiformes* with long narrow wings adapted for soaring just above the water surface. The largest of the three species of North Pacific albatrosses, they are continental shelf-edge specialists. Individuals breed at five to six years of age, laying a single egg, and chicks are fed by adults by surface feeding on squid, shrimp, fish, and fish eggs.

Short-tailed albatross were brought to the brink of extinction by the middle of the Twentieth Century. Since then the population has been steadily recovering, but remains small. The total population estimate for breeding age short-tailed albatrosses as of the 2013–14 nesting season is 1,928 individuals. Only two functional breeding populations are known (there are reports of breeding pairs in several other locations), which nest on two volcanic islands off Japan. As the population recovers it is reoccupying its range including waters off the U.S. West Coast where juveniles are more common than adults.

Because of its small population, bycatch of short-tailed albatrosses in commercial fisheries continues to be a major conservation concern. Since 1983, 19 short-tailed albatross takes have been documented throughout the North Pacific. The only known short-tailed albatross take in a Pacific Coast Groundfish Fishery was reported in the limited entry sablefish longline fishery off the Oregon coast in 2011.

Based on a Council recommendation, federal regulations currently require streamer lines be deployed during setting operations on commercial fixed gear vessels 55 feet (17 m) or greater in length.

The 2017 USFWS BiOp (USFWS 2017) incorporates a new method for estimating takes as reported in the NMFS Biological Assessment. Instead of using takes of more common black-footed albatross as a proxy for short-tailed albatross takes, a Bayesian statistical model, often used to estimate the frequency of rare events, was employed (see sections 6.3 and 6.4, pages 40-39, in the BiOp for a description of this method). Based on this method, the ITS estimates take of no more than one short-tailed albatrosses in two

years or an average estimated take of no more than five birds per two-year period as a result of the operation of the groundfish fishery.

The ITS identifies five RPMs that are necessary and appropriate for NMFS to minimize take of short-tailed albatross, and lists associated terms and conditions necessary to implement the RPMs. These terms and conditions are non-discretionary. The Council may provide recommendations to NMFS on implementation of these terms and conditions. Specifically, as discussed above, the Council will make recommendations on regulations to extend the streamer line requirement to vessels that use the longline gear to boats 26-55 feet in length.

At its November 2017 meeting, the Council decided not to develop a regulatory proposal as part of this proposed action but will take action as part of a separate rule-making package so that regulations can be implemented by the 2020 deadline set out in the ITS. This separate action is considered in Chapter 5, cumulative effects.

The terms and conditions also direct NMFS to conduct research on the effect of floating gear on albatross bycatch and improved methods to minimize risk of bycatch. A recent research paper (Gladics, *et al.* 2017) is relevant to this concern. The paper reports results on the sink rate for longline gear when floats are attached to the mainline, which is a common practice in the West Coast groundfish fixed gear fishery. Their results confirm that bird-scaring (streamer) line regulations from Alaska were sufficient to protect baits from bird attacks on longlines without floats, but not baits on longlines with floats.

3.4.4 Salmon

Bycatch (or take) of ESA-listed salmon—principally Chinook salmon—in the groundfish fishery—mainly by trawl vessels—has been subject to ESA section 7 consultations since 1990 (see Table 3-6, which lists salmon-related consultations for the PCGFMP).

Table 3-6. Salmon-related ESA section 7 consultation activities related to the Pacific Coast Groundfish FMP.

Date	ESU considered or circumstances
August 10, 1990	Sacramento River winter-run Chinook salmon, marine mammals, and turtles
November 26, 1991	Sacramento River winter-run Chinook salmon and Snake River sockeye salmon
August 28, 1992	Sacramento River winter-run Chinook salmon, Snake River sockeye salmon, Snake River spring/summer Chinook salmon, and Snake River fall Chinook salmon
September 27, 1993	High bycatch of pink salmon, ITS revised
May 14, 1996	Bycatch exceedance of take limit of Chinook in the 1995 whiting fishery (14,557)
December 15, 1999	Consultation on the effects of the FMP on 22 newly listed ESUs and Snake River fall Chinook
April 25, 2002	Bycatch exceedance of take limit of Chinook in the 2000 whiting fishery (11,513)
March 11, 2006	Bycatch exceedance of take limit of Chinook in the 2000 and 2004 trawl fishery and the 2005 whiting fishery; reconsideration of Puget Sound, LCR, Snake River fall, UWR Chinook; addition of Sacramento River winter-run, CC, and Central Valley spring-run Chinook

Date	ESU considered or circumstances
January 2013	Consultation on the effects of the newly rationalized trawl fishery on listed ESUs and Snake River fall Chinook
October 2014	Bycatch exceedance of take limit of Chinook in the 2014 whiting fishery

In December 2017, NMFS issued a BiOp (NMFS 2017) on the impacts to ESA-listed salmon species under implementation of the PCGFMP. This BiOp is incorporated by reference. Elements of the BiOp directly relevant to implementation of management measures for the 2019–20 biennial period are summarized here. The BiOp considers impacts of the proposed action on seven listed Chinook Salmon Evolutionarily Significant Units (ESUs): Puget Sound Chinook, Snake River Fall Chinook, Lower Columbia River (LCR) Chinook, Upper Willamette River (UWR) Chinook, Snake River Spring/summer Chinook, California Coastal (CC) Chinook, LCR Coho, Oregon Coast Coho, Southern Oregon/Northern California Coho, and Central California Coast (CCC) Coho Salmon. Other listed species occurring in the action area and affected by the proposed action are covered under an existing, long-term ESA opinion or NMFS has determined that the proposed action is not likely to adversely affect the species (NMFS 2012a).

In 2016 and 2017 NMFS worked with the Council to develop a description of the proposed action on which the consultation would be based. Since most salmon bycatch occurs in the portion of the fishery using trawl gear, the description focuses on those sectors. Based on Council input, NMFS then provided a number of scenarios for the possible future operation of the fishery along with an analysis of likely take of salmon (Agenda Item I.1.a, NMFS Report 1). Based on these scenarios, the Council characterized how it expected the fishery to operate in the future (see Table 1-2 and Appendix 1 in the BiOp). The Council's description of the proposed action includes the following elements:

- The whiting fishery will continue to operate as it has in the recent past, with the same geographic footprint and catch of the U.S. total allowable catch (TAC), which is expected to remain around 500,000 mt annually, consistent with sector allocations. The tribal whiting fishery will be larger in the future based on the assumed attainment of their share of the 500,000 mt TAC.
- The non-whiting trawl fishery will operate similarly to its historical geographic distribution but with higher effort and attainment rates for groundfish and bycatch rates except that:
    - The trawl RCA off Oregon and California will be eliminated in a separate action.
    - A non-whiting midwater trawl fishery targeting yellowtail and widow rockfish will continue to develop based on historical patterns that obtained before widow rockfish was declared overfished in 2001 and facilitated by anticipated regulatory changes.
- The Council would use Chinook management guidelines to consider ongoing action to mitigate bycatch and NMFS would base reinitiating consultation on the exceedance of those guidelines. These guidelines are take of 11,000 Chinook salmon per year for the whiting fishery, 5,500 Chinook salmon for all other sectors and a 3,500 Chinook salmon Reserve, which the Council could allocate to address unexpectedly high Chinook salmon bycatch in either of these sectors.
- The Council would evaluate and implement management measures to reduce salmon bycatch as part of the biennial process.

The BiOp presents the results of bycatch estimates based on this description of the fishery. (See section 2.5.1.1 in NMFS 2017 for description of the estimation methodology.)

For the at-sea whiting sectors, NMFS evaluated two fishing patterns, a northern distribution characterized by the pattern in 2009–11 and a southern distribution characterized by the pattern in 2012–15. This variable distribution of fishing affects the mix of individual ESUs making up Chinook bycatch, and it is the effect of the proposed action on these individual ESUs that is the subject of NMFS's ESA jeopardy

determination. Also, both full and partial whiting allocation scenarios were evaluated. If the at-sea fishery adheres to the northern distribution, NMFS concludes that the likely range in potential bycatch falls below 11,000 Chinook threshold for the whiting fishery. However, if the at-sea fishery adheres to the southern distribution scenario, it is likely the bycatch threshold would be exceeded. Shoreside whiting sector bycatch depends more on how much whiting it can and does catch (i.e., its level of attainment against allocation) rather than the latitudinal distribution of the fleet, which is less variable because these vessels must stay closer to their ports of landing.

Estimating Chinook bycatch in the non-whiting trawl fishery is complicated by anticipated changes in gear-related regulations intended to facilitate growth of the midwater trawl fishery targeting rockfish (see Section 3.5.3.3). These changes would both relax current restrictions on the configuration of trawl gear and their use during various times of the year and areas. Removing the trawl RCA also complicates estimating bycatch because bottom trawl fishing within the current boundaries has not occurred since 2001. Also, observer coverage in the shoreside trawl fishery was minimal before about 2004 so there is little historical data upon which to base estimates of salmon bycatch within the trawl RCA. Additionally, the fishery has changed substantially since then with the rebuilding of widow and canary rockfish, both in the way it is managed and resulting operational characteristics. The automatic closures included under the preferred alternative mitigate against this uncertainty in how bycatch of salmon will change as a result of these fishery changes.

Despite the conclusion that the Chinook bycatch thresholds are unlikely to be exceeded, "extreme catch events" (ECEs) may still occur. The 3,500 Chinook Reserve is identified to acknowledge that such events occur, albeit rarely, and little can be done operationally or through regulation to prevent them.

The ESA jeopardy analysis in the BiOp is at the level of ESUs. Stock composition of fishery catch is estimated using a coerced linear regression model based on the latitudinal distribution of bycatch. These estimates are applied to the Chinook salmon species level bycatch estimates to support the assessment of effects to stocks. While take of coho salmon at the species level is estimated, take at the ESU level is not quantitatively estimated in the BiOp as it is for Chinook salmon. Section 2.7 of the BiOp (NMFS 2017), integration and synthesis, considers the overall effect on the Oregon Coast Coho and Southern Oregon/Northern California Coho ESUs. For these coho ESUs the BiOp finds that the proposed action is not expected to have a measurable effect on species' structure or diversity. Abundance may be affected by the proposed action, because it would result in a small increase in mortality. But overall, as stated in the BiOp sections 2.7.8 and 2.7.9, the level of take expected for the proposed action is so small no notably deleterious effects are expected on these populations.

In the BiOp ITS, NMFS concludes that the amount or extent of anticipated take, coupled with other effects of the proposed actions, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. The ITS describes incidental take in numbers of salmon, both listed and non-listed, rather than the number of listed fish from individual ESUs. This approach is used because information needed to determine take at the ESU level is limited and practical mitigation measures would have to be applied at the species level. Incidental take of Chinook may not exceed 11,000 in the whiting sector[13] and 5,500 in the nonwhiting sector, including the Reserve of 3,500 Chinook per year in the event that bycatch increases unexpectedly. Coho bycatch may not exceed 474 for the whiting sector and 560 for

[13] "Sector" in this context refers to those sectors described as "whiting" and "non-whiting" in the 2017 Endangered Species Act Consultation on the impacts to salmon caused by the continued operation of the groundfish fishery. In this context, "whiting" includes commercial whiting targeting by the at-sea cooperatives, tribal fisheries, and shoreside whiting. "Non-whiting" includes commercial groundfish bottom trawl and non-whiting midwater trawl, fixed gear fisheries, and recreational fisheries outside of the salmon season.

the nonwhiting sector[14] per year. Exceeding these estimates of incidental take would be one reason for reinitiating consultation. NMFS determined that the effects of the proposed actions, including the estimated extent or amount of take, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

The ITS includes six RPMs and associated terms and conditions. These are non-discretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take. Some of these terms and conditions must be implemented through the 2019–20 biennial process as discussed in Section 2.2.2. The Council response to these terms and conditions is described in Appendix C, section C. The terms and conditions included a review of the existing BRA lines (75, 100, and 150) for their possible application to salmon bycatch purposes. That review was completed by the GMT and presented to the Council in March 2018 (Agenda Item H.5a GMT Report 1; March 2018). The Council will consider further application and development of BRAs for salmon bycatch mitigation at the November 2018 meeting.

3.5 Socioeconomic Environment

Section 3.2 in 2015 EIS, previous EISs for the biennial harvest specifications and management measures, and the Groundfish SAFE (PFMC 2018) present detailed characterizations of the Pacific coast groundfish fishery. That information is incorporated by reference, with some updates below.

3.5.1 Groundfish Fishery Sectors

The commercial groundfish fishery comprises 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 delivers 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 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, such as widow and yellowtail rockfish.
- **Fixed gear (longline and pot) fisheries** are divided between limited entry and OA from a regulatory standpoint, but fishery managers more commonly characterize the "non-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.

[14] As described above, the ITS only applies to those recreational fisheries of which salmon impacts are not attributed to preseason salmon modeling. The recreational fisheries not accounted for in preseason salmon modeling are those occurring outside of the open salmon seasons and the Oregon longleader fishery.

3.5.2 Revenue Trends for Commercially Important Groundfish

Although the PCGFMP includes many species, relatively few account for most of the revenue. For the period covered by Table 3-7, 2003–17, the top three species ranked by revenue (sablefish, Pacific whiting (hake), and Dover sole) accounted for 72 percent of total inflation adjusted groundfish ex-vessel revenue. Although the 2017 data presented here are preliminary and therefore incomplete, total revenue is up substantially from the 2015–16 biennial period and comparable to annual average total revenue in the 2011–12 biennial period. Revenue from Pacific whiting doubled in 2017 compared to the 2015–17 annual average.

Table 3-7. Average annual inflation adjusted ex-vessel revenue, $1,000s by groundfish species. (Source: PacFIN comprehensive_ft 1/2/2018).

	2003–10		**2011–12**		**2013–14**	
	Revenue	**Percent**	**Revenue**	**Percent**	**Revenue**	**Percent**
Sablefish	$28,478	41%	$39,149	44%	$22,698	29%
P. Whiting	$12,536	18%	$23,647	27%	$26,664	34%
Dover Sole	$7,881	11%	$7,315	8%	$7,318	9%
Rockfish NEI[a/]	$4,676	7%	$5,885	7%	$5,960	8%
Petrale Sole	$5,260	8%	$3,464	4%	$6,294	8%
Thornyheads	$4,374	6%	$4,180	5%	$4,153	5%
Roundfish NEI [a/]	$2,306	3%	$2,764	3%	$2,554	3%
Flatfish NEI [a/]	$2,474	4%	$1,577	2%	$1,488	2%
Other	$896	1%	$1,191	1%	$1,190	2%
Total	$68,882	100%	$89,172	100%	$78,319	100%
	2015–16		**2017**			
	Revenue	**Percent**	**Revenue**	**Percent**		
Sablefish	$30,146	42%	$33,743	36%		
P. Whiting	$11,540	16%	$24,438	26%		
Dover Sole	$6,647	9%	$7,036	8%		
Rockfish NEI [a/]	$6,383	9%	$9,936	11%		
Petrale Sole	$7,121	10%	$7,391	8%		
Thornyheads	$3,813	5%	$5,181	6%		
Roundfish NEI [a/]	$3,212	4%	$3,335	4%		
Flatfish NEI [a/]	$1,301	2%	$1,087	1%		
Other	$1,332	2%	$972	1%		
Total	$71,494	100%	$93,118	100%		

a/ Not elsewhere identified

3.5.3 Landings and Revenue for Commercial Fishery Sector

3.5.3.1 Non-whiting Fishery Sectors

Table 3-8 reports ex-vessel revenue for the main non-whiting fishery sectors. The IFQ trawl fishery has accounted for about three-fifths of ex-vessel revenue since 2013 followed by the non-nearshore fixed gear fishery (targeting sablefish) accounting for almost two-fifths. Ex-vessel revenue has increased in all sectors except nearshore fixed gear over this time period.

Table 3-8. Groundfish ex-vessel revenue in current (adjusted for inflation) dollars, $1,000s, by non-whiting commercial fishery sectors, 2013–17. (Source: Groundfish SAFE Table 12b, 1/2/2018).

Year	Shoreside IFQ Trawl (Non-whiting)	Shoreside IFQ Non-trawl	Non Nearshore Fixed Gear	Nearshore Fixed Gear	Grand Total	Pct. of Annual Average
2013	$26,113	$2,875	$12,646	$3,786	$45,421	87%
2014	$25,187	$4,610	$13,888	$3,722	$47,408	91%
2015	$26,997	$5,315	$16,373	$4,447	$53,133	102%
2016	$26,548	$6,572	$18,048	$3,563	$54,731	105%
2017[a/]	*$29,003*	*$6,472*	*$20,542*	*$3,512*	*$59,529*	*114%*
Grand Total	**$133,849**	**$25,845**	**$81,498**	**$19,030**	**$214,801**	
Pct. of Total	**62%**	**12%**	**38%**	**9%**	**100%**	

a/ 2017 data is considered preliminary.

3.5.3.2 Whiting Fishery Sectors

Table 3-9 reports ex-vessel revenue for whiting sectors. While total revenue since 2013 is more than double that of the non-whiting commercial sectors reported above, it has been more variable year to year. Revenue declined in 2015 and 2016 but rebounded in 2017 to $62.3 million, although that is still less than revenue in 2013–14, which was more than $66 million annually.

Table 3-9. Groundfish ex-vessel revenue in current (adjusted for inflation), $1,000, by whiting commercial fishery sectors, 2013–17. (Source: Groundfish SAFE Table 14b, 1/12/2018).

Year	Catcher-Processor Total	Mothership Total	Shoreside Whiting Trawl Total	Grand Total	Percent of Annual Average
2013	$23,168	$15,379	$27,706	$66,253	123%
2014	$25,823	$15,552	$24,895	$66,270	123%
2015	$11,265	$4,431	$10,509	$26,205	49%
2016	$21,315	$12,214	$13,815	$47,344	88%
2017[a/]	*$25,361*	*$11,848*	*$25,127*	*$62,336*	*116%*
Grand Total	**$191,929**	**$114,954**	**$178,748**	**485,630**	
% of Total	**40%**	**24%**	**37%**	**100%**	

a/ 2017 data is considered preliminary.

3.5.3.3 Midwater Trawl Fishery for Rockfish

The rebuilding of canary and widow rockfish has stimulated the reemergence of a fishery using midwater gear to target pelagic rockfish, principally widow and yellowtail rockfish. Widow rockfish was declared overfished in 2001 and declared rebuilt in 2011. Canary was declared overfished in 2000 and declared rebuilt in 2015. Figure 3-8 shows revenue from landings of these species (and chilipepper rockfish) since 1981. From 2004 onward only landings from the non-whiting trawl fishery are included; prior to that year the available data do not allow distinguishing among fishery sectors but the domestic whiting fishery was negligible before then. Landings steadily declined from the late 1980s onward, except in 2000 and 2001. The fishery essentially ceased after 2001 when widow rockfish was declared overfished but shows notable growth since 2014.

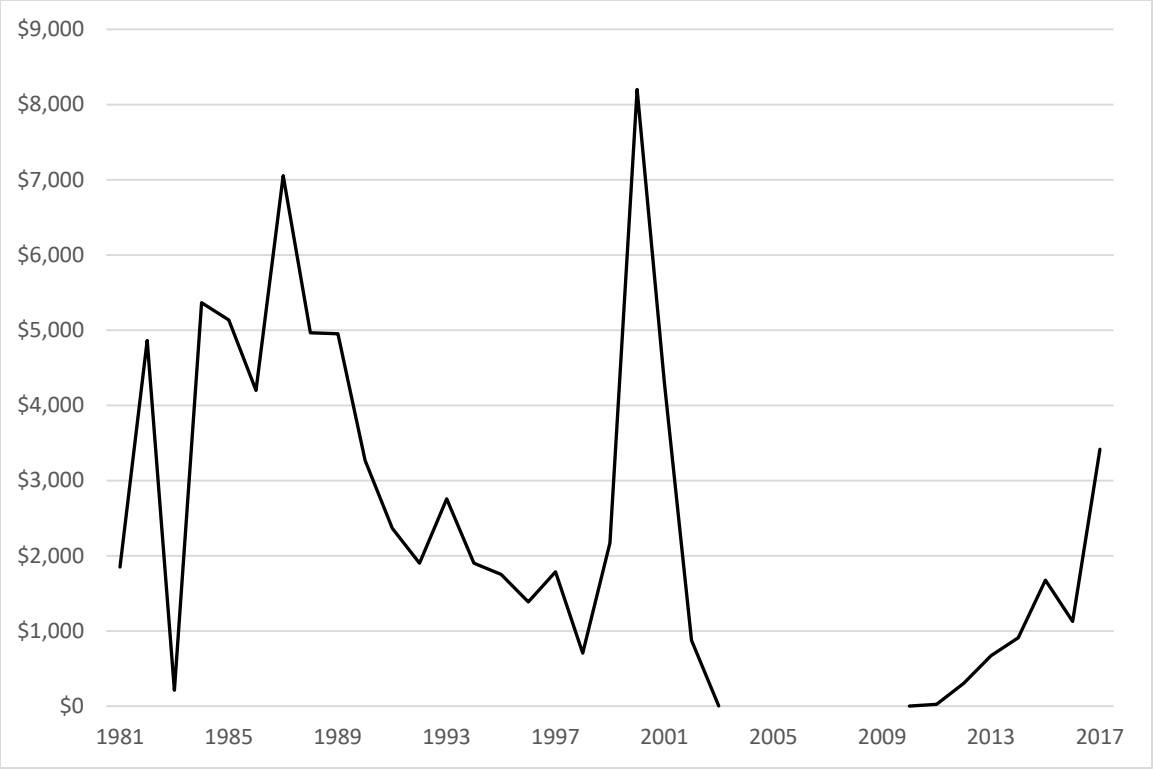

Figure 3-8. Inflation adjusted ex-vessel revenue ($1,000s) from landings of pelagic rockfish (widow, yellowtail, chilipepper), by midwater trawl gear in the non-whiting groundfish trawl sector, 1981–2017. Landings from 2004 to 2009 excluded due to data confidentiality requirements. Landings from 1994–2017 from the non-whiting trawl sector and EFPs. (Source: PacFIN comprehensive_ft, 1/11/2018).

In 2017 and 2018, NMFS issued EFPs to assess the effects of changing gear requirements—especially with regard to the take of ESA-listed salmon—that also include elements that further facilitate the reestablishment of the midwater pelagic rockfish fishery. The 2017 trawl gear EFP focused on elements of the trawl gear regulations package that was passed by the Council in 2016. Specifically, it exempted vessels from minimum mesh size requirements and the requirement to use selective flatfish trawl (SFFT) shoreward of the RCAs north of 42° N lat.[15] This allows vessels to target midwater pelagic rockfish using modified bottom trawl gear (but note that the data presented in Figure 3-8 and Table 3-10 below is only for midwater gear). EFP terms and conditions included HGs for Chinook salmon catch in order to mitigate take of ESA-listed salmon stocks.

In 2018, NMFS issued an EFP that expands on the exemptions in the 2017 EFP, consistent with changes in gear requirements proposed by the Council in 2016 (and maintains the salmon HGs). In addition to exemptions to gear requirements, the 2018 EFP allows the use of midwater trawl gear before May 15 to target pelagic rockfish, which is currently prohibited. (Targeting whiting with midwater gear would still be prohibited during that part of the year.) Currently, vessels using midwater gear may fish in the trawl RCA after May 15 north of 42° N lat.

Table 3-10 provides a snapshot of the pelagic rockfish fishery over the past six years (2017 data should be considered preliminary). The data includes landings made under EFPs, which prior to 2017 would have

[15] The Council initially proposed that the SFFT exemption applied down to 40°10’ N lat.; however, based on the salmon forecasts, the EFP was restricted to north of 42° N lat. for 2017.

been for purposes other than what is described above. Participation has increased almost four-fold and landings more than twenty times; ex-vessel revenue in 2017 was $3.4 million.

Table 3-10. Landings (mt), inflation adjusted ex-vessel revenue, and number of vessels making landings of pelagic rockfish (chilipepper, widow, and yellowtail rockfish) with midwater trawl gear, 2012–17. (Source: PacFIN comprehensive_ft, 1/11/2018).

Values	2012	2013	2014	2015	2016	2017
Metric tons	249	606	836	1,674	1,133	5,210
Thousands of dollars	$305	$670	$908	$1,674	$1,126	$3,415
Number of vessels	17	12	24	37	22	66

Pending results of the EFPs discussed above, changes consistent to the trawl gear requirements with the EFP exemptions are likely to be implemented in the 2019–20 biennial period. This is separate from the proposed action so the effects of these regulation changes will be evaluated in Chapter 5, Cumulative Effects.

3.5.4 Tribal Fishery

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 and Pacific whiting. For other species without formal allocations, the tribes propose set-asides to the Council, which the Council tries to accommodate while ensuring that catch limits are not exceeded. Whether or not they are formally allocated, tribal catches are accounted for through set-asides, which are deducted from the ACLs along with certain other sources of catch to determine the fishery HG. The Makah Tribe participates in whiting fisheries with both a mothership and shorebased component. Landings and revenue from this fishery cannot be reported due to data confidentiality restrictions.

The tribal non-whiting sector is defined by groundfish landings other than whiting and, thus, includes a variety of gear types. While all four coastal tribes have longline fleets, only the Makah Tribe currently has a trawl fleet. Table 3-11 shows ex-vessel revenue in tribal fisheries using hook-and-line and trawl gear. (Landings from net and pot gear cannot be reported due to data confidentiality restrictions. Landings from shrimp trawl is not reported, because this fishery does not target groundfish although it does land incidentally caught groundfish. Revenue from groundfish landings in these fisheries averaged slightly less than $70,000 annually for the period 2013–16.) Hook-and-line gear accounted for two-thirds of average annual revenue. Excluding 2017, for which data is likely incomplete, revenue has increased since 2013, amounting to about $4.4 million in 2016.

Table 3-11. Treaty non-whiting groundfish ex-vessel revenue for hook-and-line and trawl gear (from groundfish only), current dollars, $1,000s, 2013–17. (Source: Groundfish SAFE Table 13b, 1/12/2018).

Year	Hook-and-Line	Trawl	Total	Pct. of Annual Average
2013	$1,956	$1,608	**$3,564**	**92%**
2014	$3,056	$1,020	**$4,076**	**106%**
2015	$3,084	$1,672	**$4,755**	**123%**
2016	$3,011	$1,384	**$4,396**	**114%**
2017[a/]	*$1,800*	*$687*	***$2,487***	**64%**
Grand Total	**$12,907**	**$6,371**	**$19,278**	
Pct. of total	**67%**	**33%**	**100%**	

a/ 2017 data is considered preliminary.

3.5.5 Recreational Groundfish Fishery

Recreational fisheries are an important part of fishery-related economic activity. Because recreational catch is not sold, however, 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 and employment impacts based on GMT estimates of 2017 landings as part of the integrated alternatives analysis (Appendix A) are reported in section 4.3.4.1.

Recreational fisheries are broadly subdivided between private anglers and commercial passenger fishing vessels, commonly referred to as charter vessels. Private anglers fish from shore or from their own boats, while charter vessels take paying passengers.

Table 3-12 shows bottomfish/halibut angler trips compared to trips targeting other species.[16] Overall, private and charter trips targeting bottomfish/halibut, comprised 22 percent of all trips and modes during the 2012–16 period. Table 3-13 shows the annual averages of bottomfish/halibut marine angler trips by state and reporting area. California accounts for 84 percent of these angler trips, and southern California accounts for 47 percent, due to its large coastal population and milder year-round weather. Figure 3-9 shows bottomfish/halibut trips by state and year. The number of bottomfish/halibut marine angler trips have been increasing since 2008, peaking in 2014 at 980,569 trips but subsequently declined slightly. Nonetheless, in 2016 the number of trips, 879,988, exceeded the 10-year average by 15 percent.

[16] Because it is hard to distinguish between trips targeting bottomfish and those targeting Pacific halibut, these trip types are combined.

Table 3-12. Total Angler trips by type and mode, 2012–16. (Source: Ed Waters, GMT state reps, RecFIN).

Mode	Bottomfish+Halibut		Other Trip Types[a/]		Total	
	Annual Average	Percent	Annual Average	Percent	Annual Average	Percent
Beach/Bank	0	0%	1,058,929	28%	1,058,929	28%
Man-made[b/]	78,417	2%	1,035,946	28%	1,114,363	30%
Charter	575,190	15%	170,477	5%	745,667	20%
Private	311,538	8%	510,830	14%	822,367	22%
Total	965,145	26%	2,776,183	74%	3,741,327	100%

a/ Other trip types: Salmon, HMS, combo, other.
b/ Refers to fishing from man-made structures such as jetties

Table 3-13. Bottomfish plus Pacific halibut average 2012–16 annual marine angler boat trips (private and charter) by reporting area, 2012 to 2016. (Source: Ed Waters, GMT state reps, RecFIN).

Reporting Area	Annual Average	Percent
Washington Subtotal	**36,521**	**4%**
La Push-Neah Bay	14,443	2%
Westport	19,205	2%
Ilwaco-Chinook	2,873	0%
Oregon Subtotal	**107,971**	**12%**
Astoria	539	0%
Tillamook	16,705	2%
Newport	52,637	6%
Coos Bay	16,209	2%
Brookings	21,882	2%
California Subtotal	**742,235**	**84%**
North Coast: Humboldt and Del Norte	31,775	4%
Wine District: Mendocino	16,395	2%
SF District: San Mateo through Sonoma	67,052	8%
Central Coast: San Luis Obispo through Santa Cruz	114,786	13%
Channel: Ventura and Santa Barbara	91,453	10%
South Coast: San Diego, Orange and Los Angeles	420,774	47%
Total	**886,728**	**100%**

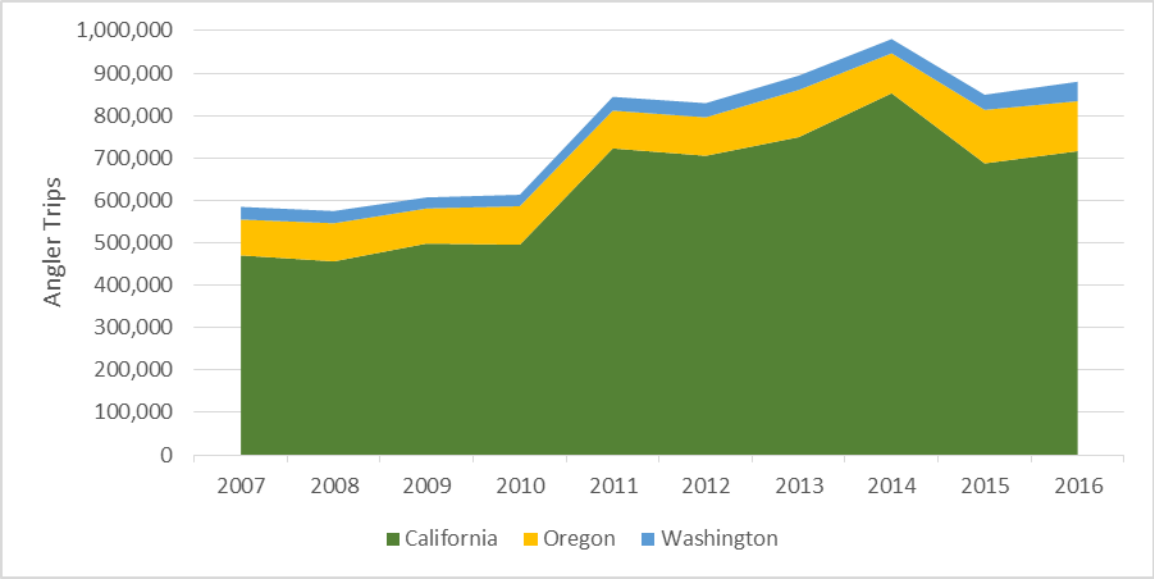

Figure 3-9. Bottomfish plus Pacific halibut marine angler boat trips (private and charter) by state, 2007 to 2016. (Source: Ed Waters, GMT state reps, RecFIN).

3.5.6 Fishing Communities

As in the 2015 EIS and previous EISs, fishing communities are described below in terms of landings by Input-output Model for West Coast Fisheries (IOPAC) port group.[17] IOPAC is used to evaluate personal income and employment impacts of proposed management measures.

Table 3-14 shows nominal ex-vessel revenue from groundfish landings for the 2013–17 period by port and groundfish fishery sector. Landings and revenue tends to be concentrated in relatively few ports. The nine top ranked ports (or half of the 18 shown) accounted for 88 percent of coastwide revenue. Astoria is the top-ranked port overall, accounting for 27 percent of coastwide revenue. Newport ranks second (21 percent of coastwide revenue) and the South and Central Washington Coast third (with confidential data included, percentage cannot be reported). The South and Central Washington Coast's rank is driven mainly by revenues from the shoreside whiting sector, because Westport and Ilwaco are major ports of landing for this fishery. However, as less than three first receivers/processors are reported for this region, the revenue value cannot be reported. Whiting landings occur in only three of these port areas, which are also the top three ranked ports overall. But Astoria and Newport also rank first and second, respectively, for revenue from the non-whiting IFQ sector (combining trawl and non-trawl IFQ landings) while Eureka ranks third. Newport ranks first for revenues from the non-nearshore (sablefish) fixed gear fishery followed by Santa Barbara and Puget Sound. Morro Bay is top ranked for the nearshore fixed fishery followed by Brookings and Crescent City.

Focusing on the shoreside IFQ sector, revenue from fixed gear landings accounted for 16 percent of the sector total during the 2013–17 period. Newport was the top-ranked port for revenue from shoreside IFQ fixed gear landings followed by Astoria and Morro Bay. For data confidentiality reasons revenue from the IFQ fixed gear sector cannot be reported for many ports. Oregon recorded the highest revenue from this sector, averaging almost $3 million per year for the 2013–17 period. Washington was next, averaging $1.5 million followed by California at $932,000.

[17] See Table 9 in the NOAA Technical Memorandum NMFS-Northwest Fisheries Science Center (Leonard and Watson (2011)) for ports included in these port groups.

Table 3-14. Nominal revenue ($1,000s) from groundfish landings, 2013–17, by IOPAC port and fishery sector. Confidential data is excluded as indicated by "Conf." Totals and averages for those rows are for non-confidential data only as indicated by shading.

Port Group	Shoreside IFQ (Non-whiting)[a/]	Shoreside IFQ Trawl (Whiting)	Non Nearshore Fixed Gear	Nearshore Fixed Gear	Other	Grand Total	Annual Average
Puget Sound	Conf.		$7,142		$143	**$11,984**	$2,396.79
North WA coast					$39	**$3,066**	$613
South and central WA coast	$5,827	Conf.	$5,652		$204	**$11,682**	$2,336
Astoria	$55,874	$35,431	$3,199	$5	$2,376	**$96,885**	$19,377
Tillamook			$269	$867	$12	**$1,148**	$230
Newport	$23,463	$37,713	$11,284	$286	$1,777	**$74,523**	$14,905
Coos Bay	Conf.		$5,869	$385	$282	**$6,536**	$1,307
Brookings	$11,096		$4,054	$4,715	$116	**$19,981**	$3,996
Crescent City	Conf.		$1,194	$1,464	$9	**$2,667**	$533
Eureka	$19,025		$2,321	$133	$44	**$21,523**	$4,305
Fort Bragg	$11,526		$5,738	$969	$91	**$18,324**	$3,665
Bodega Bay			$2,836	$79	$32	**$2,947**	$589
San Francisco	$3,125		$2,493	$757	$344	**$6,719**	$1,344
Monterey	$1,892		$3,225	$1,380	$111	**$6,607**	$1,321
Morro Bay	$5,761		$5,866	$6,123	$359	**$18,109**	$3,622
Santa Barbara	Conf.		$10,397	$1,302	$510	**$12,210**	$2,442
Los Angeles			$2,520	$276	$117	**$2,914**	$583
San Diego			$3,423	$67	$90	**$3,580**	$716

a/ Includes non-trawl.

Chapter 4 Direct and Indirect Effects

4.1 Methods used for the Impact Analysis

Section 4.2 evaluates how alternative harvest specifications affect the future status of managed groundfish stocks. Harvest specifications affect managed groundfish stocks by setting limits on how much of each stock may be caught. The effect of harvest specifications on groundfish stock status is considered in the section 4.2 analysis. It is important to note that the stock assessments and projections underlying this evaluation assume that ACLs are fully attained during the projection period as a default; that is, realized catch equals the ACL. For most stocks, however, catch has historically been less than the ACL. If roughly similar patterns persist in the 2019–20 biennial period, the actual impact of fishing mortality on the future status of most stocks is likely to be less than is forecast in the assessment projections.

Section 4.3 describes the effects of implementing new measures for the 2019–20 biennial period. Management measures control fishing behavior and resulting intensity of fishing effort through space and time. Proposed adjustments to routine management measures, primarily to control catch, are within the range of management measure changes evaluated in the 2015 EIS; the analysis found in Appendix A demonstrates that these adjustments will prevent ACLs from being exceeded. Therefore, the evaluation in section 4.3 addresses the effects of new management measures, which were not analyzed in the 2015 EIS or the 2016 EA.

In describing effects of the proposed changes, Sections 4.2 and 4.3 refer to effects of the no action alternative. As described in Section 1.2, this document is tiered from the 2015 EIS and 2016 EA. Therefore, the effects of the no action alternative refer to the effects as they stood in 2017 (the baseline), before the consideration of the proposed changes. Appendix A presents a detailed description of this baseline. It describes the regulations, management measures, and expected groundfish mortality in 2017. Appendix A then describes the no action alternative, which applies the default harvest specifications and routine management measures to all stock and stock complexes.

4.2 Impacts of Harvest Specifications on Managed Groundfish Stocks

There are four stocks with preferred HCRs that depart from the default HCRs used for 2017–18 harvest specifications (California scorpionfish, lingcod north and south of 40°10’ N lat., and yelloweye rockfish) with alternative HCRs under consideration. Alternative 1 harvest specifications are preferred for California scorpionfish and northern and southern lingcod and Alternative 2 harvest specifications are preferred for yelloweye rockfish. Stock-specific biological impacts associated with the alternatives analyzed for these four stocks are provided in Section 4.2.1. As described in the subsections that follow, none of the proposed HCRs would result in significant impacts to the managed groundfish stocks because none of the stocks would drop below the minimum stock size threshold (MSST) under the most likely state of nature model as a result of the proposed HCR.

4.2.1 Stocks with Alternative Harvest Control Rules under Consideration

4.2.1.1 California Scorpionfish South of 34°27' N lat.

A new assessment of California scorpionfish south of 34°27' N lat. was conducted in 2017 indicating the stock was healthy at a 54 percent depletion at the start of 2017 (Monk, *et al.* 2018). The main productivity parameters, steepness and the natural mortality rate (M), were fixed in the assessment. The decision table

in the 2017 assessment varied the natural mortality rate from the base case model used to develop 2019–20 harvest specifications. The stock is projected to remain healthy (i.e., ≥40% depletion) for the next ten years under either the No Action alternative (150 mt constant catch ACL) or the Preferred Alternative (ACL = ABC (P* = 0.45)) under the base case model (M = 0.235) in the 2017 assessment (Figure 4-1). The less likely low state of nature model (M = 0.164; estimated to be half as likely as the base case model) indicates the stock starts at a 47% depletion in 2019 and is projected to decline to the B_{MSY} target of 40 percent depletion in ten years under the No Action alternative and a very low depletion of 9 percent under the preferred alternative. The low state of nature model is estimated to be half as likely as the base case model and is not used to set harvest specifications.

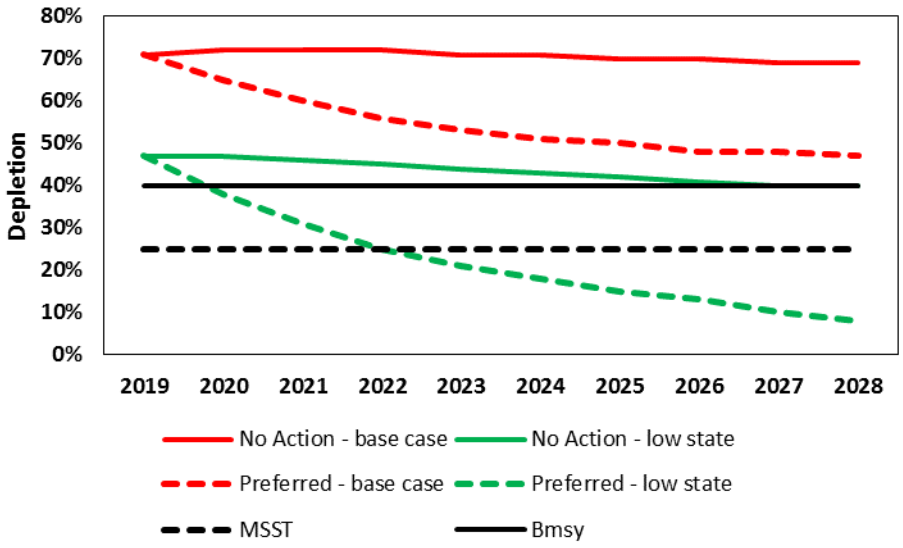

Figure 4-1. Predicted 10-year depletion trajectory of California scorpionfish south of 34°27' N lat. under two alternative harvest control rules and two states of nature from the decision table in the 2017 assessment.

4.2.1.2 Lingcod North and South of 40°10' N lat.

Lingcod was assessed in 2017 with two assessment models north and south of the California/Oregon border at 42° N lat. (Haltuch, *et al.* 2018). Current spawning stock biomass is estimated to be 57.9 percent in the northern assessment area relative to unfished spawning biomass, and has continued to increase over the last five years as a result of high recruitment in 2008 and 2013. Current spawning stock biomass is estimated to be 32.1 percent in the southern assessment area relative to unfished, and is currently in the precautionary zone. Although spawning biomass in the southern region is estimated to have been increasing in recent years, and above the minimum stock size threshold by 2016 as a result of high recruitment in 2013, it remains a concern that recruitment is estimated to have been well below average over the last 10-15 years. The SSC endorsed the use of the 2017 north and south lingcod stock assessments as the best scientific information available for status determination and management as a category 1 assessment. While the 2009 south lingcod stock assessment (Hamel, *et al.* 2009) was deemed a category 2 assessment, the additional eight years of data in the current assessment provided an adequate basis for a category 1 designation.

Since lingcod are managed north and south of 40°10' N lat., a reapportionment of the projected OFLs from the assessments was made. The relative biomass and OFLs were reapportioned north and south of 40°10' N lat. by using the most recent 5-year (2012-16) average percentage of swept area biomass estimates of lingcod from the NMFS NWFSC trawl survey in California waters occurring between 40°10'

N lat. and 42° N lat., which was 21.3 percent of the California biomass. Therefore, 21.3 percent of the OFLs projected from the southern assessment model were added to the north of 40°10' N lat. OFLs and subtracted from the south of 40°10' N lat. OFLs. The 2019 and 2020 harvest specification alternatives are provided in Table 4-1.

Table 4-1. Alternative 2019 and 2020 lingcod harvest specifications (in mt) decided for detailed analysis.

Stock	Alternative	2019			2020			Harvest Control Rule
		OFL	ABC	ACL	OFL	ABC	ACL	
Lingcod N. of 40°10' N lat.	No Action	5,110	4,872	4,859	4,770	4,549	4,533	ACL = ABC (P* = 0.45 in OR & WA; P* = 0.4 in CA) w/ 40-10 adj. for the CA contribution to the ABC and ACL. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Lingcod S. of 40°10' N lat.		1,143	1,043	996	983	898	839	ACL = ABC (P* = 0.4) w/ 40-10 adj. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Lingcod N. of 40°10' N lat.	Alt. 1 (Preferred)	5,110	4,885	4,871	4,768	4,558	4,541	ACL = ABC (P* = 0.45) w/ 40-10 adj. for the CA contribution to the ABC and ACL. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.
Lingcod S. of 40°10' N lat.		1,143	1,093	1,039	977	934	869	ACL = ABC (P* = 0.45) w/ 40-10 adj. Assumes 1,000 mt and 750 mt removals for 2017 and 2018 in the north and south, respectively and full ACL attainment thereafter.

There is very little difference in predicted biological impacts between the two lingcod harvest specification alternatives and impacts are solely expressed for the California subpopulation since the HCR only varies for that subpopulation. Predicted starting (2017) and ending (2028) depletions for the northern subpopulation (the portion of the coastwide population occurring off Oregon and Washington) are 57.9 percent and 43.3 percent, respectively (Figure 4-2). The southern subpopulation is estimated to be below target biomass and in the precautionary zone. Both alternatives are predicted to slowly rebuild the stock under an average recruitment assumption in the next ten years. The predicted starting and ending depletions for the southern subpopulation (the portion of the coastwide population occurring off California) are 32.1 percent and 38.6 percent, respectively under the No Action alternative. The ending depletion in 2028 for the southern subpopulation under the Preferred Alternative is slightly less than under No Action at 37.7 percent (Figure 4-2).

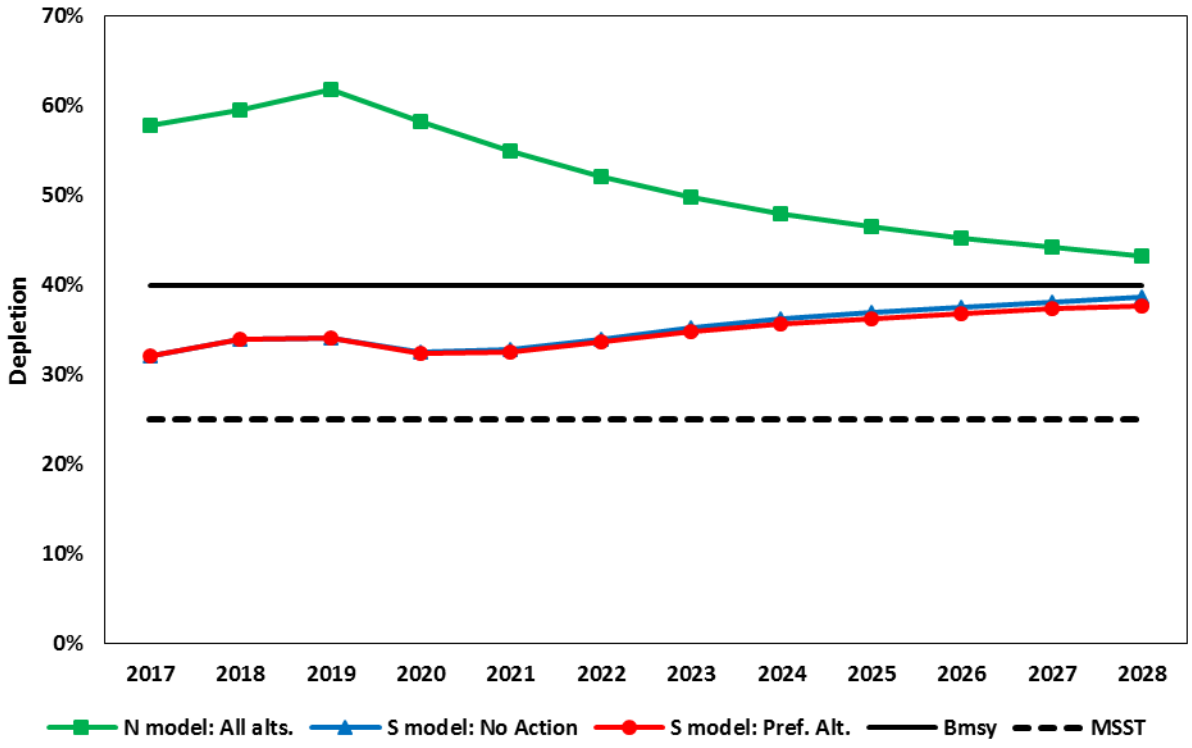

Figure 4-2. Projected depletion of lingcod by assessment area (N = OR + WA; S = CA) and by alternative through 2028.

4.2.1.3 Yelloweye Rockfish

The analysis of the effects of the alternatives for the yelloweye rockfish harvest control rule and rebuilding plan parameter changes is found in Appendix A and Appendix B. Appendix A contains an analysis of the integrated effects of each of the yelloweye rebuilding plan alternatives within the larger suite of groundfish ACLs and routine management measures. Appendix B contains an analysis of how the alternatives meet the dual objectives of rebuilding in the shortest time as possible and meeting the needs of fishing communities. This section summarizes the information provided in both appendices.

A full yelloweye rockfish assessment was conducted in 2017 indicating the stock was at a 28.4 percent depletion at the start of 2017 (Gertseva and Cope 2017b). The current yelloweye rockfish rebuilding plan specifies a target year to rebuild of 2074 and a prescribed harvest rate in terms of spawning potential ratio

(SPR) of 76 percent. The 2017 and 2018 ACLs projected from the previous (2011) rebuilding analysis are 20 mt in each year (Taylor 2011). The new rebuilding analysis (Gertseva and Cope 2017a) revises the maximum time to rebuild (T_{MAX}, which is calculated as the minimum time to rebuild (T_{MIN}) plus one mean generation time) of 2070 or four years sooner than the target year in the current rebuilding plan.

The yelloweye rockfish alternatives analyzed vary the harvest rate under the rebuilding plan from an SPR of 76 percent under the No Action alternative to SPR harvest rates of 70 percent and 65 percent, which are progressively higher harvest rates than status quo. The median year to rebuild under these alternatives varies from 2027 under the No Action SPR of 76 percent to 2028 and 2029 under SPRs of 70 percent and 65 percent, respectively (Table 4-2 and Figure 4-3). This compares to the shortest time to rebuild the yelloweye rockfish stock of 2026 under a zero fishing mortality rate (i.e., SPR = 100 percent) starting in 2019 ($T_{F=0}$; Table 4-2). The 2019 and 2020 ACLs vary from 29 mt and 30 mt, respectively under the No Action alternative to 48 mt and 49 mt, respectively under the preferred SPR harvest rate of 65 percent (Table 4-2 and Figure 4-3).

Table 4-2. The alternative 2019 and 2020 yelloweye rockfish harvest specifications (in mt), SPR harvest rates, and predicted times to rebuild decided for detailed analysis.

Stock	Alternative	2019			2020			SPR	Median Year to Rebuild
		OFL	ABC	ACL	OFL	ABC	ACL		
Yelloweye rockfish	$T_{F=0}$	82	78	0	85	81	0	100%	2026
	No Action	82	78	29	84	80	30	76%	2027
	Alt. 1	82	78	39	84	80	40	70%	2028
	Alt. 2 (Preferred)	82	78	48	84	80	49	65%	2029

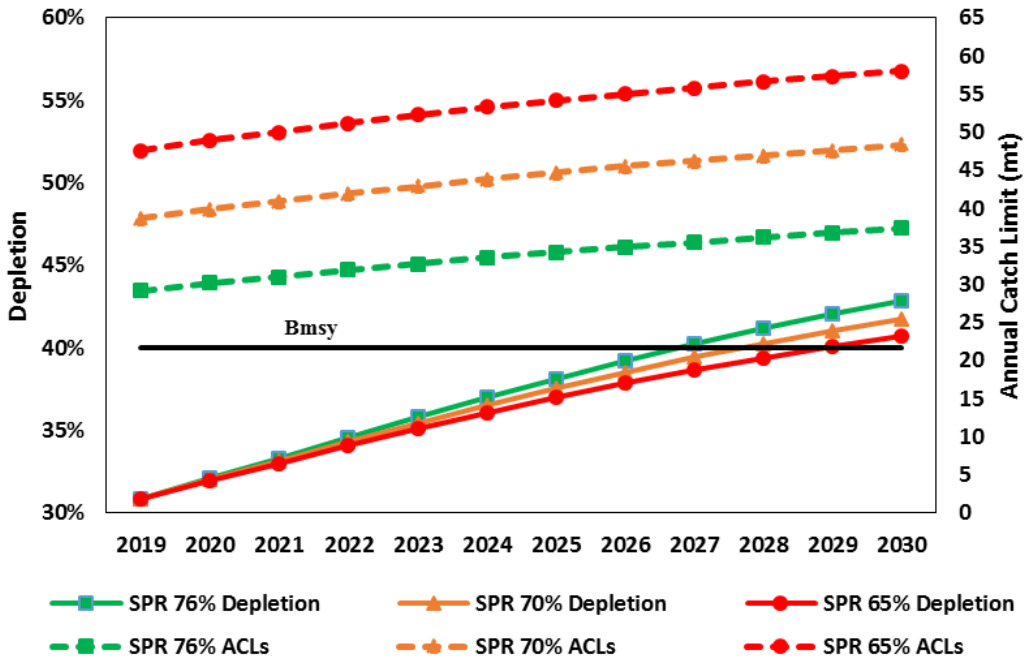

Figure 4-3. Projected depletions and annual catch limits of yelloweye rockfish under alternative harvest rates assuming the base case model in the 2017 assessment and rebuilding analysis.

The Council's preferred alternative for the yelloweye rockfish rebuilding plan and the associated 2019–20 ACLs is Alternative 2 with a P* of 0.4 to determine 2019 and 2020 ABCs and an SPR harvest rate of 65 percent to determine ACLs. The resulting 2019 and 2020 ACLs are 48 mt and 49 mt, respectively and the target rebuilding year is specified as 2029, which is the median year to rebuild under that harvest rate (Table 4-2). The full analysis of the proposed changes to the yelloweye rockfish rebuilding plan is provided in Appendix B.

The preferred 2019 and 2020 management measures include a trawl allocation of 3.4 mt (shore-based IFQ allocated 3.4 mt and 0 mt set-aside for bycatch by at-sea whiting sectors[18]) and a non-trawl allocation of 38.6 mt and 39.5 mt in 2019 and 2020, respectively of yelloweye rockfish. Management of non-trawl impacts under the preferred alternative is the specification of sector-specific HGs based on the non-trawl allocation of Alternative 2 ACLs and specification of sector-specific ACTs based on an allocation of Alternative 1 ACLs (Table 4-3). The sector-specific buffers between HGs and the ACTs are designed to provide some flexibility in managing these sectors given the uncertainty in future yelloweye rockfish impact projections and the ACTs are designed to keep overall impacts within those identified in Appendix A under Alternative 1 ACLs.

[18] Yelloweye rockfish are rarely caught in midwater whiting trawls.

Table 4-3. Preferred sector-specific 2019 and 2020 non-trawl harvest guidelines and annual catch targets of yelloweye rockfish.

Non-Trawl Sectors	Shares (HGs in mt)		ACTs (mt)		Difference (HG - ACT)	
	2019	2020	2019	2020	2019	2020
Non-Nearshore	2.0	2.1	1.6	1.7	0.4	0.4
Directed OA: Nearshore	6.0	6.2	4.7	4.9	1.3	1.3
WA Recreational	10.0	10.2	7.8	8.1	2.2	2.1
OR Recreational	8.9	9.1	7.0	7.2	1.9	1.9
CA Recreational	11.6	11.9	9.1	9.4	2.5	2.5

As stated in Section B.1.2.3 of Appendix B, the 2017 yelloweye rockfish stock assessment showed that the stock was 47 years closer to rebuilding than indicated in the 2011 assessment; however, with all other factors remaining the same, increasing fishery removals can decrease spawning stock biomass and increase rebuilding time. In this instance, the differences in projected rebuilding times among levels of fishery removals for alternatives considered by the Council are small, with the additional yield under Alternative 2 adding two years respectively to the median time to rebuild within the next ten years. Projected resilience of the stock to fishery removals is the result of a series of strong year classes joining the spawning population, as the Scientific and Statistical Committee (SSC) wrote in its November 2017 statement. While the analysis of impacts in Appendices A and B assume full attainment of the ACLs, it is likely that that the ACLs would not be fully attained, thereby further reducing the stock mortality. For example, the GMT assumes that the 2017 and 2018 removals would be at 65 percent of ACL attainment in the integrated analysis in Appendix A.

Section B.1.3 of Appendix B summarizes that the proposed routine management measures possible under Alternative 2 would include fewer recreational depth restrictions and more QP on the IFQ market to better facilitate trading. This proposed action would likely benefit the recreational sector in particular, as effort continues to shift away from salmon trips to lingcod and rockfish targeting substitutes. The highest-impact benefits may be the most difficult to quantify; for example, the creation of a cushion between management measures and catch limits may increase management stability by an undefined amount. This also allows for increased set asides for research and experimental fishing in commercial, recreational, and tribal sectors. Data from these projects would have indispensable value to improve understanding of the stock and to inform state, federal, and tribal management decisions.

4.3 Impacts of Implementing New Management Measures

As defined in the FMP (Section 6), management measures prevent overfishing and the resulting adverse biological, social and economic impacts. Specifically, the Council designs management measures to provide sufficient fishing opportunity to achieve but not exceed ACLs and to minimize other effects on the environment. These measures regulate the behavior of fishery participants, which in turn minimizes environmental effects. The management measures may either control catch (groundfish, non-target species, protected species, or marine mammals), protect essential fish habitat, or improve federal and state monitoring or management of the fishery.

The introduction of a new management measure to address a particular concern (e.g., salmon bycatch mitigation) may have unintended consequences on other resources (e.g., economic). This section summarizes the effects of implementing the proposed new management measures. Appendix C contains detailed analyses of the impacts of new management measures. As described in this section, while each management measure may directly have positive or negative effects on a particular resource, none of the

proposed management measures would have significant impacts to groundfish stocks, essential fish habitat, protected species, or socioeconomic resources.

4.3.1 Effect of Management Measures on Groundfish Catch

In section 4.2 the impacts of proposed harvest specifications on future stock status is assessed. This section summarizes the effects of the proposed new management measures (including the stock complex reorganization proposals). The full analysis of each measure can be found in Appendix C. Overall, no significant effects of the preferred alternative on groundfish catch are expected.

4.3.1.1 Salmon Incidental Take Statement: Mitigation Measures and Reserve Rule Analysis

The effects of the Council's Preferred Alternative for the proposed salmon bycatch mitigation measures vary across the four separate actions:

- Prohibiting all midwater trawling and bottom trawling, except with selective flatfish trawl (SFFT), within the Klamath River Salmon Conservation Zone (KRCZ) and Columbia River Salmon Conservation Zone (CRCZ) year-round.
- Removing the OSCZ.
- Adding a 200 fathom depth contour to the BRAs available for vessels using midwater trawl gear.
- Creating a provision for automatic closures of either or both the whiting and non-whiting sectors upon exceedance of Chinook bycatch guidelines and/or the reserve.

The effects of prohibiting all midwater trawling and bottom trawling, except with SFFT, within the KRSCZ and CRSCZ year-round under the action alternatives are the same as the effects under No Action. There has been no midwater trawl activity in these areas since 2011 (Agenda Item F.5.a, Supplemental GMT Report 3, April 2018). Furthermore, industry has stated that it would not be practical to fish in either zone with midwater gear (Agenda Item F.5.a, Supplemental GAP Report 1, April 2018). The combination of these factors would result in no changes to expected midwater trawl groundfish catch in these areas compared to No Action. Additionally, the current bottom trawl footprint (shown in Agenda Item F.5.a, Supplemental GMT Report 3, April 2018) could be maintained in the area as vessels could still fish in the zones with SFFT.

The effects to groundfish catch of removing the OSCZ under this alternative are the same as the effects of No Action because the OSCZ has only been implemented once (in October 2014). Based on catch data for the Pacific whiting fishery from 2004 to 2017, even in high bycatch years, the 11,000 Chinook threshold is not likely to be reached until the fall. Neither at-sea sector has fished in the depths shallower than 100 fm from October through December since 2011. Additionally, the shorebased whiting sector has had minimal activity within the depths of the OCSZ later in the year (see Table A-10 in Agenda Item H.5.a, GMT Report 1, March 2018). Whiting activity typically increases in the fall and therefore, if the salmon bycatch threshold were to be exceeded, it would likely be later in the year. Therefore, there would likely be no impact from removing this provision in the regulations to groundfish catch because the sectors potentially affected by the provision operate in areas outside the OSCZ during the fall and winter months.

The effects of the other components of the salmon mitigation measures action within the Council's Preferred Alternative are framed by the estimated likelihood of the various groundfish sectors taking substantial amounts of salmon bycatch and the risk of them exceeding their bycatch guidelines described in the action analyzed in the 2017 BiOp. Since 2002, when monitoring through the West Coast Groundfish Observer Program (WCGOP) began, the whiting sector (including the at-sea, shorebased, and tribal components) have only twice taken more than the sector's guideline of 11,000 Chinook (in 2005 and 2014; Agenda Item H.5.a, GMT Report 1, March 2018). In the non-whiting sector, the bottom trawl

fleet has historically taken the majority of the salmon bycatch during the WCGOP era. Since 2002, that fleet has taken more than their sector guideline (5,500 Chinook) twice, in 2002 and 2003. These sector exceedances have never occurred in the same year. Therefore, based on past performance, the risk of either sector taking an amount of Chinook bycatch that would result in a closure is unlikely. Additionally, industry has shown the ability to be proactive in their avoidance of salmon, and some sectors, such as the at-sea fleets, have self-regulated hotspot closures and move-along rules. With that framing on the likelihood of these actions, the following summary of the effects on groundfish detailed in Appendix C is provided.

The effects of implementing a BRA at the 200 fm line for vessels using midwater trawl gear would depend on the different sectors' (shoreside whiting, non-whiting midwater, and at-sea) ability to fish in areas deeper than 200 fm. Table C-1 and C-2 of Appendix C contain a description of the recent catch data shallower and deeper than 200 fm for the catcher/processor (CP) and mothership (MS) sectors. While these sectors have historically been able to fish seaward of 200 fm, their capacity at these depths is limited, especially in the MS sector. The concentrated schools of whiting necessary for efficient fishing may not always be available outside of 200 fm due to the interannual variation in whiting distribution. Data from the CP and MS sectors from 2011 to 2017 in the area seaward of 200 fm has shown higher amounts of bycatch of spiny dogfish, yellowtail rockfish, and widow rockfish compared to shoreward of 200 fm. Therefore, if the sectors were pushed seaward of 200 fm due to salmon bycatch concerns, there could be increased bycatch of these other non-target groundfish species in the CP and MS sectors.

Based on historical data, the shoreside whiting trawl sector would likely have limited or no ability to fish seaward of 200 fm due to horsepower restrictions and the need to quickly deliver whiting for processing. There has been only six hauls outside of 200 fm from 2011–16. Similarly, for the non-whiting midwater trawl sector, vessels would likely have difficulty fishing seaward of 200 fm, as well as being restricted by having catch targets (canary rockfish, widow rockfish, yellowtail rockfish) that are primarily found in shallower depths. Therefore, a 200 fm BRA would potentially reduce shoreside effort and landings by both the whiting and non-whiting midwater trawl vessels. This would result in a lower catch of target species (whiting, canary, widow, and yellowtail rockfish) as well as any co-occurring non-target groundfish species. The Council and NMFS monitor salmon bycatch by the trawl fleet throughout the season[19], it the bycatch rate and overall amount of bycatch relative to the guideline harvest limit was projected to reach the limit before the end of the season, the Council would recommend inseason action to turn on the BRA line. Bycatch rates for the components of the midwater trawl fleet can vary by area and time of year, therefore it is difficult to predict the likelihood of the Council needed to use this tool to mitigate bycatch.

The effects of an automatic closure of either the whiting or non-whiting sector if a sector reached the salmon bycatch guideline plus the reserve, and/or the other sector reached the bycatch guideline after the other sector took the reserve, would be a decrease in attainment of target stock ACLs due to the early closure of the fishery. The magnitude of the difference would depend on the time of year the closure occurred, the sector(s) closed, and environmental factors such as ocean conditions. September, October, and November tend to have the highest salmon bycatch rates in the whiting and non-whiting fisheries, specifically midwater trawl fisheries (Agenda Item H.5.a, GMT Report 1, March 2018). A closure, especially earlier in the fishing year, would reduce the catch of groundfish stocks as compared to past catches from full seasons. Part C, Section A of Appendix C analyzes the effects on groundfish harvest for each of the different subsectors within the whiting and non-whiting sectors. Table 4-4 below shows the average percentage of catch for all commercial sectors that would be forgone if a closure were implemented under the low impact (December only) and high impact (October-December) closure

[19] For more detailed information on salmon bycatch monitoring for each fleet, see Agenda Item H.5a GMT Report 1; March 2018.

scenarios. As described above, only those recreational fisheries not accounted for in pre-season salmon forecasts would be subject to a closure. Salmon seasons vary by state and year and therefore potential losses in groundfish catch (and associated revenue) can be found in Appendix C. Overall, Washington recreational fisheries would likely see little to no impact under either scenario as groundfish fisheries close in mid-October while Oregon and California would see potentially significant impacts in November and December. However, the effects of this action are tempered by the low likelihood of salmon bycatch leading to a closure, as explained above.

Table 4-4. Average Percentage of Target Groundfish Catch That Would Be Lost Under Low and High Impact Closure Scenarios. For details on target species, data sources, and years, please see Appendix C.

Sector	Low Impact (DEC)	High Impact (OCT-DEC)
Shoreside Whiting	0.53%	17.16%
MS	a/	41.73%
CP	12.25%	44.97%
Tribal	0.30%	15.79%
Midwater Non-Whiting	13.22%	25.76%
Bottom Trawl	9.09%	24.63%
IFQ Fixed Gear	6.29%	40.12%
Nearshore	4.85%	21.58%
Non-Nearshore	3.67%	20.97%

a/ Confidential data.

4.3.1.2 Updates to Rockfish Conservation Area Coordinates in California

The Council regularly examines the appropriateness of the coordinates defining the boundary lines used to define closed areas through the harvest specifications and management measure process. As part of the process of correcting crossovers under this proposed action, RCA lines would be modified to achieve better alignment with their corresponding isobaths. This would allow better access to target species by more accurately defining closed areas. By more accurately defining the depth contours, these proposed changes would increase the available fishing area in some areas by 6.3 mi^2, but decrease it in others by 4.6 mi^2, resulting in a net change of only 1.7 mi^2. In addition, mortality generated from fishing effort would better fit the bycatch model estimates since estimates assume that mortality is derived from specific fishing areas and the depths defining those areas.

The intent of the RCA is to protect overfished species by minimizing bycatch. Proposed modifications aim to maintain the intent of the RCA lines, while at the same time keeping the harvest levels of target species within acceptable harvest limits. These modifications are intended to allow improved access to target species by having specific lat. and longitude waypoint coordinates approximate depth contours as closely as possible. Achieving the described objectives will provide better opportunity to the fishing communities by helping participants to efficiently achieve their fishing harvest.

4.3.1.3 Stock Complex Reorganization

Stock complex harvest specifications are computed as the sum of the specifications for component stocks and catch is managed to the stock complex ACL. The stock complex reorganization proposals described in section 2.2.2.2 present variable risks for overfishing. In some instances, there is a risk that while the complex ACL (or OFL) is not exceeded, the ACL (or OFL) contribution for one of the component stocks

could be exceeded. This is especially the case if the specifications for one of the component stocks is large relative to one or more of the other component stocks, and catch of that stock is well below its ACL. These higher ACL/low attainment stocks are referred to as "inflator stocks.". Overharvest of a component stock with a lower ACL could be compensated by the unused harvest of the inflator stock such that the complex ACL is not exceeded. This kind of risk does not apply to stocks managed outside of a complex.

Stock complex reorganization option 1 would pair Oregon black rockfish, currently managed with stock-specific harvest specifications, with Oregon blue/deacon rockfish, currently part of the Nearshore Rockfish North complex to create a new Oregon Black/Blue/Deacon Rockfish complex. This could increase the risk of overfishing for Oregon black rockfish, because it is a desirable target with catches close to the ACL, relative to no action. The blue/deacon contribution to the new complex could conceivably compensate for such an overage to the black rockfish component ACL in the new complex.

As discussed in Appendix C, the preferred alternative implements several measures to lower the risk that the black rockfish ACL contribution would be exceeded. The Council adopted black rockfish HGs to mitigate overharvest of the stock. These HGs are 515.8 mt and 512.2 mt for 2019 and 2020, respectively, which are the ACL contributions of black rockfish to the new Oregon Black/Blue/Deacon Rockfish complex (Table 2-3). To make this measure more effective, ODFW intends to shorten the catch reporting time lag from one month to one week so that state management measures could be quickly adjusted in the event an overage appears imminent. Inseason catch projection methods will also be revised to better account for rapid periodic increases in fishing effort observed in the recreational fishery. Through their state process, ODFW has reduced its aggregate recreational bag limit for 2018 from seven to five fish per day, which has reduced the overall catch rate during the recreational season. For 2019–20, ODFW intends to do something similar through state rules. Finally, the promotion of a new recreational fishing opportunity, the longleader fishery, for underutilized stocks (primarily widow and yellowtail rockfish) could shift some effort away from targeting black rockfish.

Stock complex option 2 involves combining cabezon and kelp greenling stocks to form new complexes. Oregon cabezon is currently managed under its own harvest specifications while the two kelp greenling stocks and Washington cabezon are part of the Other Fish complex.

Combining Oregon cabezon and Oregon kelp greenling in a new Oregon Cabezon/Kelp Greenling complex would slightly increase the risk of exceeding the Oregon cabezon component ACL, relative to no action. First, it would shift cabezon from single stock management to management in a stock complex and second, Oregon kelp greenling would function as an inflator stock in the new complex, because its ACL contribution is much larger than that of Oregon cabezon. A similar mitigation to this risk is proposed under the preferred alternative as that specified for Oregon black rockfish. The Council adopted Oregon cabezon HGs to mitigate overharvest of the stock. These HGs are 46.8 mt for 2019 and 2020, which are the ACL contributions of cabezon to the new Oregon Cabezon/Kelp Greenling complex (Table 2-3).

Removing the Washington stocks from the Other Fish complex to create a new Washington Cabezon/Kelp Greenling complex reduces the overfishing risk compared to No Action, because their ACL contributions are relatively small compared to the inflator stocks—Oregon kelp greenling and leopard shark—in the Other Fish complex. The new complex would combine relatively equivalent contributions; for example, in 2019 the Washington cabezon ACL contribution would be 4.6 mt and the Washington kelp greenling contribution would be 5.9 mt (Table 2-3).

Removing OR and WA kelp greenling from the Other Fish complex and combining kelp greenling and cabezon (WA cabezon has been managed in the Other Fish complex while OR cabezon has been managed with stock-specific harvest specifications) in state-specific cabezon/kelp greenling complexes better complies with National Standard 1 guidelines that recommend stocks managed in a stock complex

"should have a similar geographic distribution, life history characteristics, and vulnerabilities to fishing pressure such that the impact of management actions on the stocks is similar." These complexes meet these standards better than the stocks managed in the Other Fish complex. The Other Fish complex under the preferred alternative is more compliant with NS1 guidelines with only leopard shark and CA kelp greenling as component species in the complex. Both of these are nearshore species occurring only in CA waters.

4.3.1.4 Remove Automatic Authority Established in Conjunction with Amendment 21-3 for Darkblotched Rockfish and POP in the At-Sea Sectors

Under this new management measure, the Council is considering removing the automatic authority for darkblotched rockfish and POP so that they are managed like all other at-sea set-asides. Set-asides are not managed inseason; however, NMFS can take action if there is a conservation concern, unforeseen impact to another sector, or a risk to the ACL. Unlike other set asides that apply to the at-sea sector as a whole, separate set asides are established for the catcher-processer and mothership portion of the at-sea sector for these two species. Separate set asides help the at-sea sectors track catch for accountability. For management tracking, the combined values for the sectors against the trawl allocations and the ACLs is more relevant.

The analysis in Appendix C finds, through bootstrap simulation, there is only a 1 percent chance that the combined set asides would be exceeded. Furthermore, shoreside IFQ catch of these two stocks historically has been well below its allocation. Catch projections for the 2019–20 biennial period estimate similarly low attainment. The risk of exceeding the set asides is further mitigated through available inseason management measures in the form of BRAs, which are closures of depths shallower than 75, 100, 150, or 200 fm applicable to fisheries using midwater trawl gear (50 CFR 660.130(e)(6)).

The analysis in Appendix C (section C.3.2) finds:

- This measure may allow at-sea sectors to increase their attainment of whiting.
- The risk of overfishing on darkblotched rockfish and POP is low. Catch of these species in the at-sea sector may increase but attainment of allocations by other sectors has been low so there is little risk of exceeding the trawl allocation of the ACL.

4.3.1.5 Lingcod and Sablefish Discard Mortality Rates in the Shorebased IFQ Program

This management measure would reduce the current 100 percent IFQ DMRs used in catch accounting of QPs in the shoreside IFQ fishery to the lower DMRs for lingcod and sablefish shown in Table 4-5. These are the DMRs—identified as appropriate by the GMT and endorsed by the SSC—that are used by the WCGOP for catch accounting and stock assessors to determine fishing mortality.

Table 4-5. Proposed DMRs for sablefish and lingcod for QP accounting.

Species	Gear	WCGOP DMRs ("survival credit")
Lingcod	Bottom Trawl	50%
	Fixed Gear	7% [a/]
Sablefish	Bottom Trawl	50%
	Fixed Gear	20% [b/]

a/ Only for hook and line gear.
b/ Applies to both pot and hook and line gear.

The current policy creates an inherent buffer between the catch limit (or sector allocation) and actual fishing mortality, which is the direct impact on the stock. This would be eliminated in a shift to managing for fishing mortality. A potential negative effect of this proposed action would be an increase in discard rates due to high-grading.

In the case of sablefish, there is a substantial price difference across different size grades so a harvester could be motivated to discard smaller, lower value sablefish in the expectation that some of the resulting survival credit could be realized in landings of larger, higher value sablefish. The analysis in Appendix C demonstrates that trawlers are unlikely to increase gross revenue through high-grading, even if discarding the smallest, lowest value grade. An equivalent analysis for the fixed gear portion of the IFQ fishery yields similar results except in the case of the smallest size grade. However, the contributions to gross revenue would be small and likely outweighed by the implicit cost of the discarding activity. Thus, if considering sablefish discarding by itself, the current low discard rates in the IFQ fishery are likely to continue.

The Appendix C analysis also considers the interaction between sablefish discard credits and the opportunity to land co-occurring species in the trawl fishery. Because of the difference in allocation amounts, sablefish acts as a constraint in realizing the allocations of other species, Dover sole and thornyheads. Increased sablefish discarding to access these species is unlikely both because current market conditions are likely acting as a greater constraint on landing more of those species and, as with discarding low value sablefish for higher value sablefish, the gains would be too small to motivate a behavioral change.

In the IFQ fishery most lingcod are caught by trawl gear. The potential for high-grading lingcod is much less than for sablefish, because there are no price-differentiated grades for this fish and catch is well below the sector allocation. Discarding of this fish is mainly driven by a regulated minimum size and this would continue to be the case if survival credits were implemented.

In conclusion, implementing survival credits is not expected to increase discarding in the IFQ fishery, because the costs of discarding likely would outweigh the benefits. Landings would likely increase by an amount roughly equivalent to the proportion of discard survival currently debited against QP. Since sablefish discards are currently low, this increase in landings (and consequent fishing mortality) would be modest—an additional 5-11 mt for trawl and 9-16 mt for fixed gear, which would be only about a one percent increase in total coastwide IFQ mortality. Although higher landings would increase IFQ attainments, the IFQ sector would still be managed to its individual (i.e., QP) and sector allocations, presenting a low risk that the ACL would be exceeded.

A change in the risk of overfishing either stock due to implementation of these DMRs relative to no action is low. While fisheries targeting sablefish north of 36° N lat. tend to have high ACL attainment rates, the southern sablefish fishery does not and the coastwide harvest is unlikely to exceed specified OFLs. Fisheries targeting lingcod north and south of 40°10' N lat. have shown low ACL attainment rates and are not projected to exceed proposed ACLs.

4.3.1.6 Modify Commercial Fixed Gear and Recreational Fishery Depths inside the Western Cowcod Conservation Area

Two CCAs (Western and Eastern) were originally established in 2001 as an overfished species rebuilding measure for cowcod, which had been recently declared overfished. The CCAs close areas to fishing in the main portion of the species' depth range to reduce catch and consequent mortality, in order to meet rebuilding plan objectives. The western CCA encompasses 5,126 square miles and is located in the Southern California Bight.

This measure would increase fixed gear and recreational fishing opportunity within the Western CCA, relative to no action, by increasing the permitted fishing depths around islands enclosed by the CCA. As discussed in Appendix C, this would lead to modest increases in catch of various target species. In the commercial fisheries, these are principally shelf rockfish, bocaccio, nearshore rockfish, and lingcod. Recreational fishery targets include shelf rockfish, bocaccio, and deeper nearshore rockfish. Cowcod are required to be discarded, and descending devices are required in the recreational fishery to reduce bycatch mortality of cowcod and canary and yelloweye rockfish. Commercial fishery effort in the current open area within 20 fm has been modest, because the returns do not justify the cost of accessing these areas.

As noted, the CCAs were implemented as part of the rebuilding strategy for cowcod. Cowcod are found at the highest densities in depths of 100 fm to 130 fm (PFMC 2018). No cowcod catch was documented in WCGOP observed fixed gear sets made in the western CCA between 2002 and 2016. In 2014, the NFWSC hook and line survey for shelf rockfish was allowed to operate inside the CCA. In the two years that the survey has been allowed to operate inside the CCA, zero cowcod have been encountered inside 40 fm or outside the RCA in those depths over the entire 12-year survey period.

The Council also cited the change in cowcod status as a basis for making this management measure change. The depletion estimate in the most recent stock assessment (Dick and MacCall 2013) is 34 percent and the rebuilding plan target year is 2020. There is also evidence of strong recruitment. This assessment is much more optimistic than previous assessments and suggests that the risk that this measure would compromise stock rebuilding objectives is low.

An ancillary benefit of this closed area is a reduction of fishing mortality on bronzespotted rockfish, a shelf species that may have been depleted in the 1980s with a life history similar to cowcod. However, increased fishing mortality is unlikely, because bronzespotted rockfish occur deeper than 40 fm, the maximum depth proposed to be opened under this management measure change.

Catch of cowcod is not expected to increase under this measure relative to no action due to the lack of overlap in species habitat preference and areas that would be opened under this action. Therefore fishing mortality is expected to continue to be well within the non-trawl allocation and the risk of overfishing would be negligible. Although this measure could increase catch of lingcod, a trip limit reduction proposed for 2019–20 is expected to keep catches within the non-trawl allocation and harvest specifications.

4.3.1.7 Removal of Daily Vessel Quota Pound (QP) Limits

Unused QP vessel limits, also called ‘‘daily vessel limits,’’ apply to overfished groundfish stocks and Pacific halibut and cap the amount of QPs any vessel account can have sitting available in their account on a given day, which is lower than the annual QP vessel limit. The Council and NMFS established daily vessel limits to prevent hoarding of available overfished stocks' QPs in any one vessel account, since the IFQ sector allocations of some overfished stocks are very low. The proposed action to remove daily QP limits will affect the following stocks: bocaccio (south); canary rockfish; cowcod (south); darkblotched; Pacific ocean perch; yelloweye rockfish, and Pacific halibut north of 40°10' N lat.[20]

While the annual vessel QP limit limits the amount of used and unused QP in a vessel account, the daily limit limits the amount of unused QP that can be in a vessel account at any one time. Daily limits attempt to limit a person's ability to acquire additional QP from others before those QP are needed. Theoretically, QP that would be in excess of the daily limit are left on the market for others to acquire. Because daily limits are set at the level of the QS control limits they have no effect on those who only use QP from their own QS account.

The analysis in Appendix C explains that for any daily limit, if a vessel does not land more than the daily limit during the year, then the daily limit is not constraining. This has been the case for the majority of the stocks for which there are limits. Additionally, there are a few work arounds which limit the policies effectiveness in encouraging QP to remain on the market until needed. First, sales contracts can be signed but the QP transfers not implemented until a vessel account has room under the daily limit. Second, entities can temporarily acquire trawl permits and use them to establish a second vessel account in which they can store QP (similar to what risk pools do). For these reasons, the daily limits have been ineffective at achieving the purpose for which they were designed to achieve. As such, the Council chose to remove the daily vessel QP limits for all affected stocks as part of its preferred alternative.

4.3.1.8 Modify the Incidental Lingcod Retention Ratio in the Salmon Troll Fishery

This proposed management measure applies to the commercial ocean salmon troll fishery and would be an adjustment to the existing incidental allowance (expressed as a ratio) for landing lingcod subject to the number of Chinook. The Council considered one action alternative, raising the current ratio of one lingcod per 15 Chinook to one lingcod per five Chinook.

Both alternatives apply only to trolling in the area north of 40°10' N lat. (“the north”), allow for a “plus one” lingcod (i.e., one lingcod in addition to those allowed by the number of Chinook landed), retain the 10 lingcod trip limit, and are subject to the OA monthly limit for lingcod. The Council's Preferred Alternative for 2019–20 for OA lingcod limits is 900 lbs. per month for the area north of 42° N lat. and 600 lbs. per month for the area between 40°10' and 42° N lat.

As described in Appendix C, this limit is supposed to accommodate only incidental catches of lingcod. The Council's Preferred Alternative is expected to result in slight increases to lingcod mortality, which, as described previously in this analysis, is a low attainment species. Because this action does not affect the overall lingcod limit for this sector, the effects on the lingcod stock would be within what is expected under no action, which includes the routine adjustment to the OA trip limit. Additionally, yelloweye rockfish bycatch is a concern when catching lingcod.

[20] Pacific halibut are not allowed to be retained in the trawl fishery and impacts are managed with individual bycatch quota in the trawl fishery north of 40°10' N lat. The small amount of incidental Pacific halibut bycatch in the trawl fishery south of 40°10' N lat. is managed with a set-aside.

This action could encourage targeting of lingcod by salmon trollers, which would also increase the level of yelloweye rockfish bycatch in this sector. However, the analysis in Appendix C section C.9 demonstrates that an increase in targeting of lingcod by salmon trollers is not expected under this action because fishing behaviors are driven by the primary targets of Chinook and coho salmon. Relatively few salmon trollers retain lingcod under current limits due to lack of financial incentive and due to the requirement to have vessel monitoring systems (VMS) on board when retaining groundfish.

4.3.2 Physical Environment including Essential Fish Habitat

Evaluation of impacts to the physical environment focuses on groundfish EFH, because this is the habitat principally affected by the groundfish fishery.

Of the new management measures evaluated under the action alternatives (see section 2.2.2), none would be expected to have significant impacts on groundfish EFH beyond those previously disclosed in the 2015 EIS. Section 4.1.1 in the 2015 EIS evaluates the long-term impacts of groundfish fishery management on EFH. Effects on EFH are a function of the distribution of fishing effort by gear type. 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, recreational gear), because the contact is more extensive. Biogenic and hard bottom habitats may be substantially modified with relatively little fishing effort.

The new management measure to loosen depth restrictions within the Western CCA may have minor effects on physical environment, however, none of the areas proposed to be opened are currently designated as EFH. Figures in Appendix C show that in the Western CCA hard substrate occurs shoreward of the proposed 40 fathom depth-based boundaries as well as the 20 fathom depth contour within which fishing is currently allowed in all proposed areas except around San Nicolas Island. Hard substrate is most extensive in the areas proposed to open around Tanner and Cortes Banks. Around Tanner Bank the area open to fishing would increase by a maximum of 8.2 square miles; around Cortez Bank it would increase by at most 21.3 square miles. Around Santa Barbara Island, where hard substrate is less extensive, the maximum increase in the area open to fishing would be 2.7 square miles. Permitting fishing in these areas would have a minor adverse effect on physical habitat, because of the limited impact of longline and recreational gear on hard substrate and the limited increase in fishable area.

4.3.3 Protected Species

4.3.3.1 Eulachon

Eulachon are bycatch in groundfish trawl fisheries, and the distribution of total bycatch among fisheries varies from year to year. The current estimate of take in the ITS has been exceeded and NMFS has reinitiated consultation. The trawl fishery is the main component of the fishery that has bycatch of eulachon. Four proposed new management measures that are applicable to the trawl fishery were analyzed for environmental effects on eulachon: 1) Salmon Incidental Take Statement: Mitigation Measures and Reserve Rule Analysis; 2) Remove Automatic Authority Established in Conjunction with Amendment 21-3 for Darkblotched Rockfish and POP in the At-Sea Sector; 3) Lingcod and Sablefish DMRs in the Shorebased IFQ Program; and 4) removal of daily QP vessel limits for the shoreside IFQ fishery.

The four proposed items within the preferred alternative for the salmon mitigation measures are not expected to have any additional impacts to eulachon. Removing the OSCZ and limiting the gear use within the KRSCZ and CRSCZ would likely maintain a similar pattern of bycatch as seen in No Action. The 200 fm BRA and closure provisions would likely reduce any bycatch of eulachon as it would reduce or eliminate effort. For the other three new management measures—Remove Automatic Authority

Established in Conjunction with Amendment 21-3 for Darkblotched Rockfish and POP in the At-Sea Sector, Lingcod and Sablefish DMRs in the Shorebased IFQ Program, and removal of daily QP vessel limits for the shoreside IFQ fishery—it is likely there would be no impacts to eulachon bycatch compared to No Action as these measures are not expected to result in substantial changes to fishing behavior or effort.

4.3.3.2 Humpback Whale

As discussed in section 3.4.2, humpback whales have been taken in the fixed gear fishery targeting sablefish, specifically in pot gear. Humpback whales have not been observed having interactions with any other groundfish gear types. Observed entanglements increased in 2015 and 2016 as humpback whales foraged closer to shore, especially in Central California—however, entanglements declined in 2017. Historically, data on entanglements have been kept at the overall gear level, rather than specific to the fishery using the gear. As such, entanglements of whales in sablefish pot gear were often lumped in with entanglements of whales in Dungeness crab pot gear. NMFS has been trying lately to determine gear type with more specificity. As discussed in Section 3.4.2, in 2017, only one humpback whale was entanglement was documented for sablefish pot gear.

Three new management measures apply to fixed gear fisheries: the salmon BiOp RPMs, QP accounting survival credits in the shoreside IFQ fishery, and the Western CCA boundary change.

Under salmon BiOp RPM number 3, closure of the non-whiting portion of the groundfish fishery (which includes fixed gear) would occur if the threshold amount and Reserve of Chinook salmon were exceeded in any one year. Closing the fishery sector is likely to occur infrequently, if at all, because the Council and NMFS would likely implement other measures to reduce salmon bycatch before the threshold and Reserve is exceeded. A closure would have a modest beneficial effect on the take of humpback whales, because the risk of takes would be eliminated during the closure period.

Lingcod and sablefish survival credits applicable to the fixed gear portion of the shoreside IFQ fishery could moderately increase landings of lingcod and sablefish according to the analysis in Appendix C. This could increase attainment of the ACLs of these stocks, other things being equal. However, the expected change in catch would be the result of fishermen retaining more fish that they already catch, rather than expected increases in effort, as described in Section C.5. Therefore, NMFS does not expect that this proposed action would affect humpback whales above the level of effect from the no action alternative.

The proposed expansion of areas where recreational fishing gear would be allowed in the 4,200 square miles of the Western CCA would, at the maximum, result in an increase in fishing area of 140 square miles. Recreational fishing gear poses little risk for entanglement leading to serious injury or mortality because the gear is light weight and not likely to seriously impair an animal; furthermore it is unlikely that recreational fishers would be close enough to humpback whale so that their gear could become entangled.

The proposed expansion of areas where commercial fixed gear, such as pots and traps, is allowed in the Western CCA, may pose a greater risk, because the float lines are heavier and affixed to the bottom. In 2016, eight humpback whale entanglements were reported in the Southern California bight, where the CCA is located; however, all reported entanglements were in between the Channel Islands and the mainland (so outside of the area that would be affected under this proposed action) and with non-groundfish fixed gear (see the 2016 West Coast Entanglement Summary). Additionally, most of the stocks that would be targeted in the expanded depths available under this action are more commonly fished with longline gear, rather than pot gear. Therefore, NMFS does not expect a meaningful increase in effort with pot gear. As a result, the effects of this proposed action on humpback whales are expected to be similar to those under the no action alternative.

The combined effect of these four measures applicable to the fixed gear fishery—the salmon BiOp RPMs, QP accounting survival credits in the shoreside IFQ fishery, and the Western CCA boundary change—on the likelihood of humpback whale take is not expected to be significantly different than the effect of no action.

4.3.3.3 Short-Tailed Albatross

One observed take of short-tailed albatross occurred in the fixed gear longline fishery in 2011. Although not observed in the trawl fishery, bird strikes on trawl gear cables, especially the third wire used for telemetry, and entanglement in nets have been observed for other species. Albatrosses may be more vulnerable to these types of interactions due to their large wingspan (USFWS 2017, page 37). The highest concentrations of short-tailed albatross are found in the Aleutian Islands and Bering Sea (primarily outer shelf) regions of Alaska, but subadults appear to be distributed along the Pacific Coast of the U.S. more than has been previously reported (USFWS 2017, page 20).

Three new management apply to fixed gear fisheries: the salmon BiOp RPMs, QP accounting survival credits in the shoreside IFQ fishery, and the Western CCA boundary change.

The salmon BiOp RPMs impose a remote risk of fishery closure while the remaining three measures may modestly increase operational flexibility. If a closure were triggered, that would reduce effort in the groundfish fleets, which could reduce potential interactions with seabirds, and therefore is beneficial to these protected species.

Given the distribution of short-tailed albatross is more concentrated in boreal regions, their occurrence in the region of the Western CCA is likely to be rare so any increased fixed gear fishing activity in the relatively small shoreward areas proposed to be opened is likely to pose a negligible risk with respect to takes. QP accounting survival credits may allow IFQ vessels to increase landings slightly, which could result in a marginal increase in fishing effort. This could result in a negligible increase in the risk of short-tailed albatross takes.

Similarly, measures affecting the trawl fishery have mixed effects. Four proposed new management measures applicable to the trawl fishery are analyzed for environmental effects. Two measures—changing POP and darkblotched set aside management and revising sablefish and lingcod bycatch mortality rates—provide greater operational flexibility and/or fishing opportunity for IFQ at-sea whiting or trawl sectors. Complying with the RPMs in the salmon BiOp to be implemented as part of the biennial process could reduce operational flexibility, because of bycatch avoidance strategies adopted by harvesters, mitigation measures implemented by the Council and NMFS, and the risk of fishery closure if a sector specific threshold amount plus the Reserve is exceeded. Removing the daily vessel QP limit would have no discernable effect on the operation of the fishery, and therefore no discernable effect on short-tailed albatross.

Changes in the timing and location of fishing due to these management changes cannot be predicted, nor is there a clear correlation between the operation of the fishery and the risk of short-tailed albatross take. The net effect of these measures are not expected to appreciably increase the risk of short-tailed albatross take.

4.3.3.4 Salmon

As with the evaluation of impacts to other ESA-listed species above, the new management measures, other than measures implemented through the biennial process in response to the 2017 BiOp, would affect salmon bycatch indirectly to the extent that they change operational characteristics of the groundfish

fishery. Historically, salmon bycatch has mostly comprised Chinook salmon with small amounts of coho salmon. Most of the bycatch has occurred in the groundfish trawl fishery and in particular fisheries targeting Pacific whiting with midwater gear. This is reflected in threshold values presented in the BiOp ITS as a guide for conditions that would trigger reinitiation of consultation. The take guideline for the whiting trawl fishery is 11,000 Chinook and 474 coho salmon and for the non-whiting fishery sectors (including trawl, commercial fixed gear, and recreational) is 5,500 Chinook and 560 coho salmon. (These values exclude the Reserve amount of 3,500 Chinook considered for extreme bycatch events.)

Within the non-trawl fishery, bycatch estimates for the non-whiting non-trawl part of the fishery are 404 Chinook and 494 coho salmon. Given the small amount of bycatch involved, new management measures exclusively affecting the non-trawl fishery (e.g., modifying allowable fishing depths in the Western CCA) are likely to have a negligible impact on salmon bycatch.

As discussed in section 4.3.1.5, sablefish and lingcod survival credits for the shoreside IFQ fishery could result in a modest increase in landings of these species, because QP would apply only to landings plus estimated discard mortality rather than total catch. To the degree that this results in some increase in fishing opportunity and fishing effort the risk of increased salmon bycatch could increase. However, the likelihood that this measure would substantially contribute to increased salmon bycatch in relation to the ITS thresholds is negligible because of only the modest expected increase in landings.

Eliminating the automatic authority to close at-sea whiting sectors if set aside amounts plus the buffer are exceeded would result in a remote chance that the fishery would continue to operate in a situation where currently it would be closed, which could result in a potential increase in salmon bycatch that otherwise would not occur. As discussed in Appendix C, this change, along with higher ACLs for darkblotched rockfish and POP, could result in a more northern distribution of fishing effort than what has occurred in the recent past. The salmon BiOp concluded that a northerly distribution is likely to result in lower salmon bycatch. Overall, it is not possible to predict the impact to bycatch directly attributable to this management measure change but it is likely negligible to modestly beneficial for salmon.

The salmon bycatch mitigation measures pursuant to the BiOp RPMs would be beneficial and protective of ESA-listed salmon species. Three of the four actions would benefit salmon by reducing bycatch in the groundfish fisheries. The fourth action, removing the OSCZ, would have no effect because this provision in the regulations has been shown to be ineffective in reducing salmon bycatch (see Appendix C.3.2).

Compared to No Action, adding a new 200 fathom BRA for vessels using midwater trawl gear may be protective of salmon because bycatch rates tend to be higher in shallower areas. Additionally, implementing a BRA would reduce overall effort of the fisheries, especially by the shoreside whiting and non-whiting fleets, as described in Appendix C.4.2. A BRA closure of the areas shoreward of 200 fm could reduce salmon bycatch in the at-sea whiting sector because it could shift about 25 percent of the effort from the shallower depth bins (0-200 fm) into the deepest depth bins (> 200 fm), which typically has at least two to three times lower bycatch rates than the shallower depths (Table A-2 of Agenda Item H.5.a, GMT Report 1, March 2018). However, curtailing salmon bycatch through depth restrictions alone may have limited effectiveness due to the patchy nature of bycatch.

And finally, compared to No Action, automatic closures would be more protective of salmon by preventing further bycatch after the amount of take that was determined to not likely adversely affect the species under the Biological Opinion has been taken.

4.3.4 Socioeconomic Environment

4.3.4.1 Estimated Ex-Vessel Revenue and Income and Employment Impact of the Integrated Alternatives

This section evaluates the effects of the alternatives on fishery participants and fishing communities using projections and estimates of economic variables including landings, revenue, and number of angler trips. As described in Appendix A, the Status Quo scenario characterizes catch, landings, and recreational fishing effort in 2017 using the same GMT catch projection methods applied to the alternatives. (Section 3.5 supplements this characterization of the baseline with landings and ex-vessel revenue amounts recorded in the PacFIN database.)

Status Quo represents the environmental baseline using regulations in place towards the end of 2017. However, to better compare socioeconomic effects across the alternatives the assumption about whiting landings has been changed from the Appendix A description. The Appendix A environmental baseline includes the reapportionment of unused tribal fishery quota to the commercial fishery, which may occur late in the year and did in 2017. The other alternatives representing 2019–20 whiting catch use the 2017 allocations prior to any reapportionment. A comparison under these assumptions results in a decline in whiting ex-vessel revenue (and associated income and employment) that is only an artifact of the underlying assumption relative to reapportionment. Instead, the un-apportioned 2017 allocations are used across both the baseline scenario and the alternatives.

Various methods are used to estimate how conditions may change from the 2017 Status Quo, either by applying harvest specifications based on default HCRs and compliant management measures (No Action Alternative) or under the action alternatives, which contain different ACLs for key stocks and default ACLs for the remaining stocks.

The 2015 EIS describes the models and data used to project socioeconomic impacts. Updated documentation of the models may be found in Appendix D. Projection models include:

- GMT catch projection models for different commercial sectors of the groundfish fishery
- GMT fishing effort (angler trips) projection models for the recreational groundfish fishery
- The landings distribution model (LDM), which is used to estimate where landings are likely to occur and the resulting port-level ex-vessel revenue
- The IOPAC model used to evaluate the effect of the alternatives on coastal communities (ports where commercial groundfish landings and recreational groundfish effort occur) by estimating personal income generated ("income impacts") and associated employment
- Net revenue in commercial fishery operations based on projected landings and vessel cost earnings surveys.

The following sections assess socioeconomic impacts in terms of:

- Changes in commercial ex-vessel revenue by fishery sector
- Change in recreational angler trips by community
- Change in net revenue by fishery
- Change in income and employment impacts by community resulting from changes in commercial landings revenue and recreational effort.
- Change in Ex-Vessel Revenue and Angler Trips

Commercial Fisheries

Revenue estimates are based on projected landings estimates from the GMT models referenced above. Table 4-6, Table 4-7, and Table 4-8 compare ex-vessel revenue estimates under the alternatives to the Status Quo. Projections assume average ex-vessel prices observed in 2017. Effects are presented according to groundfish fishery "sectors," which are described in Section 3.5.1.

A number of caveats apply to modeling commercial fishery impacts. Effort displaced by management measures is assumed not to switch readily into another fishery sector or geographic region. Landings projection models and 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. Catch projections in the IFQ fishery may not reflect the leveraging effect of increases in ACLs for "choke" species (those with low ACLs/allocations). A higher allocation of, for example, canary rockfish to the shorebased IFQ fishery may generate more actual revenue than is forecast using the current catch projection models. Stock recruitment variability and catch monitoring uncertainty mean that actual catches may differ from the projections. Although actual ACL attainment may differ from projections, inseason management measures are applied to prevent ACLs from being exceeded. As noted above, the Pacific whiting 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. Since the TAC and resulting allocation is not determined during the harvest specifications process, a historical TAC is used to estimate socioeconomic impacts. The actual TACs for 2019 and 2020 could be higher or lower than the assumed value.

Under the alternatives, annual average coastwide ex-vessel revenue for the 2019–20 period increases from the 2017 baseline by slightly over $2 million to $141.5 million. There is a very slight difference in ex-vessel revenue of $13,000 between No Action, Alternative 1, and the harvest specifications Preferred Alternative (Alternative 2), which is likely with the range of error in these estimates; effectively there is no discernable difference in ex-vessel revenue across the alternatives.

By fishery sector ex-vessel revenue estimates are as follows:

- The TAC for Pacific whiting is set annually outside of this harvest specifications process. Because the 2019–20 TAC and allocations are assumed to be the same as in 2017 there is no difference from the baseline for the whiting fisheries. Shoreside whiting revenue is estimated to be $21 million, the commercial at-sea sectors at $35 million, and the tribal at-sea fishery at $7 million.
- Estimated shoreside IFQ fishery ex-vessel revenue averages $38.4 million annually in 2019–20, with a very slight difference of $13,000 between No Action and Alternatives 1 and 2. Across fishery sectors, this is the only difference among the alternatives and, as noted above, is likely within the range of error for these estimates. Estimated average ex-vessel revenue is $526,000–$539,000 higher than the Status Quo estimate, a 1.4 percent increase. As discussed in Appendix A, notable increases in catch and landings are projected for bocaccio, cowcod, lingcod, and yelloweye rockfish. Increases in yelloweye rockfish ACLs and allocations are an important driver as this is a key choke species for some fishing strategies, because low QP holdings at the vessel level contribute to risk averse fishing strategies.
- The limited entry fixed gear and non-nearshore OA sectors target sablefish with sablefish landings accounting for around 85 percent of ex-vessel revenue (see Groundfish SAFE Table 8b). Both these sectors show a 4.8 percent increase in average ex-vessel revenue under the alternatives compared to the baseline. The limited entry sector realizes greater revenues, estimated to average $19.8 million in 2019–20 compared to $3.8 million for the non-nearshore OA sector. These

projected increases in ex-vessel revenue are mainly due to the increase in the sablefish ACL and resulting allocations under the default HCR.

- Nearshore OA sector primarily targets rockfish, cabezon, and lingcod with black rockfish accounting for the largest share of any one species (see Groundfish SAFE Table 9b). Average annual ex-vessel revenue is estimated to increase by $175,000 to $3.6 million in 2019–20, representing an almost 20 percent gain. Although a large percentage gain for this fishery sector, the nearshore sector is a small contribution to shoreside revenue coastwide, although it is important in Southern Oregon and Northern California fishing communities.

Table 4-6. Estimated ex-vessel revenues by groundfish harvest sector under the alternatives (2017 $million).

Sectors	Status Quo	No Action		Alternative 1		Preferred Alternative (Alternative 2)	
		2019	2020	2019	2020	2019	2020
Shoreside Sectors:							
Whiting	21.1	21.1	21.1	21.1	21.1	21.1	21.1
Non-whiting Trawl+Non-trawl IFQ	37.9	38.6	38.3	38.6	38.3	38.6	38.3
Limited Entry Fixed Gear	18.9	19.7	20.0	19.7	20.0	19.7	20.0
Nearshore Open Access	4.5	5.3	5.3	5.3	5.3	5.3	5.3
Non-nearshore Open Access	3.6	3.8	3.8	3.8	3.8	3.8	3.8
Incidental Open Access	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Tribal (incl. whiting)	11.7	11.3	11.4	11.3	11.4	11.3	11.4
Shoreside sectors' Totals	**97.9**	**99.9**	**100.0**	**99.9**	**100.0**	**99.9**	**100.0**
At-sea Sectors:							
Non Tribal Whiting	34.6	34.6	34.6	34.6	34.6	34.6	34.6
Tribal Whiting	6.9	6.9	6.9	6.9	6.9	6.9	6.9
At-sea sectors' Totals	**41.5**	**41.5**	**41.5**	**41.5**	**41.5**	**41.5**	**41.5**
TOTAL Groundfish Revenue	**139.4**	**141.4**	**141.5**	**141.4**	**141.5**	**141.4**	**141.5**

Table 4-7. Estimated change in groundfish ex-vessel revenues from Status Quo by groundfish harvest sector under the action alternatives (2017 $million).

Sectors	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Shoreside Sectors:				
Whiting	*21.1*	+0.000	+0.000	+0.000
Non-whiting Trawl+Non-trawl IFQ	*37.9*	+0.526	+0.539	+0.539
Limited Entry Fixed Gear	*18.9*	+0.905	+0.905	+0.905
Nearshore Open Access	*4.5*	+0.826	+0.826	+0.826
Non-nearshore Open Access	*3.6*	+0.175	+0.175	+0.175
Incidental Open Access	*0.2*	+0.000	+0.000	+0.000
Tribal (incl. whiting)	*11.7*	-0.403	-0.403	-0.403
Shoreside sectors' Totals	***97.9***	**+2.029**	**+2.043**	**+2.043**
At-sea Sectors:				
Non Tribal Whiting	*34.6*	+0.000	+0.000	+0.000
Tribal Whiting	*6.9*	+0.000	+0.000	+0.000
At-sea sectors' Totals	***41.5***	**+0.000**	**+0.000**	**+0.000**
TOTAL Groundfish Revenue	***139.4***	**+2.029**	**+2.043**	**+2.043**

Table 4-8. Estimated change in groundfish ex-vessel revenues from Status Quo by groundfish harvest sector under the action alternatives (percent).

Sectors	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Shoreside Sectors:				
Whiting	*21.1*	+0.0%	+0.0%	+0.0%
Non-whiting Trawl+Non-trawl IFQ	*37.9*	+1.4%	+1.4%	+1.4%
Limited Entry Fixed Gear	*18.9*	+4.8%	+4.8%	+4.8%
Nearshore Open Access	*4.5*	+18.6%	+18.6%	+18.6%
Non-nearshore Open Access	*3.6*	+4.8%	+4.8%	+4.8%
Incidental Open Access	*0.2*	+0.0%	+0.0%	+0.0%
Tribal (incl. whiting)	*11.7*	-3.4%	-3.4%	-3.4%
Shoreside sectors' Totals	***97.9***	**+2.1%**	**+2.1%**	**+2.1%**
At-sea Sectors:				
Non Tribal Whiting	*34.6*	*+0.0%*	*+0.0%*	*+0.0%*
Tribal Whiting	*6.9*	*+0.0%*	*+0.0%*	*+0.0%*
At-sea sectors' Totals	***41.5***	***+0.0%***	***+0.0%***	***+0.0%***
TOTAL Groundfish Revenue	*139.4*	***+1.5%***	***+1.5%***	***+1.5%***

Recreational Fisheries

Projected marine area angler boat trips taken in groundfish plus Pacific halibut fisheries are compared to Status Quo fishing effort under the proposed management alternatives. Table 4-6, Table 4-7, and Table 4-8, compare average annual recreational angler trips under Status Quo to projected angler effort under the alternatives. Results are shown by coastal regions that are aggregated from statistical reporting regions.[21]

The Council wished to explore a number of recreational management options under each of the alternative ACLs and allocations. Most of these management variations have a modest effect on projected angler effort. To produce a tractable number of projections that cover the range of potential effort levels, the alternatives and these recreational management options are presented in two alternatives in addition to No Action. For more information about the proposed management options, see Appendix A. Projected increases in recreational fishing effort are as follows:

- Coastwide recreational effort projected to increase from the 2017 baseline marginally under No Action. Under Alternative 1 and the Preferred Alternative (Alternative 2) recreational fishing effort is projected to increase by 26 percent overall.
- Recreational fishing effort for the Washington Coast is projected to increase from the 2017 Status Quo under the alternatives ranging from 3.6 percent to 12.6 percent. Washington accounts for 5 percent of coastwide fishing effort under the baseline. Increases in fishing effort across the alternatives is due to the relaxation of management restrictions associated with constraining the catch of yelloweye rockfish.
- The three coastal regions of Oregon together account for 14 percent of baseline effort. Recreational fishing effort in Oregon is not projected to change from the 2017 baseline under the alternatives. This results from the assumptions made in state's recreational projection model; although recreational management measures would change, a response in terms of increased effort is not modeled both because it is believed the management measure changes would not prompt increased effort or the fishery constraints due to species other than yelloweye rockfish would prevent effort increases.
- California recreational fishing effort is project to increase by the same amount under Alternative 1 and the Preferred Alternative (Alternative 2) but no change is projected under No Action. Southern California accounts for the largest share of coastwide recreational angler trips, slightly more than half of the coastwide total, and the Santa Barbara to San Diego region also shows the largest absolute changes in effort, an increase of 148,000 trips (35 percent). Equivalent relative increases are projected for the Crescent City-Eureka and Fort Bragg-Bodega Bay areas. The regions from San Francisco to Morro Bay are projected to increase recreational effort by 23 percent to 25 percent. The projected increase under No Action is due to allowing the fishery at deeper depth in some times and areas. Under Alternatives 1 and 2, fishing would be allowed at all depths and times of the year, resulting in the large increase in projected fishing effort.

[21] The Puget Sound region is not shown in these tables because Council managed recreational fisheries do not occur in this region.

Table 4-9. Estimated Recreational Effort (halibut+bottomfish) under Status Quo and 2019–20 Alternatives (thousands of angler trips).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	43.2	44.7	44.9	48.6
Astoria-Tillamook	17.5	17.5	17.5	17.5
Newport	54.8	54.8	54.8	54.8
Coos Bay-Brookings	40.4	40.4	40.4	40.4
Crescent City-Eureka	47.3	47.3	63.7	63.7
Fort Bragg - Bodega Bay	20.8	20.8	28.0	28.0
San Francisco Area	69.1	69.1	86.4	86.4
SC – Mo – MB [a/]	106.4	106.4	130.6	130.6
SB – LA – SD [a/]	425.9	425.9	574.0	574.0
Coastwide Total	**825.3**	**826.9**	**1,040.2**	**1,043.9**

a/ SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Table 4-10. Estimated change from Status Quo Recreational Effort (halibut+bottomfish) under the 2019–20 Alternatives (thousands of angler trips).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	*43.2*	+1.6	+1.8	+5.4
Astoria-Tillamook	*17.5*	-	-	-
Newport	*54.8*	-	-	-
Coos Bay-Brookings	*40.4*	-	-	-
Crescent City-Eureka	*47.3*	-	+16.4	+16.4
Fort Bragg - Bodega Bay	*20.8*	-	+7.2	+7.2
San Francisco Area	*69.1*	-	+17.4	+17.4
SC – Mo – MB [a/]	*106.4*	-	+24.2	+24.2
SB – LA – SD [a/]	*425.9*	-	+148.0	+148.0
Coastwide Total	***825.3***	+1.6	+214.9	+218.5

a/ SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Table 4-11. Estimated change from Status Quo Recreational Effort (halibut+bottomfish) under the 2019–20 Alternatives (percent).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound		-	-	-
Washington Coast	43.2	+3.6%	+4.1%	+12.6%
Astoria-Tillamook	17.5	-	-	-
Newport	54.8	-	-	-
Coos Bay-Brookings	40.4	-	-	-
Crescent City-Eureka	47.3	-	+34.6%	+34.6%
Fort Bragg - Bodega Bay	20.8	-	+34.6%	+34.6%
San Francisco Area	69.1	-	+25.1%	+25.1%
SC – Mo – MB [a/]	106.4	-	+22.7%	+22.7%
SB – LA – SD [a/]	425.9	-	+34.8%	+34.8%
Coastwide Total	**825.3**	+0.2%	+26.0%	+26.5%

a/ SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Communities: Change in Income and Employment Impacts by Community

Socioeconomic impacts to fishing communities engaged in groundfish fisheries are evaluated based on the change in personal income (income impacts) and employment-related measures under the alternatives. These effects are a function of the projected changes in commercial landings and recreational effort described above. Comparisons are with respect to the 2017 Status Quo. Impacts were estimated using the NWFSC IOPAC 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. See page 378 in the 2015 EIS for a description of the counties included in these regions.

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.

Income and employment impacts from Tribal fisheries and also from Pacific whiting caught in the at-sea catcher-processor and mothership sectors are not included in these totals. The reasons are:

1. Tribal groundfish harvesting and processing are not included in any of the cost-revenue data collected by NWFSC, so the Tribal fisheries' contributions to regional income and employment impacts are not estimated.
2. While overall estimators of income and employment impacts derived from the at-sea whiting fishery (CPs and motherships) have been developed, the detail required to attribute these impacts to particular port groups have not.

Regarding the at-sea whiting fishery, presumably most of the associated income and employment impacts would likely accrue in the Seattle region; while corresponding impacts of Tribal groundfish fisheries would mostly accrue in Washington Coastal communities. This is because the majority of the at-sea whiting vessels are homeported or owned by companies in the Seattle region.

Table 4-12 presents estimates of personal income by region due to projected commercial groundfish fishing activity under the Alternatives. Table 4-13 and Table 4-14 compare this information relative to the 2017 Status Quo. Table 4-15 presents the estimated income impacts resulting from recreational groundfish fisheries with Table 4-16 and Table 4-17 presenting the estimates relative to Status Quo. The commercial and recreational impacts are presented under No Action and the two action alternatives.

Commercial Fishery Income Impacts

Coastwide estimated personal income impacts from commercial groundfish fishing are estimated to be $138 million under the 2017 baseline and projected to increase to $142 million under the alternatives. There is no difference in projected income impacts across the action alternatives, as management measures were not explored that changed the fishery noticeably enough to result in changes to income impacts. All other port areas are projected to see some increases relative to Status Quo under the two alternatives.

- Puget Sound ports show a projected increase of $0.5 million from Status Quo or 7 percent under the two alternatives.
- Oregon and Washington Coast port areas together account for 70 percent of estimated coastwide 2017 Status Quo personal income. In combination, personal income in these communities would increase by $1.2 million, or 1 percent. The Coos Bay-Brookings area shows the largest percentage increase in income impacts. Nearshore fisheries are dominant in these ports and the increase in ex-vessel revenue in that fishery translates into larger income impacts.
- California accounts for 25 percent of estimated coastwide Status Quo income. All California port groups are projected to see increases from the 2017 baseline under the alternatives totaling $1.6 million, a 5 percent increase. The largest relative increase in personal income impact compared to Status Quo is projected for the Santa Cruz to Morro Bay region at 11 percent under both action alternatives; in absolute terms a $700,000 difference. Fixed gear fisheries are more important in these ports and the increase in projected landings from these fisheries accounts for increases in income impacts.

Table 4-12. Estimated commercial fishery income impacts under the alternatives by community group ($mil) in 2019–20. Estimates are presented as the average annual value for the two-year management period.

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	7.3	7.8	7.8	7.8
Washington Coast	20.0	20.2	20.2	20.2
Astoria-Tillamook	43.7	44.0	44.0	44.0
Newport	22.0	22.1	22.1	22.1
Coos Bay-Brookings	11.1	11.6	11.6	11.6
Crescent City-Eureka	8.5	8.6	8.6	8.6
Fort Bragg–Bodega Bay	7.3	7.8	7.8	7.8
San Francisco Area	2.7	2.9	2.9	2.9
SC–Mo–MB	5.9	6.6	6.6	6.6

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
SB–LA–SD	10.0	10.1	10.1	10.1
Coastwide Total	138.3	141.5	141.6	141.6

Table 4-13. Estimated change in commercial fishery income impacts (from Status Quo) under the alternatives by community group ($mil) in 2019–20. Estimates are presented as the average annual value for the two-year management period.

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	*7.3*	+0.5	+0.5	+0.5
Washington Coast	*20.0*	+0.2	+0.2	+0.2
Astoria-Tillamook	*43.7*	+0.3	+0.3	+0.3
Newport	*22.0*	+0.1	+0.1	+0.1
Coos Bay-Brookings	*11.1*	+0.5	+0.5	+0.5
Crescent City-Eureka	*8.5*	+0.2	+0.2	+0.2
Fort Bragg – Bodega Bay	*7.3*	+0.5	+0.5	+0.5
San Francisco Area	*2.7*	+0.2	+0.2	+0.2
SC – Mo – MB	*5.9*	+0.7	+0.7	+0.7
SB – LA – SD	*10.0*	+0.1	+0.1	+0.1
Coastwide Total	*138.3*	+3.2	+3.3	+3.3

Table 4-14. Estimated change in commercial fishery income impacts (from Status Quo) under the alternatives by community group (percent) in 2019–20.

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	*7.3*	+7.1%	+7.1%	+7.1%
Washington Coast	*20.0*	+1.1%	+1.1%	+1.1%
Astoria-Tillamook	*43.7*	+0.6%	+0.7%	+0.7%
Newport	*22.0*	+0.6%	+0.6%	+0.6%
Coos Bay-Brookings	*11.1*	+4.5%	+4.5%	+4.5%
Crescent City-Eureka	*8.5*	+1.9%	+1.9%	+1.9%
Fort Bragg – Bodega Bay	*7.3*	+6.5%	+6.6%	+6.6%
San Francisco Area	*2.7*	+7.8%	+7.8%	+7.8%
SC – Mo – MB	*5.9*	+11.3%	+11.3%	+11.3%
SB – LA – SD	*10.0*	+0.8%	+0.8%	+0.8%
Coastwide Total	*138.3*	+2.3%	+2.4%	+2.4%

Recreational Fishery Income Impacts

Recreational income impacts are related directly to changes in recreational fishing effort (angler trips). See the discussion above for explanations for increases in fishing effort due to management changes. Table 4-21 shows recreational income impacts under the alternatives; Table 4-22 shows the incremental change; Table 4-23 shows the percentage change. The following list summarizes the projected changes for the various alternatives:

- Coastwide recreational fishing income impacts are projected to increase by 29 percent and 30 percent under Alternative 1 and Alternative 2, respectively, with increases on the Washington Coast and in all areas of California.
- Under No Action, income impacts increase by an estimated $200,000 (3 percent) on the Washington Coast. The Washington Coast shows relative increases under Alternatives 1 and 2, ranging from 3 percent to 13 percent, representing increases of $0.2 million and $0.9 million in income impacts, respectively.
- Recreational fishing income impacts are projected to be the same as Status Quo in Oregon across all the alternatives, because the management measure changes would not prompt increased effort or the fishery constraints from species other than yelloweye rockfish would prevent effort increases.
- In California, the Santa Barbara to San Diego region shows the largest absolute changes in income impacts, an increase of $43.5 million under Alternative 1 and the Preferred Alternative (Alternative 2). This is also the largest relative increase in projected effort (35 percent) under the range of alternatives. The next largest relative increases in income impacts are shown in the Crescent City-Eureka and Fort Bragg-Bodega Bay areas (35 percent) under Alternatives 1 and 2.

Table 4-15. Estimated recreational fishery income impacts under Status Quo and the alternatives by community group ($ mil.).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	6.9	7.1	7.1	7.8
Astoria-Tillamook	1.8	1.8	1.8	1.8
Newport	7.9	7.9	7.9	7.9
Coos Bay-Brookings	3.3	3.3	3.3	3.3
Crescent City-Eureka	5.4	5.4	7.2	7.2
Fort Bragg - Bodega Bay	3.4	3.4	4.5	4.5
San Francisco Area	14.6	14.6	18.3	18.3
SC – Mo – MB [a/]	16.7	16.7	20.5	20.5
SB – LA – SD [a/]	125.1	125.1	168.5	168.5
Coastwide Total	**185.0**	**185.2**	**239.2**	**239.9**

a/ SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-16. Estimated change in recreational fishery income impacts from Status Quo under the alternatives by community group ($ mil.).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	*6.9*	+0.2	+0.2	+0.9
Astoria-Tillamook	*1.8*	-	-	-
Newport	*7.9*	-	-	-
Coos Bay-Brookings	*3.3*	-	-	-
Crescent City-Eureka	*5.4*	-	+1.9	+1.9
Fort Bragg - Bodega Bay	*3.4*	-	+1.2	+1.2
San Francisco Area	*14.6*	-	+3.7	+3.7
SC – Mo – MB [a/]	*16.7*	-	+3.8	+3.8
SB – LA – SD [a/]	*125.1*	-	+43.5	+43.5
Coastwide Total	*185.0*	+0.2	+54.2	+54.8

a/ SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-17. Estimated change in recreational fishery income impacts from Status Quo under the alternatives by community group (percent).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	*6.9*	+3.0%	+3.3%	+13.2%
Astoria-Tillamook	*1.8*	-	-	-
Newport	*7.9*	-	-	-
Coos Bay-Brookings	*3.3*	-	-	-
Crescent City-Eureka	*5.4*	-	+34.6%	+34.6%
Fort Bragg - Bodega Bay	*3.4*	-	+34.6%	+34.6%
San Francisco Area	*14.6*	-	+25.1%	+25.1%
SC – Mo – MB [a/]	*16.7*	-	+22.7%	+22.7%
SB – LA – SD [a/]	*125.1*	-	+34.8%	+34.8%
Coastwide Total	*185.0*	+0.1%	+29.3%	+29.6%

a/ SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Employment Impacts

Table 4-18 shows projected employment impacts due to the commercial groundfish fishery under the alternatives; Table 4-19 and Table 4-20 show the impacts relative to Status Quo. Table 4-21 shows projected employment impacts due to the recreational groundfish under the alternatives; Table 4-22 and Table 4-23 show the impacts relative to Status Quo.

Commercial Fishery Employment Impacts

Compared to the 2017 baseline coastwide estimated employment impacts from commercial groundfish fishing are estimated to increase by 103 jobs under the alternatives, an increase of 5 percent.

- Puget Sound ports show an estimated increase of six jobs from the 2017 baseline and the Washington Coast is estimated to gain four jobs.
- Oregon ports show estimated gains in jobs ranging from three in Newport to 23 in the Coos Bay-Brookings area.
- California ports show estimated gains in jobs of between four and 32. The largest gain is estimated to occur in the Santa Cruz-Monterey-Morro Bay area.

Table 4-18. Estimated commercial fishery employment impacts under Status Quo (the 2017 baseline) and the alternatives by community group (number of jobs).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	81	87	87	87
Washington Coast	285	289	289	289
Astoria-Tillamook	503	509	510	510
Newport	284	287	287	287
Coos Bay-Brookings	217	240	240	240
Crescent City-Eureka	125	128	128	128
Fort Bragg – Bodega Bay	186	200	200	200
San Francisco Area	71	78	78	78
SC – Mo – MB	216	249	249	249
SB – LA – SD	200	204	204	204
Coastwide Total	2,167	2,271	2,271	2,271

Table 4-19. Estimated change in commercial fishery employment impacts from Status Quo under the alternatives by community group (number of jobs).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	*81*	+6	+6	+6
Washington Coast	*285*	+4	+4	+4
Astoria-Tillamook	*503*	+7	+7	+7
Newport	*284*	+3	+3	+3
Coos Bay-Brookings	*217*	+23	+23	+23
Crescent City-Eureka	*125*	+4	+4	+4
Fort Bragg – Bodega Bay	*186*	+14	+14	+14
San Francisco Area	*71*	+7	+7	+7
SC – Mo – MB	*216*	+32	+32	+32
SB – LA – SD	*200*	+4	+4	+4
Coastwide Total	*2,167*	+103	+103	+103

Table 4-20. Estimated change in commercial fishery employment impacts from Status Quo under the alternatives by community group (percent).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	*81*	+7.0%	+7.1%	+7.1%
Washington Coast	*285*	+1.4%	+1.4%	+1.4%
Astoria-Tillamook	*503*	+1.3%	+1.4%	+1.4%
Newport	*284*	+1.1%	+1.1%	+1.1%
Coos Bay-Brookings	*217*	+10.5%	+10.5%	+10.5%
Crescent City-Eureka	*125*	+3.0%	+3.0%	+3.0%
Fort Bragg – Bodega Bay	*186*	+7.5%	+7.5%	+7.5%
San Francisco Area	*71*	+10.5%	+10.5%	+10.5%
SC – Mo – MB	*216*	+14.8%	+14.8%	+14.8%
SB – LA – SD	*200*	+1.8%	+1.8%	+1.8%
Coastwide Total	*2,167*	+4.8%	+4.8%	+4.8%

Recreational Fishery Employment Impacts

Employment impacts from recreational fishing effort are projected to increase by five jobs (3 percent) on the Washington Coast, but be the same as the 2017 baseline in all areas of Oregon and California.

Coastwide recreational fishing employment impacts are projected to increase by 27 percent and 28 percent under Alternative 1 and the Preferred Alternative (Alternative 2), respectively, with increases on the Washington Coast and in all areas of California. Recreational fishing employment impacts are projected to be the same as Status Quo in Oregon.

The Santa Barbara to San Diego region shows the largest absolute changes in projected employment impacts, an increase of 631 jobs (35 percent) under Alternatives 1 and 2. This is also the largest relative increase in projected effort under the range of alternatives.

Table 4-21. Estimated recreational fishery employment impacts under Status Quo and the alternatives by community group (number of jobs).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	182	188	188	207
Astoria-Tillamook	49	49	49	49
Newport	196	196	196	196
Coos Bay-Brookings	84	84	84	84
Crescent City-Eureka	83	83	111	111
Fort Bragg - Bodega Bay	55	55	74	74
San Francisco Area	192	192	240	240
SC – Mo – MB [a/]	273	273	335	335
SB – LA – SD [a/]	1,815	1,815	2,446	2,446
Coastwide Total	2,929	2,935	3,724	3,742

a/ SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-22. Estimated change in recreational fishery employment impacts from Status Quo under the alternatives by community group (number of jobs).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	*182*	+5	+6	+25
Astoria-Tillamook	*49*	-	-	-
Newport	*196*	-	-	-
Coos Bay-Brookings	*84*	-	-	-
Crescent City-Eureka	*83*	-	+29	+29
Fort Bragg - Bodega Bay	*55*	-	+19	+19
San Francisco Area	*192*	-	+48	+48
SC – Mo – MB [a/]	*273*	-	+62	+62
SB – LA – SD [a/]	*1,815*	-	+631	+631
Coastwide Total	*2,929*	+5	+794	+813

a/ SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-23. Estimated change in recreational fishery employment impacts from Status Quo under the alternatives by community group (percent).

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Puget Sound	-	-	-	-
Washington Coast	*182*	+3.0%	+3.3%	+13.5%
Astoria-Tillamook	*49*	-	-	-
Newport	*196*	-	-	-

Community Groups	Status Quo	No Action	Alternative 1	Preferred Alternative (Alternative 2)
Coos Bay-Brookings	*84*	-	-	-
Crescent City-Eureka	*83*	-	+34.6%	+34.6%
Fort Bragg - Bodega Bay	*55*	-	+34.6%	+34.6%
San Francisco Area	*192*	-	+25.1%	+25.1%
SC – Mo – MB [a/]	*273*	-	+22.7%	+22.7%
SB – LA – SD [a/]	*1,815*	-	+34.8%	+34.8%
Coastwide Total	*2,929*	+0.2%	+27.1%	+27.8%

a/ SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

4.3.4.2 New Management Measures

Remove the Automatic Action Authority for Darkblotched Rockfish or POP Set Asides in the At-Sea Whiting Fishery

This management measure would not change the distribution of catch opportunity among user groups. It is intended to reduce the operational costs to the at-sea sectors from having to constantly move from good whiting grounds due to the fear of automatic closure. In recent years, areas would be vacated if only one or two darkblotched rockfish or POP were caught. This flexibility would provide the fleets increased opportunities to harvest their whiting allocation and likely increase their overall revenues due to lower operational costs.

Overall, this management measure would have modestly beneficial socioeconomic impacts.

Sablefish and Lingcod Catch Mortality QP Accounting in the Shoreside IFQ Sector ("Survival Credits")

This management measure is predicted to result in a small increase in sablefish landings on the order of 5-11 mt for the trawl portion of the IFQ fishery and 9-17 mt for the fixed gear portion. This represents less than 1 percent of projected landings in these sectors, representing a small socioeconomic benefit. This measure may also result in a small increase in lingcod landings as well.

Modify Allowable Fishing Depths in the Western CCA for Commercial Fixed Gear and/or Recreational Fisheries

Although changes are proposed under separate actions for the recreational and fixed gear commercial fisheries, no change in distribution of catch is expected between user groups. Management measures for both fisheries are designed to ensure they remain within their respective allocations. This management measure is expected to provide a positive economic impact for vessels fishing inside the CCA. The magnitude cannot be predicted for commercial vessels but this measure would likely result in modest socioeconomic benefit. This management measure is expected to provide a positive economic impact for recreational vessels fishing inside the CCA with an estimated 10 percent to 20 percent increase in the number of trips and increased revenue to boat crews from fish processing and tips (see Appendix C.3.5).

Salmon Mitigation Measures and Reserve Rules

Of the four measures of the Council's preferred alternative for salmon mitigation measures and reserve rules, only two are likely to cause negative economic impacts. As described above and in Appendix C, the removal of the OSCZ is likely to have little to no impact overall compared to No Action. The continuation of the prohibition of midwater trawling is likely to have no economic impacts as vessels have not midwater trawled in the CRSCZ and KRSCZ in several years and industry has stated that it isn't practical to fish in the areas. Additionally, while the recent pattern of bottom trawling activity with SFFT could be maintained within these areas, there may be some desire to access target species within these areas without SSFT with the implementation of the trawl gear rule. There would be no impacts compared to No Action however.

If the 200 fm BRA were implemented, the impacts to industry would depend on the sector and time the depth restriction was enacted. For the shoreside whiting and non-whiting midwater sectors, a 200 fm BRA would likely be a de facto closure for both sectors and could result in millions of dollars of lost ex-vessel revenue. Appendix C describes two scenarios: low impact (implemented in December) and high impact (implemented in October). The low impact scenario shows up to $0.9 million in ex-vessel revenue lost for the non-whiting midwater sector compared to the high impact scenario which could result in $3.7 million in losses for the shoreside whiting and $1.8 million for the non-whiting midwater trawl fishery. (There was less than $0.1 million in expected revenues for the shoreside whiting fishery in December due to minimal average catch in December. See Table C-4 in Appendix C for average whiting catch by month.) For the at-sea sectors, the impact of the 200 fm BRA would depend on the ability for the sectors to find and prosecute their whiting allocations deeper than 200 fm. As noted above, there are some operational constraints, particularly for the MS sector, at deeper depths.

In the event that a closure to the whiting or non-whiting sector were to occur due to exceeding a sector's threshold or threshold and the Reserve, there would be economic impacts. The magnitude of those impacts though would depend on the time of year the closure was implemented. Looking at the same two impact scenarios described above, if the whiting fishery were to close early, the impacts to the non-tribal sectors would be the same as the 200 fm BRA except there would be negative impacts to the at-sea sector based on the amount of whiting unharvested. For the tribal fisheries, the low impact scenario would result in $0.1 million in ex-vessel revenue lost and $0.3 million in personal revenue compared to the high impact scenario of $0.8 million in ex-vessel revenue and $3.4 million in personal revenue. Additionally, for all whiting sub-sectors there would be associated job losses and other community impacts (described in further detail in Appendix C).

Within the non-whiting sector, there are commercial and recreational fisheries that would be impacted by a closure. The non-whiting midwater trawl fisheries impacts would be the same under the two scenarios as described for the 200 fm BRA.

However, as noted above, these effects are framed by the estimated likelihood of the various groundfish sectors taking substantial amounts of salmon bycatch and the risk of them exceeding their bycatch guidelines allowed under the ITS. Based on past performance, the risk of either sector taking an amount of Chinook bycatch that would result in a closure is unlikely.

Stock complex Reorganization

These changes are not expected to have discernable socioeconomic impacts because catch limit contributions will remain the same for individual stocks within these stock complexes.

Remove Daily Vessel QP Limits

The removal of daily vessel QP limits may have a modest, but likely undiscernible, beneficial socioeconomic impact to the degree it allows harvesters to attain allocations of marketable species.

Chapter 5 Cumulative Effects

The cumulative effects analysis (CEA) considers the effects of the proposed action combined with the effects of other actions on the human environment. The CEA assesses impacts that would be missed if each action were evaluated separately.

The 2015 EIS (PFMC and NMFS 2015) includes an analysis of the cumulative effects of biennial management under the Groundfish FMP framework. That EIS addresses the significance of the expected cumulative impacts as they relate to the federally managed groundfish fishery. The 2016 EA (NMFS 2016) updates that analysis by evaluating subsequent actions. These analyses are incorporated by reference and summarized here. New information indicating potential changes in cumulative effects is also presented. As described below, there are no cumulatively significant impacts above and beyond what is already captured in the 2015 EIS.

5.1 Scope of the Analysis

5.1.1 Affected Resources

Chapter 3 identifies the resources affected by the proposed action. Chapter 4 evaluates the direct and indirect impacts of the proposed action on these resources. The cumulative effects analysis caries forward this information. Those resources are as follows:

- Groundfish
- Habitat including Groundfish Essential Fish Habitat
- Protected species
- Socioeconomic environment including fishing communities

5.1.2 Geographic Boundaries

The analysis of impacts focuses on actions related to the management unit of species in the Groundfish FMP. The geographic scope for groundfish, habitat, and protected species is the West Coast Exclusive Economic Zone (EEZ). For the socioeconomic environment, the geographic scope is defined as those U.S. fishing communities directly involved in the harvest or processing of Council-managed resources, particularly those of the states of Washington, Oregon, and California.

5.1.3 Temporal Boundaries

The temporal scope of past and present actions for the affected resources encompasses actions that occurred after FMP implementation (1982). The cumulative effects analysis in this EA incorporates that long-term time scale but focuses specifically on actions that have occurred since the implementation of the previous cumulative effects analysis in the 2016 EA (NMFS 2016). For protected species, the scope of past and present actions is determined by analysis pursuant to ESA and the Marine Mammal Protection Act (MMPA), including Biological Opinions for the groundfish fishery and marine mammal stock assessment reports. The temporal scope of future actions for all affected resources takes into account the fact that this tiered action is undertaken every two years and evaluation of this periodic action includes a consideration of cumulative effects. Thus, in this instance, the cumulative effects of establishing harvest specifications, adjusting routine management measures, and adopting new management measures will again be evaluated in 2020 for the 2021–22 biennial period. That analysis will take advantage of the most current information

on which to base the assessment of future effects beyond the 2019–20 biennial period subject to this evaluation. Therefore, the temporal scope of the cumulative effects analysis in this EA is the same as that for the evaluation of direct indirect effects, through the 2019–20 biennial period.

5.2 Effects of Past, Present, and Reasonably Foreseeable Future Actions other than the Proposed Action

The CEA does not specifically identify past actions no longer affecting subject resources because those effects have contributed to current baseline conditions described in Chapter 3. As described in Section 1.2, this EA is tiered from the 2015 EIS as updated by the 2016 EA. The effects of past and present fishing and non-fishing actions were described in both these documents (Section 4.15.4 of the 2015 EIS and Section 5.2 of the 2016 EA).

5.2.1 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions were included in this CEA based on the following four criteria.

1. Actions in the West Coast EEZ that affect the same resources affected by the proposed action. Administrative fishery management actions that have no discernible effect are not included.
2. Actions that are not speculative in that the action is defined to an extent that it can be analyzed, including actions for which the Council has decided on a Preliminary Proposed Alternative (PPA) or a Final Preferred Alternative (FPA).
3. Actions that are not identified in the 2016 EA.
4. Actions in which additional information or analysis has been completed since the 2016 EA.

Based on the above criteria, the following reasonably foreseeable future actions are considered in this CEA.

Reasonably Foreseeable Future Action	**Estimated Effective Date**
Gear Changes for the Pacific Coast Groundfish Fishery's Trawl Catch Share Program	January 1, 2019
Amendment 28 to the Pacific Coast Groundfish Fishery Management Plan (Refine and Expand Habitat Closed Areas and Change the Trawl Rockfish Conservation Area)	June 2019
Amendment 26 to the Pacific Coast Groundfish Fishery Management Plan (Allocation of Harvest Opportunity Between Sectors of the Pacific Coast Groundfish Fishery of Blackgill Rockfish and Other Species Managed in the Slope Rockfish Complex South of 40° 10' N. Latitude)	mid to late 2019

5.2.1.1 Gear Changes for the Pacific Coast Groundfish Fishery's Trawl Catch Share Program

Over the years, numerous actions have been taken to manage gear use in the trawl fisheries to meet the objectives of the FMP and the MSA. Prior to the catch share program, gear restrictions were used to limit effort in specific areas (i.e. EFH conservation areas), reduce bycatch, and to increase size selectivity of certain species. To allow for the escapement of small or undersized fish, historic fishery management actions were used to increase the effective mesh size. The restrictions applied to net mesh, codend mesh, chafing gear mesh, coverage and attachment, and the use of double-walled codends. Midwater trawl chafing gear requirements were modified over time to align with requirements in the Alaska groundfish fishery, allowing gear to be used in both regions. Bottom trawl chafing gear restrictions were restricted to reduce

fishing effort on more abrasive bottom substrate. Regulations that limited the protection on footropes at the front end of the net were implemented for midwater trawl to encourage the gear to remain off bottom. Footropes greater than 19 inches that allowed fishing in rocky habitat were prohibited and large and small footrope trawl were defined. The use of large footrope trawl was prohibited in nearshore areas (shoreward of a line approximating100 fm). To address concerns about overfished species catch and staying within the harvest specification specified for rebuilding, selective flatfish trawl (SFFT) was introduced. This type of small footrope trawl was developed to maintain a nearshore flatfish trawl fishery while reducing the catch of overfished rockfish species.

In addition to gear restrictions, regulations specify where and when specific gears can be used. These time area restrictions have primarily been used to address concerns with the catch of listed salmonids and overfished species. Gear restrictions on the numbers and types of gears on a vessel were adopted prior to catch shares to aid enforcement in monitoring fishing activities in areas where certain types of fishing was restricted for either catch concerns or habitat concerns.

NMFS and the Council are considering a rule to implement Gear Changes for the Pacific Coast Groundfish Fishery's Trawl Catch Share Program. A NEPA analysis[22] is under development to addresses proposed changes to legal gear used in the trawl catch share program, which includes both trawl and fixed gear. The action would provide more flexibility in the configuration and use of gear for participants in the trawl rationalization program, while at the same time ensuring that conservation objectives are met. The eight trawl-gear issues included for analysis are:

- Minimum Mesh Size
- Measuring Mesh Size
- Codend Regulations
- Selective Flatfish Trawl
- Chafing Gear
- Multiple Gears On Board
- Fishing in Multiple IFQ Management Areas
- Fishing Before Previous Catch is Stowed

Removing chafing gear requirements for bottom trawl and midwater trawl, changing the definition of measuring mesh size, and eliminating codend regulations are expected to result in neutral impacts to groundfish. Actively reducing size-selective properties of trawl gear is unlikely under the catch share program. Instead, it is more likely that fishermen in the program would limit changes to mesh size to those that improve efficiency, reduce bycatch, and increase catch of marketable fish.

The trawl gear action could provide additional protection to trawl nets from rips and tears (or abrasion) when contacting the bottom or being pulled up the stern ramp. However, it is unlikely that if codend and chafing gear specifications are relaxed, that gear may be "armored" to the extent that bottom trawling over rock habitat may increase. "Armoring" is unlikely due to (a) increased drag and decreased flow (b) increased expense while hauling due to increased fuel consumption (c) increased expense to purchase smaller mesh, additional chafing gear, and double-walled nets, and (d) increased retention of undersized and unmarketable fish. Thus, neutral impact to the physical environment is expected from the anticipated changes in Selective Flatfish Trawl requirements. Fishing would not occur outside of areas typically fished. EFH protections would continue to prohibit bottom contact gear, including bottom trawl, from specific

[22] The Council prepared a preliminary draft EIS in March 2016. Since that time new information has become available. On June 8, 2018, NMFS announced their intent to withdraw preparation of the EIS and instead prepare an EA (83 FR 26640).

areas designated as EFHCA. Footrope restrictions would continue and therefore provide additional protection to rock habitats that may not be closed to bottom contact gear.

Neutral to low-positive impact is expected for salmon, whereas neutral impact is expected for very small species, such as eulachon. Low-negative to low-positive impacts could occur for intermediate sized species (e.g., species where the mesh size may be larger than smallest fishes encountered), however, it is anticipated few fishermen would reduce the mesh size of their codend (or other large areas of the net) to something smaller than what they currently use.

The trawl gear action is expected to increase operational flexibility and have positive socioeconomic impacts.

5.2.1.2 Amendment 28 to the Pacific Coast Groundfish FMP

In 2005, the Council established EFH provisions for the groundfish fishery. The EFH provisions along with long-term RCA restrictions were considered by the Council in a 5-year EFH review.[23] The Council has compiled available information on Pacific Coast groundfish habitat associations, fishing activities, prey species, and many other elements of groundfish EFH and has proposed revisions to existing EFH Conservation Areas and RCA areas under Amendment 28. At its April 2018 meeting, the Council took final action and selected a final preferred alternative, consisting of the following:

- Reopen the groundfish trawl rockfish conservation area (RCA) off Oregon and California to bottom trawling
- Modify the current configuration of EFH Conservation Areas (EFHCAs) where groundfish bottom trawl gear is prohibited coastwide. This includes a new EFHCA prohibiting groundfish bottom trawl gear in most of the Southern California Bight
- Prohibit use of all groundfish bottom contact gear in waters deeper than 3,500 meters

In all, the Council took final action to reopen approximately 3,000 square miles to groundfish bottom trawling, close approximately 13,000 square miles (including almost all of the Southern California Bight), and close approximately 123,000 square miles to all bottom contact groundfish gear, in waters deeper than 3,500 meters.

Amendment 28 is likely to allow some long-term RCA closures to reopen, expanding the areas where bottom trawl gear may be used. Amendment 19 introduced EFHCAs to reduce impacts of bottom contact gears in sensitive areas and Amendment 28 would likely increase the total area of the EFHRCAs, especially of EFHRCAs with priority habitat. Therefore, although Amendment 28 may reduce trawl RCA restrictions, there is likely to be less access to sensitive EFH areas than were fished historically. The magnitude of the overall effects of Amendment 28, are expected to be positive in the long-term.

Amendment 28 proposes to re-open trawl RCA closures to bottom trawl gear. It is possible fishing effort would shift to other areas, including those proposed for reopening. Amendment 28 may result in minor changes in the composition of species caught due to minor shifts in areas fished coastwide. Opening new fishing areas would potentially increase ACL attainment for some species. While higher attainment of underutilized groundfish species such as Dover sole is possible under Amendment 28, overall catch levels would not change under Amendment 28. Although trawl RCA restrictions may be reduced under Amendment 28, there is likely to be less access to sensitive EFH areas than were fished historically. This habitat protection would benefit groundfish and non-groundfish. Non-target species

[23] https://www.pcouncil.org/groundfish/groundfish-essential-fish-habitat/

composition may change slightly due to the minor shifts in areas fished coastwide and would continue to be monitored. A shift in fishing effort could impact eulachon positively or negatively, but catch levels in the trawl fishery are relatively low compared to other fisheries and would be monitored. It is not expected that additional areas being closed or opened in combination with one another would change observation rates under the WCGOP (100 percent monitoring with EM or human observers), change the observed number of interactions, or change the impacts on other protected species because of an overall similar level of effort in the fishery.

Under Amendment 28 it is possible fishing effort would shift to other areas, including those proposed for reopening, thereby mitigating the impacts of displaced landings and displaced revenues from the proposed closed areas. Although groundfish bottom trawl landings are limited by ACLs, opening new fishing areas would give the fleet flexibility to optimize its fishing effort, including potentially increasing ACL attainment for some species. Flexibility for operations and access to more fishing area with the potential for increased attainment in those areas would provide positive economic benefits to the fleet, supply chains, and associated coastal communities. Areas to be closed would contribute to ecosystem services and existence values, while reopened areas may detract from those indirect benefits.

5.2.1.3 Amendment 26 to the Pacific Coast Groundfish FMP

Amendment 26 is in development with NMFS. In November 2015, the Council took final action to remove blackgill rockfish from the slope rockfish complex south of 40º10' N. latitude and reallocate blackgill rockfish and the remaining species in the southern slope rockfish complex to trawl and non-trawl sectors as follows:

- Blackgill sector allocations: 41% to limited entry trawl and 59% to non-trawl sectors;
- Remaining southern slope rockfish allocations: 91% to limited entry trawl and 9% to non-trawl sectors.

Amendment 26 is not expected to change overall harvest levels or the magnitude or distribution of bottom trawl or non-trawl trawl effort. Therefore, it is expected to have neutral impacts on habitat and protected species. Amendment 26 could provide stock-specific benefits to blackgill rockfish which management at the complex level does not provide. Overall, it is expected to have neutral to low positive impacts on the groundfish. Amendment 26 would likely result in a lower allocation of blackgill to the LE trawl sector and the non-trawl sectors compared to what each sector caught between the 2003 and 2013. Ex-vessel revenue and personal income associated with harvesting and processing would be anticipated to decrease slightly. Amendment 26 could redistribute landings revenue from southern port areas to the northern port areas or result in a mixed pattern of shifting landings revenue between northern and southern port areas of landings revenue between northern and southern port areas. Overall, Amendment 28 would have mixed low negative and low positive impacts on the socioeconomic environment.

5.2.2 Effects of the Proposed Action

The Council has identified its preferred action alternatives in Chapter 2. Because of the complexity of the action (one proposed harvest control rule for each of California Scorpionfish, Lingcod N. and Lingcod S.; two action alternatives for yelloweye rockfish rebuilding parameters, and eight proposed new management measures), there are over 100 combinations of alternatives that could be analyzed. This tiered cumulative effects analysis analyzes the cumulative effect of the preferred alternative. The cumulative effect of the no-action alternative is described as the cumulative effect of the proposed actions in the 2016 EA.

While mortality of some groundfish stocks may increase relative to the No Action, catch limits for 2019–20 would continue to consider stock productivity and fishing mortality, and are expected to continue to be effective at ending and preventing overfishing of groundfish. Adjustments to routine management measures are projected to prevent the proposed ACLs from being exceeded. The proposed new management measures (including the stock complex reorganization proposals) could increase the risk of overfishing but their effects are mitigated by ACLs and management measures designed to keep catch within ACLs. Harvest policies or fishery performance would not be expected to change substantially. Therefore, specifications and management measures are not expected to result in a big change in the composition of incidentally caught non-target groundfish. Overall, the proposed action is expected to have neutral to low negative impact on groundfish.

Increases in harvest specifications amounts for 2019–20, particularly for yelloweye rockfish, could result in increased fishing effort and negative habitat impacts compared to the 2017–18 harvest specification levels. Of the new management measures in the proposed action, only adjusting the shoreward, depth-based boundary in the Western CCA for open access fixed gear and recreational fisheries may have discernable impacts (minor negative) on groundfish EFH.

When considered in the context of the fishery management system, the effects of the proposed action on salmon and other protected species are not expected to be significant. While fishing effort may increase under the proposed action, the management measures to address the salmon biological opinion are intended to limit the bycatch of salmon. These measures are expected to be negligible to modestly beneficial to salmon. None of the new management measures would directly affect eulachon bycatch but may have a modest effect on the operation of trawl fisheries, which could indirectly affect bycatch. The effects of the new measures applicable to the fixed gear fishery on the likelihood of humpback whale take is likely to be low. The net effect of the new measures are not expected to appreciably increase the risk of short-tailed albatross take. Overall, the proposed action is expected to have neutral to low positive impacts on protected species.

Increases in harvest specifications amounts for 2019–20, particularly for yelloweye rockfish, could result in increased commercial and recreational fishing opportunities and revenues compared to the 2017–18 harvest specification levels. Preliminary analysis indicates that West Coast groundfish communities would see an increase of about 900 jobs and $60 million in income in 2019, mostly from changes in recreational access to scorpionfish in California. New management measures would be expected to have mixed socioeconomic impacts. Addressing certain reasonable and prudent measures in the salmon biological opinion is likely to increase operational costs for groundfish trawl fisheries. Measures such as modifications to the allowable fishing depths in the Western CCA for commercial fixed gear and/or recreational fisheries would likely result in modest socioeconomic benefit. Overall the 2019–20 harvest specification would be expected to have a positive socioeconomic impact.

5.2.3 Summary of the Cumulative Effects of the Proposed Action and Past, Present, and Reasonably Foreseeable Future Actions

The magnitude and significance of the cumulative effects, which include the additive and synergistic effects of the proposed action, as well as past, present, and future actions, have been taken into account throughout this section.

Overall, when the proposed action is considered in conjunction with all the other pressures placed on fisheries by past, present, and reasonably foreseeable future actions, the incremental effect of the proposed action is not expected to result in any significant cumulative impacts, positive or negative, for any affected resource.

5.2.3.1 Groundfish

Amendment 28 would protect groundfish habitat. Amendment 28 may shift the distribution of fishing effort through the removal of the trawl RCA and changes to the EFHRCA areas. When combined with the expected increase in catch limits under the proposed action, Amendment 28 would further serve to increase flexibility and efficiency so fishermen may increase catch of rebuilt groundfish species and attain more of the ACL. The catch limits under the proposed action would be set consistent with the Pacific Coast Groundfish FMP, based on the best available science, and would be intended to prevent overfishing while achieving optimum yield as required by the MSA. There is 100 percent monitoring and accountability for groundfish IFQ species caught.

The trawl gear action may have an impact on stock productivity if changing the trawl mesh size causes smaller fish to be harvested. However, the incentive to target smaller fish or reduce the net size so as to catch more small fish is not there, nor would Amendment 28 or the proposed action change this incentive. Small fish are not marketable and catch would be covered by IFQ. Therefore, the harvesters are likely to reduce their mesh size just enough to address concerns with gilled fish (fish stuck in the net). This, along with improved used and experimentation with selective devices, may also change size or species selectivity slightly. If at any time a conservation concerns arises such as the exceedance of an annual catch limit in the 2019–20 harvest specifications, the Regional Administrator for NMFS's West Coast Region has the ability to restrict fishing through spatial closures, close a sector, or close a fishery. This action can be taken during routine inseason management or through automatic action authority. Amendment 28 would establish another management tool in Block Area Closure (BAC) boundaries that could be closed to reduce harvest of target or non-target stocks.

Overall impacts from the proposed action were found to be neutral to low negative on groundfish. When combined with the medium positive effects of past, present, and reasonably foreseeable future actions, the incremental effect of the proposed action would not result in significant cumulative impacts on the biological environment.

5.2.3.2 Habitat including Groundfish Essential Fish Habitat

Trawl fishermen would able to access the trawl RCA if it is opened under Amendment 28. It is the footrope, and not chafing gear or double wall codend, that discourages fishing over high-relief areas due to the potential for costly damage or loss of gear. The codend typically floats above the bottom, due to the taper in the net and floats attached to the codend. So, if fishermen moved into high-relief areas within the RCA, they would do so regardless of the relaxed chafing gear and double-wall codend requirements proposed in this action. Soft substrate makes up the majority (94.2 percent) of the habitat within the RCA boundaries. Soft substrates are the most resilient and the fastest to recover, with full recovery possible in as little as one year after bottom trawling. While hard substrate (including high rocky, relief areas) is more vulnerable to the negative impacts associated with trawl gear fishing, only a small portion (2.7 percent) of the RCA area consists of hard substrate.

Most bottom trawl fisherman are expected to target flatfish with small footrope inside the former RCA. If fishermen target pelagic rockfish inside of the RCA, they would probably use the "modified" midwater trawl prior to May 15 as shown by actions of fishermen during the 2017 trawl gear EFP. Matson and Erickson (2017) described how the distribution of fishing effort may change for bottom trawl in the near future (e.g., new bottom trawl effort within what is currently the boundaries of the trawl RCA). Fishermen may opt to use the selective flatfish trawl (SFFT) while targeting flatfish whether within or shoreward of the RCA to avoid salmon, Pacific whiting, or other unwanted semi-pelagic species. Fishermen who may target pelagic or semi-pelagic rockfish within the RCA or shoreward of the RCA may choose to do so with

high-rise, hooded nets in the future, but they may also opt to install salmon excluder devices or select areas and times where Chinook salmon bycatch may be low.

The trawl RCA was not implemented as a habitat protection measure. It was implemented as a way to reduce catch of overfished rockfish species. Fishing historically took place in the trawl RCA as vessels targeted rockfish in these areas. The habitat type within the trawl RCA is mostly soft, with some mixed and hard substrate. EFHRCAs would still be in place and provide protection to hard bottom habitat areas. Amendment 28 is expected to result in a net-gain in protection of high relief habitat even after RCAs are open.

While the impact analysis in this action is focused on direct and indirect impacts to the physical environment, there are a number of non-fishing impacts that must be considered when assessing cumulative impacts. Many of these activities are concentrated near-shore and likely work either additively or synergistically to decrease habitat quality. Other non-fishing factors such as climate change are also thought to play a role in the degradation of habitat.

Overall impacts from the proposed action were found to be low negative on the physical environment due primarily to the increased fishing effort associated with the catch limits. When combined with the low positive effects of past, present, and reasonably foreseeable future actions, the incremental effect of the proposed action would not result in significant cumulative impacts on the physical environment.

5.2.3.3 Protected Species

When considered in the context of the fishery management system, the effects of the proposed action on salmon and other protected species are not expected to be significant. The 2017 incidental take statement for salmon (NMFS 2017) requires the Council to create closure mechanisms for when salmon bycatch thresholds are reached. The Council has proposed these mechanisms in the proposed action. These would close a sector (whiting or non-whiting) once a certain amount of salmon has been taken. Additional measures in the proposed action, such as prohibiting all midwater trawling and all bottom trawling except selective flatfish trawl inside the Klamath River Salmon Conservation Zone and Columbia River Salmon Conservation Zone, would provide additional protection in areas where salmon are known to occur.

Under the trawl gear action, the ability to fish with high-rise trawls shoreward of the RCA may increase salmon catch compared to SFFT if both were towed through the same school of salmon, and if fishermen did not use salmon excluders or other trawl modifications. Elimination of SFFT requirements may cause a shift of effort shoreward of the RCA only when midwater trawling is not allowed (January 1 through May 15). After that, most “beach draggers” that target summer flatfish would likely still use SFFT to avoid bycatch, while those interested in widow and yellowtail would switch to midwater trawl. During January through March, Chinook salmon bycatch for bottom trawl in deeper waters (seaward of the RCA) is higher than shallow waters (shoreward of the RCA). Generally, the magnitude of Chinook salmon bycatch is highest during winter months (November to April) and lowest during summer months (May to October). However, bycatch during summer is higher in shallower waters than deeper waters. So, if SFFT requirements were eliminated, fishermen that would shift effort from deep to shallow waters during January through March might expect lower bycatch rate.

Overall salmon catch would likely be below the Biological Opinion estimates (e.g., 5,500 Chinook salmon for non-whiting trawl). The trawl fishery has 100 percent monitoring and salmon bycatch reports are available approximately 24 hours after the trip. We expect NMFS and the Council to be able to monitor salmon bycatch by species, area, and sector for the trawl fisheries on a weekly basis. Since the vast majority of historical salmon bycatch has been from the trawl fisheries, the timely reporting of salmon bycatch in the trawl fishery should help ensure that inseason monitoring includes the majority of salmon bycatch.

NMFS and the Council have area management tools in place to address salmon bycatch concerns. Bycatch Reduction Areas (BRAs) can be used to close depths shallower than a specified depth contour to vessels using midwater gear to minimize impacts to groundfish, or any prohibited or protected species, such as salmon. This action adds an action to close areas shoreward of the 200 fathom depth contour for a specific sector (i.e., catcher/processor, mothership, shoreside whiting, and shoreside non- whiting midwater).

NMFS and the Council can currently modify the Rockfish Conservation Areas (RCAs) inseason through routine action to ease salmon bycatch by the bottom trawl sector and this would be tool at least until Amendment 28 takes effect. Block Area Closures (BACs) in Amendment 28 could prohibit fishing by vessels using groundfish bottom trawl gear at certain depths and latitudes. The waters off the West Coast, seaward of state waters to the 700 fathom contour line, are proposed to be divided into separate BACs using existing depth contours and latitudes in regulation. Regardless of any regulations or procedures proposed in the reasonably foreseeable future actions, the Regional Administrator of NMFS has the authority to close certain areas to fishing or, in the most extreme case, to close the entire fishery if a conservation concern were to arise. The Biological Opinion requires NMFS and the Council to manage to the salmon guidelines.

The fishing industry is also equipped to react quickly, and more directly, to high bycatch events of salmon compared to broad Council or NMFS actions. In recent years, some industry sub-sectors have shown the ability to be proactive in minimizing salmon bycatch. As an example, the at-sea sectors have instituted self-regulated hotspot closures and move-along rules. The industry has economic and social incentives to minimize salmon bycatch. Voluntary use of salmon and halibut excluder devices is expected. The trawl industry has the incentive of reducing bycatch of all species to remain certified by the Marine Stewardship Council (NMFS and PFMC 2017). The Marine Stewardship Council certified the West Coast LE groundfish trawl fishery as sustainable in 2014 (MSC.org). The Pacific whiting mid-water trawl fishery first achieved Marine Stewardship Council certification as a sustainable and well-managed fishery in 2009 and was recertified in 2017 (MSC.org). It is unlikely that fishing strategies would change significantly throughout the EEZ, due to reasons described above, and any changes in distribution of effort and gear type could be strategic (i.e., to improve efficiency and maintain or reduce bycatch; NMFS and PFMC 2017; Agenda Item G.8 Attachment, March 2016; Matson and Erickson 2017). The availability of these measures and the increased incentives to avoid bycatch, combined with advancements in management, monitoring, and technology, would likely result in Chinook salmon bycatch rates similar to those of recent years. Additional areas being closed or opened in combination with one another under Amendment 28 would not change observation rates under the West Coast Groundfish Observer Program (WCGOP) (100 percent monitoring with electronic monitoring or human observers) or change the observed number of interactions beyond what has been observed under baseline conditions.

The trawl gear action is expected to have neutral to low positive impact for very small species, such as eulachon. If the trawl RCA were removed under Amendment 28, it is assumed that large footrope gear may be used seaward of the 100 fm line (currently it is required seaward of the 150 fm line). We assume that other small footrope gear may be used shoreward of the trawl RCA in the future because vessels are using EFPs to be exempt from the use of SFFT gear, and they use other small footrope gear. The use of these different gear types in various depth bins could impact eulachon, but we are uncertain to what extent. Given the relatively small amount of eulachon caught the groundfish trawl fishery and the level of monitoring and tools with which NMFS can respond, cumulative effects to eulachon are not expected to be significant. The trawl gear action and Amendment 28 are expected to have neutral impact on humpback whales because the gear types affected by the action are not known to have negative effects on this protected species.

Overall impacts from the proposed action were found to be neutral to low positive impacts on protected species. When combined with the medium positive effects of past, present, and reasonably foreseeable

future actions, the incremental effect of the proposed action would not result in significant cumulative impacts on the biological environment.

5.2.3.4 Socioeconomic Environment Including Fishing Communities

The trawl gear action and Amendment 28 would increase operational flexibility and are expected to result in positive socioeconomic impacts. Amendment 26 could redistribute landings revenue from southern port areas to the northern port areas or result in a mixed pattern of shifting landings revenue between northern and southern port areas of landings revenue between northern and southern port areas. When considered in the context of the fishery management system, the effects of the proposed action on the socioeconomic environment are not expected to be significant. Increased flexibility and efficiency may increase catch of rebuilt groundfish species and allow fishermen to attain more of the ACL. However, catch limits would continue be set consistent with the Pacific Coast Groundfish FMP and be based on the best available science, with the goal of preventing overfishing while achieving optimum yield as required by the MSA.

Overall impacts from the proposed action were found to be positive on the socioeconomic environment. When combined with the medium positive effects of past, present, and reasonably foreseeable future actions, the positive incremental effect of the proposed action would not result in significant cumulative impacts on the socioeconomic environment.

Chapter 6 Regulatory Impact Review

The President of the United States signed E.O. 12866, "Regulatory Planning and Review," on September 30, 1993. This order established guidelines for promulgating new regulations and reviewing existing regulations. The E.O. covers a variety of regulatory policy considerations and establishes procedural requirements for analysis of the benefits and costs of regulatory actions. The E.O. stresses that in deciding whether and how to regulate, agencies should assess all of the costs and benefits of available regulatory alternatives. Based on this analysis, they should choose those approaches that maximize net benefits to the Nation, unless a statute requires another regulatory approach.

NMFS satisfies the requirements of E.O. 12866 through the preparation of an RIR. The RIR provides a review of the potential economic effects of a proposed regulatory action in order to gauge the net benefits to the Nation associated with the proposed action. The analysis also provides a review of the problem and policy objectives prompting the regulatory proposal and an evaluation of the available alternatives that could be used to solve the problem.

The RIR provides an assessment that can be used by the Office of Management and Budget to determine whether the proposed action could be considered a significant regulatory action under E.O. 12866. E.O. 12866 defines what qualifies as a "significant regulatory action" and requires agencies to provide analyses of the costs and benefits of such action and of potentially effective and reasonably feasible alternatives. An action may be considered significant if it is expected to: (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the EO.

6.1 Statement of the Problem

The proposed action is needed to conserve and manage Pacific Coast groundfish fishery resources. This proposed action would set catch limit specifications for 2019–20 consistent with existing or revised harvest control rules for all stocks, and establish management measures designed to keep catch within the appropriate limits.

6.2 Description of the fishery and other affected entities

Federally managed Pacific groundfish fisheries occurring within the Exclusive Economic Zone (EEZ) off the coasts of Washington, Oregon, and California establish the geographic context for the proposed action. West Coast communities engaged in these fisheries are also part of the context. Although this is the federal fishery management area, the states manage the fisheries in within 3 miles of their coastlines to meet the goals and objectives of the Pacific Groundfish FMP. A detailed description of the fishery and other affected entities is available in Section 3.5 of the Environmental Assessment (EA) document above.

6.3 Description of the management goals and objectives

The harvest specifications are set consistent with the optimum yield (OY) harvest management framework described in Chapter 4 of the PCGFMP. The management objectives of this action are: 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)) This rule is authorized by 16 U.S.C. § 1854–55 and by the PCGFMP.

6.4 Description of the Alternatives

A detailed description of the harvest specifications, management measures, and integrated Alternatives is available above in Chapter 2 of the EA.

6.5 An Economic Analysis of the Expected Effects of Each Selected Alternative Relative to the No Action Alternative

Note on estimated costs on entities: Potential costs from the proposed rule would be unlikely, and only in the event of ESA-salmon related closures or management restrictions on groundfish sectors. Closures and restrictions are not anticipated by either managers or participants, who monitor their own catch inseason, and in many cases use coop structures and information sharing to limit bycatch. Potential impacts in the event of closures are discussed in detail in Appendix C.1.4 of this document. This harvest specifications, routine management measures, and other new management measures of this rule are not expected to results in additional regulatory costs for any directly regulated entity. Specifically, there are no impact direct compliance, reporting, or recordkeeping costs; changes in market competition between entity types/sizes; taxes or fees required, or other administrative costs associated with this rulemaking. Estimated benefits may vary by entity type and size as defined and described in the IRFA below.

A detailed analysis of the expected effects of the selected Alternative relative to the No Action alternative is available in the Environmental Assessment section 4.2.4 above. The analysis concludes that the Council's preliminary preferred alternative will result in an increase of about 900 jobs and $60 million in coastwide income for 2019 relative to No Action, mostly from changes in recreational access to California scorpionfish, as well as other previously constraining species (yelloweye rockfish, darkblotched rockfish, bocaccio, Pacific Ocean Perch) and target species (lingcod north of 40'10) in both commercial and recreational sectors. The only species with a notable decline (65 percent), starry flounder, is not economically important in either commercial or recreational fisheries. Modest declines (between 10 and 20 percent) in canary rockfish, lingcod south of 40'10, longspine thornyheads, and widow rockfish are not expected to have negative economic impacts, as catch of these species was well below the ACL in baseline year. Management measures will provide operational flexibility, regulatory streamlining, and some modest economic benefits for a subset of harvesters, but are not expected to have significant economic impacts.

6.6 Determination of Significant Impact

As noted above, under E.O. 12866, a regulation is a "significant regulatory action" if it is likely to: (1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order. Pursuant to the procedures established to implement

section 6 of E.O. 12866, the Office of Management and Budget has determined that this action is not significant.

Chapter 7 Initial Regulatory Flexibility Analysis

For any rule subject to notice and comment rulemaking, the RFA requires federal agencies to prepare, and make available for public comment, both an initial and final regulatory flexibility analysis, unless the agency can certify that the proposed and/or final rule would not have a "significant economic impact on a substantial number of small entities." These analyses describe the impact on small businesses, non-profit enterprises, local governments, and other small entities as defined by the RFA (5 U.S.C. § 603). This analysis is to inform the agency and the public of the expected economic effects of the alternatives, and aid the agency in considering any significant regulatory alternatives that would accomplish the applicable objectives and minimize the economic impact on affected small entities. The RFA does not require the alternative with the least cost or with the least adverse effect on small entities be chosen as the preferred alternative.

The IRFA must only address the effects of a proposed rule on entities subject to the regulation (i.e., entities to which the rule will directly apply) rather than all entities affected by the regulation, which would include entities to which the rule will indirectly apply.

7.1 Description of the reasons why action by the agency is being considered

The reasons why agency action is being considered are explained in the "Statement of the Problem" section in the RIR and in the Purpose and Need discussion of section 1.1 in the EA above.

7.2 Statement of the objectives of, and legal basis for, the proposed rule

The reasons why agency action is being considered and legal basis for the proposed rule are explained in the "Description of the Management Goals and Objectives" section in the RIR above.

7.3 A description and, where feasible, estimate of the number of small entities to which the proposed rule will apply

Part 121 of Title 13, Code of Federal Regulations (CFR), sets forth, by North American Industry Classification System (NAICS) categories, the maximum number of employees or average annual gross receipts a business may have to be considered a small entity for RFAA purposes. *See* 13 CFR 121.201. Under this provision, the U.S. Small Business Administration established criteria for businesses in the fishery sector to qualify as small entities. Standards are expressed either in number of employees, or annual receipts in millions of dollars. The number of employees or annual receipts indicates the maximum allowed for a concern and its affiliates to be considered small (13 CFR 121.201).

A business primarily engaged in seafood product preparation and packaging (NAICS 311710) is a small business if it employs 750 or fewer persons on a full time, part time, temporary, or other basis (13 CFR 121.106), at all its affiliated operations.[24]

As the harvest specifications process determines the amount of quota pounds available in the catch share (limited entry trawl permit Individual Fishing Quota) sector, this proposed rule will impact quota share owners. Twenty-two non-whiting quota share permit owners are estimated, based on holdings of first receiver permit affiliation in the non-public West Coast Region permits database, to be primarily engaged in seafood "product preparation and packaging.". According to the size standard defined above, three of the entities that own three of these permits are considered small. These small processing entities were issued 1.7 percent of the non-whiting quota pounds issued in 2018. Some of these small processing entities also own groundfish permits, required on both catcher vessels and catcher processors, which would be regulated by the proposed rule; three small entities primarily engaged in seafood processing own two groundfish permits. Thirty groundfish vessel permits are owned by seven entities who are considered large both estimated independently using the definition above, as well as through ownership affiliation to self-reported size on groundfish permit and first receiver site license permits (self-reported using the definition above). Six of these seven large processing entities were issued 10.2 percent of the non-whiting quota pounds issued in 2018 across sixteen quota share permits. In addition to increasing benefits from recently rebuilt overfished species, at-sea processors are expected to benefit somewhat from the removal of the automatic authority established in conjunction with Amendment 21-3 for recently rebuilt species.

A business primarily engaged in charter fishing boat operation (NAICS 487210) is a small business if it has annual receipts of less than $7.5 million.

There were an estimated 287 active Commercial Passenger Fishing Vessels (charter) engaged in groundfish fishing in California in 2017. In 2017, an estimated 49 charter boats targeted groundfish in Oregon. There is no Oregon license or tracking of "six pack" or party fishing vessel businesses which will also be impacted, however in one week in August 2017, there were 285 boat trips targeting recreational groundfish in Oregon, which would include the 49 charter vessels, and is an upper bound of such entities likely to be impacted in Oregon. Similarly in Washington, the number of party/charter vessels likely to be impacted by the proposed rule was 182 in 2017. All 705 of these vessels are likely to be impacted by changes in recreational catch guidelines for groundfish in their respective states. An unknown number of the charter operations in California described above are expected to benefit somewhat from the modifications to recreational depths inside the Western Cowcod Conservation area.

NMFS's small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing is $11 million in annual gross receipts.[25] *This standard applies to all businesses classified under North American Industry Classification System (NAICS) code 11411 for commercial fishing, including all businesses classified as commercial finfish fishing (NAICS 114111), commercial*

[24] For purposes of rulemaking, NMFS West Coast Region is applying the seafood processor standard to catcher processors (C/Ps) and mothership processor ships, which earn the majority of their revenue from selling processed seafood product.

[25] Provision is made under SBA's regulations for an agency to develop its own industry-specific size standards after consultation with Advocacy and an opportunity for public comment (see 13 CFR 121.903(c)). NMFS has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing (80 FR 81194, December 29, 2015). This standard is only for use by NMFS and only for the purpose of conducting an analysis of economic effects in fulfillment of the agency's obligations under the RFA.

shellfish fishing (NAICS 114112), and other commercial marine fishing (NAICS 114119) businesses. (50 C.F.R. § 200.2; 13 C.F.R. § 121.201).

Groundfish targeting commercial vessels

Entities that are not registered as trusts, estates, governments, or non-profits are assumed to earn the majority of their revenue from commercial fishing. The definition above is thus used for 124 quota share permit owners, who collectively received 76.5 percent of the quota pounds issued in 2018. Benefits are expected to increase for quota share owners proportional with the increase in ACLs for most IFQ species. Limited entry groundfish vessels are required to self-report size across all affiliated entities; of the business who earn the majority of their revenue from commercial fishing, one self-reported as large. This entity owns four groundfish permits and one quota share permit. 264 entities owning 376 permits self-reported as small. The average small entity owns 1.4 permits, with 30 small entities owning between 3-6 permits each. Open access groundfish vessel owners are assumed to earn the majority of their revenue from fishing and would thus fall into this SBA definition. 186 non-limited entry vessels harvested at least $10,000 worth of groundfish in 2017; these are likely to be impacted by the proposed rule. This number is likely an upper bound as some entities may own more than one vessel, however, these generally small operations are assumed to be independent entities; with the top three vessels having coastwide (including non-groundfish) revenues averaging $585,000. Median revenues were $37,000 per vessel.

In addition to benefits from increasing ACLs in the harvest specifications, several of the new management measures contained in the proposed rule are likely to benefit vessels. Clarifications such as the stock complex restructuring and updates to Rockfish Conservation Area coordinates may streamline management burden for vessels. IFQ vessels are expected to benefit from the removal of daily vessel quota pounds, which did not appear to constrain operations but did account for some level of administrative burden for quota pound account managers. With the elimination of these limits, managers will have greater flexibility in moving and holding quota pounds for the remaining overfished species and halibut IBQ. These vessels and vessel account operators may also benefit somewhat from changes to the discard mortality rates in the IFQ program. Some of the non-trawl fixed gear vessels are expected to benefit by the modifications to the commercial depths inside the Western Cowcod Conservation area in California.

Salmon trollers

The proposed rule primarily impacts entities in the groundfish fishery. However, one new management included the proposed rule will likely benefit vessels primarily involved in the salmon troll fishery, through a modification in the incidental lingcod retention ratio in that fishery. This modification reflects the increased rate of lingcod encounters during declining Chinook salmon harvest seasons. This modification would allow salmon trollers to retain and sell a larger number of lingcod caught incidentally when targeting salmon. The level of activity varies substantially, with trips ranging from 500 to over 5,500 in a year. The subsector of the fleet expected to benefit from the proposed rule is much smaller, as historically a small proportion has elected to land lingcod within the previously allowed limits. In order to land lingcod, the vessel would have to install VMS, which likely deters salmon trollers, among other factors. Thus, this provision of the proposed rule is likely to impact 3 vessels in California of the 220 operating there. In Oregon, between 7 and 85 trollers have landed lingcod, and in Washington between 10 and 17. The proposed rule would have a small benefit to these 105 vessels, which landed lingcod on a median of 1-2 trips, with vessels in the 90th percentile landing lingcod on 5 trips annually. This small positive benefit is not expected to be a substantial impact, nor are the entities likely to be impacted a substantial number of the overall salmon troll fishery.

In addition to small businesses, the RFA recognizes and defines other kinds of small entities. *A small governmental jurisdiction is any government or district with a population of less than 50,000 persons.*

According to the public IFQ Account database as of 6/19/2018, the City of Monterey owns quota shares of ten species. The U.S. Census estimates the population to be 28,454 as of July 1, 2017, so would be considered a small governmental jurisdiction by the RFA standard above. The City of Monterey received 0.5 percent of the quota pounds issued for 2018 according to the public IFQ Account database.

A small organization is any not-for-profit enterprise that is independently owned and operated and not dominant in its field (5 U.S.C. § 601). A nonprofit organization is determined to be "not dominant in its field" if it is considered "small" under SBA size standards.[26] *Environmental, conservation, or professional organizations (NAICS 813312, 813920) are considered not dominant in its field (small for the purposes of NMFS rulemaking) if they have combined annual receipts of $15 million or less. Other organizations (NAICS 813319, 813410, 813910, 813930, 813940, 813990) are considered not dominant in their fields with combined annual receipts of $7.5 million or less.*

According to the public IFQ Account database, six not-for-profit organizations own quota share in the catch share program and would thus be impacted by the trawl sector allocation under this proposed rule. Five of these would be considered small by the definition above (2016 annual receipts as reported on IRS form 990 of $120-500 thousand dollars), and one large (self-reported fiscal year 2017 receipts of $1.1 billion). Collectively, the five small not-for-profit organizations received 7.2 percent of the non-whiting[27] quota pounds issued in 2018, and the large not-for-profit organization received 0.5 percent. The large not-for-profit organization also owned four limited entry trawl permits which would be impacted by the management measures of the rule.

7.4 *A small trust, estate, and agency account (NAICS 525920) is defined at 13 C.F.R. § 121.201 as having annual receipts of less than $32.5 million (including affiliates).*

Eleven personal or family trusts/estates owned quota share permits and would thus potentially be impacted by the trawl sector allocation under this proposed rule. All of these are assumed to be smaller than the size standard above. Collectively, these eight small entities received 4.2 percent of the non-whiting quota pounds issued for 2018.

7.5 Reporting and recordkeeping requirements

There are no reporting or recordkeeping requirements associated with this proposed rule.

7.6 An explanation of the criteria used to evaluate whether the rule would impose "significant" economic effects.

NMFS considers two criteria to consider in determining the significance of adverse regulatory effects, namely, disproportionality and profitability.

Disproportionality compares the effect of the regulatory action between small and large entities. These

[26] There is no available guidance beyond this statutory language regarding how to determine if non-profit organizations are "small" for RFA purposes. The Small Business Administration (SBA) does have provisions for determining whether a business is "small" for RFA purposes and whether it is "dominant in its field," and those provisions can inform how NMFS classifies non-profit organizations for the purposes of RFA analyses in rulemaking. After consultation with the SBA, NOAA Fisheries has decided to use SBA's size standards for non-profit organizations to determine whether a non-profit organization is "small" and, in turn, whether it is "dominant in its field," to apply the statutory definition of a "small organization" in practice.

[27] Whiting is issued annually through a separate rulemaking process resulting from international treaty negotiations, see 83 FR 22401 for more information and 2018 allocations).

regulations relate to harvest specifications, with inter and intra-sector allocations largely fixed within the FMP framework and not impacted by biennial determination of ACLs. Management measures are created for each commercial and state recreational fishery independently; with all but the trawl sector made up of exclusively small entities. Regulations in the trawl sector are anticipated to benefit all entities, and are not expected to place any of the small entities described above at a significant competitive disadvantage to large entities.

Profitability. As discussed in the RIR above, there are no compliance costs to entities associated with this rule anticipated for the 2019-2020 biennium. It is assumed, based on available analyses in the supporting Environmental Assessment document and its appendices, that there will not be any explicit costs associated with this rule, with the exception of unlikely closures resulted from what would be historically high takes of endangered salmon species (described in Chapter 6 and Appendix C).

Total/variable/operating costs are not available for most sectors, however analyses summarized in the EA above indicate either neutral or positive changes in expected total gross revenue in both the commercial sectors and, through an increase in number of angler trips, the recreational sector. These increases in total revenue would overstate the likely impacts to profits, as they do not take into account variable operating costs. With management measures and increased harvest levels expected to allow for increased opportunity, it is possible that annual variable costs may increase for harvesters and charter boat operators increasing their days at sea, however they are not predicted to increase as a proportion of revenue. It is rational to assume that entities will only take additional trips if doing so increases their profits, thus, with no compliance costs, the rule is expected to be either neutral or positive for profitability. The harvest levels and management measures will be reevaluated for subsequent bienniums, so any unanticipated costs would be able to be addressed in future biennium specification rulemakings.

An explanation of the criteria used to evaluate whether the rule would impose effects on "a substantial number" of small entities.

This rule will set the harvest specifications and biennial management measures for all 1007 entities described above, all but nine of which are considered small. This is "a substantial number" (one hundred percent) of small entities within the groundfish fishery.

7.7 A description of, and an explanation of the basis for, assumptions used.

Data used to inform this analysis come primarily from PacFIN, and RecFIN, which includes data provided by the states of Oregon, California, and Washington on commercial and recreational fishing trips and landings. Other data sources include the California Passenger Fishing Vessel survey, the West Coast Region permit database, and the West Coast Region Individual Fishing Quota Account public database. The number of entities predicted to be impacted is generally based on the level of participation in the previous year (2017), and as noted above is in some cases likely to be an overestimate of the true number of entities likely to be impacted if current trends continue. However, it is possible that environmental or management conditions change in other fisheries that would impact the level of participation in the groundfish fishery beyond what is predicted here.

7.8 Relevant federal rules that may duplicate, overlap or conflict with the proposed rule:

There are no relevant federal rules that may duplicate, overlap, or conflict with this action.

7.9 A description of any significant alternatives to the proposed rule that accomplish the stated objectives of applicable statutes and that minimize any significant adverse economic impact of the proposed rule on small entities

This rule is not expected to result in adverse impacts to small entities. In the event of a fishery closure under the ESA ITS provisions including in this rule, the loss of revenue in groundfish fisheries would likely have a substantial negative impact on a significant number of small entities. Such a closure is not anticipated by either analysts or industry, given historic catch levels and cooperative management structures with extensive inseason monitoring. Because these provisions are non-discretionary under the ESA, thus, there are no significant alternatives to the proposed rule that would minimize adverse economic impacts on small entities.

The Council did consider alternatives to the proposed rule which would have had a lower level of benefits to small entities, the Council did not consider alternatives that would have had greater benefits to small entities as these would not have met several primary objectives of the rule (prevent overfishing, rebuild overfished stocks, ensure conservation).

Under No Action, the default harvest specifications and associated routine management measures would be implemented using best scientific information available to stablish default harvest control rules for all groundfish stocks. The Council considered alternative specifications for California scorpionfish, lingcod North of 40 40°10' N. lat, and yelloweye rockfish. In each case, the Council selected the harvest control rule that resulted in the maximum benefits to both large and small directly regulated entities. Routine management measures are adjusted according to harvest specifications, which also impact the new management measures available for implementation.

7.10 Conclusion

The analysis above suggests that the proposed rule will impact a significant number of small entities, but that these impacts are expected to range from neutral to positive depending on individual response to increased harvest guidelines and updated management measures. Because there are no anticipated compliance costs or other adverse effects, NMFS concludes (subject to review of any pertinent public comments) that the rule will not have a substantial adverse impact on the significant number of directly regulated entities.

Chapter 8 Magnuson-Stevens Act and FMP Considerations

8.1 Magnuson-Stevens Act National Standards

Below are the 10 National Standards as contained in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), and a brief discussion of how each alternative is consistent with the National Standards, where applicable. In recommending a preferred alternative, the Council must consider how to balance the national standards.

National Standard 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.

MSA section 303(a)(3) requires that each FMP include an estimate of MSY and OY for the fishery. OY is the amount of fish that will provide the greatest overall benefit to the U.S., particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems. OY is prescribed as such on the basis of the MSY from the fishery as reduced by any relevant economic, social, or ecological factor; and in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery. The harvest specification action alternatives are consistent with the OY harvest management framework described in Chapter 4 of the Groundfish FMP. The FMP Chapter 4 describes OY as "a decisional mechanism for resolving the MSA's multiple purposes and policies, implementing an FMP's objectives and balancing the various interests that comprise the national welfare." The OYs are based on MSY or MSY as reduced in consideration of social, economic, or ecological factors.

The most important limitation on the specification of OY is that the choice of OY and the conservation and management measures proposed to achieve it must prevent overfishing (50 CFR Section 600.310(b)). In establishing OYs, the interim step of calculating OFLs, ABC, and ACLs is taken (PCGFMP Section 4.1). OFL is the MSY harvest levels associated with the current stock abundance. Over the long term, if OFLs are fully harvested, the average of the OFLs would be MSY. ABC is a threshold below the OFL, which accounts for scientific uncertainty in the estimate of OFL. ACL is a harvest specification set at or below ABC, and it is intended to prevent overfishing. The ACLs are established to achieve OY. The OY for a stock or stock complex is the long- term average of the stock or stock complex ACLs.

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 PCGFMP 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.

Further, the management measures that are part of the Council's preferred alternative were designed to achieve, but not exceed, the ACLs, and as a result OY.

National Standard 2—Conservation and management measures shall be based upon the best scientific information available.

The best available science standard applies to the following areas relative to this proposed action: stock assessments, rebuilding analyses, and methods for determining management reference points (OFL, ABC, ACL, etc.); these areas form the basis for determining harvest levels and the evaluation of socioeconomic impacts. Harvest specifications for 2019 and 2020 were updated and based on default HCRs (HCRs). These values reflect the application of the best scientific information available to current harvest management policies. The supporting science is discussed below.

The 2018 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 harvest specifications (specifically, ACLs) considered under the proposed action (the action alternatives, including the Preferred Alternative), are based on the most recent stock assessments and 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 more than 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). Additionally, 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. 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, be less in need of regular assessment.

Socioeconomics are also a critical component to fishery management. The NWFSC has developed a model application, called the Input-Output Model for Pacific Coast Fisheries (IOPAC), for estimating personal income impacts of commercial fishing on the West Coast. Outputs from this model are used by the Council in its decision making process. This model is documented in Appendix D.

National Standard 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.

The Council develops and designates management units for groundfish, which include stocks, stock complexes, or geographic subdivisions thereof. Groundfish ACLs are set for these management units. The Groundfish SAFE document details the process by which ACLs for each management unit are developed.

In general, stocks, stock complexes, and geographic subdivisions are managed through the methods in the following discussion. 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.

Stock complexes group co-occurring species (e.g., Other Flatfish), many of which have not been formally assessed. The 2018 Groundfish SAFE document describes how ACLs for stock complexes are developed, based on ABC and ACL 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 the fact that 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.

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. For example, in this biennial harvest specification, lingcod (*Ophiodon elongatus*) is divided into two management units; one unit is for lingcod north of 40°10' N lat. and the other for those south of 40°10' N lat. The Council can designate separate ACLs for geographic subcomponents of a stock for management purposes.

As part of the Council's preferred alternative, this action would make changes to several of the stock complexes in order to better align stocks that have similar habitat usage or are subject to similar fishing effort. This action helps achieve the goal of managing interrelated stocks of fish as a unit.

National Standard 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 a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

Chapter 3 describes allocation decisions made during this biennial harvest specification process. The proposed measures will not discriminate between residents of different states. Decision-making on allocations occurs through the Council process, which facilitates substantial participation by state representatives and the public. Generally, state proposals are brought forward when alternatives are crafted and integrated to the degree practicable. Emphasis is placed on equitable division, while achieving conservation goals. Allocation decisions are also made as part of the Council's biennial harvest specifications process for those stocks that do not, at present, have established formal allocations under the PCGFMP.

National Standard 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.

Measures have been taken to reduce fishing capacity in the limited entry trawl fleet and non-trawl fleets. These measures include the 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—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. Such measures include spatial closures, catch control, and input controls. For example, different RCA configurations are established for different gear types (trawl versus fixed gear). Catch control tools can be specific to fishery. 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 OA sector, cumulative trip limits are used for particular management units and/or during certain times of the year. Input control can be used as a

recreational fishery management tool, for example area closures and bag limits can be proposed by the states and are appropriate to the catches and characteristics of each state's recreational fishery.

National Standard 7—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 are minimized.

National Standard 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 National Standard 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.

The 2015 EIS evaluating 2015–16 harvest specifications and management measures and Amendment 24 to the PCGFMP (PFMC and NMFS 2015) evaluates the long-term effects of alternative harvest management policies on fishing communities. The short-term impacts of the current proposed actions do not differ substantially in context or intensity from the impacts disclosed in the 2015 EIS (see Section 4.2). These effects were taken into account in choosing the Preferred Integrated Alternative (incorporating harvest specifications and related management measures). Target species catch for each alternative is projected based on these management measures; allowing 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) to be calculated.

In particular, the changes to the yelloweye rockfish rebuilding plan as part of the Council's preferred alternative were initiated primarily to account for the needs of fishing communities. The Council selected a new default harvest control rule in order to more appropriately account for the needs of West Coast communities by providing greater opportunity in both commercial and recreational groundfish sectors and improving income stability for dependent communities.

West Coast fishing communities depend on a portfolio of commercial and recreational fisheries to support year-round operations. Recent coastwide declines in commercial and recreational fisheries for non-groundfish species due to changing environmental conditions and changes in management have created considerable instability for many communities.

For the recreational sectors in communities off Washington, Oregon, and California, the proposed change to the rebuilding plan and higher ACLs for yelloweye rockfish would allow reduced depth restrictions, which would allow more targeting of a broader suite of species such as yellowtail rockfish, lingcod, and chilipepper rockfish, while also reducing pressure on sensitive nearshore stocks such as black rockfish (see Section B.5.3 of Appendix B of the Analysis). For commercial trawl activity in communities, this proposed action would facilitate more quota trading, and in doing so increase attainment of underutilized species, including lingcod, chilipepper rockfish, and Pacific cod (see Section B.5.2.3 of Appendix B of the Analysis). For commercial fixed gear activity in communities, the proposed change in the rebuilding plan could allow for future actions to consider reopening the non-trawl Rockfish Conservation Area or to increase trip limits (see Section B.5.2.2 of Appendix B of the Analysis). Overall, the proposed change would also allow for additional research opportunities to collect much-needed data to better inform stock assessments and management decisions. As a result, this action would not only provide for the sustained participation of communities in the groundfish fisheries, but also create substantial positive economic impacts for these communities.

National Standard 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.

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). Non-trawl sectors use cumulative trip limits as the principal catch control tool. Because trip limits are based on landings, setting them at a low level to discourage directed and incidental catch of overfished species can result in regulatory 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 CP sector 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 OA fisheries are subject to partial observer coverage. The observer data are used to develop bycatch rate estimates, which can be used to forecast and account for total catch of all managed species.

The salmon bycatch mitigation measures included in the Council's preferred alternative will have a positive impact on minimizing bycatch, especially in the trawl fisheries.

National Standard 10—Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Individual accountability under catch share management has resulted in vessels more often fishing seaward of the RCA 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. A study reported to the Council in the 2015 Annual State of the California Current Ecosystem Report (California Current Integrated Ecosystem Assessment Team 2015) found that since catch share (IFQ) management was implemented in the groundfish fishery "the overall average annual rate of fishing on high wind days to decrease by 85 percent, even accounting for the influence of safety trainings and other types of Coast Guard regulations that have varied over time."

8.2 Consistency of the Proposed Actions with 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). The full analysis of the proposed changes to the yelloweye rockfish rebuilding plan can be found in Appendix B.

NMFS prepared an EIS evaluating programmatic measures designed to identify and describe West Coast groundfish EFH (NMFS 2005) and to minimize potential fishing impacts on West Coast groundfish EFH. The Council took final action amending the PCGFMP 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. This process is ongoing; the Council chose a preferred alternative in April 2018. The current proposed actions are unlikely to result in adverse impacts to EFH outside those disclosed in Section 4.1.4 in the 2015 EIS. That EIS describes impacts of the groundfish management program on EFH, consistent with the EFH assessment requirements of 50 CFR 600.920 (e)(3).

Chapter 9 Persons and Agencies Consulted

Most of the analyses done in this EA, as well as the analyses and write-up in the appendices, were contributions from the Pacific Council's Groundfish Management Team (GMT). Much of the document preparation and authorship of the EA was done by Pacific Council staff. The following persons made significant contributions to the EA.

Name	Affiliation	Contribution
Kelly Ames	NMFS WCR	App. A, document review
Kit Dahl	PFMC	Socioeconomics write-up, protected species write-up, document review
John DeVore	PFMC	Biological impact assessment; lead document writer
Jessi Doerpinghaus	WDFW, GMT	Non-nearshore modeling and model documentation, salmon mitigation measures analysis, Am 16-3 modeling, App. B, document review
Gretchen Hanshew	NMFS WCR	Document review
Abigail Harley	NMFS WCR, GMT	App. B lead author, document review
Brian Hooper	NMFS WCR	Document review
Galeeb Kachra	NMFS WCR	Document review
Keeley Kent	NMFS WCR	Document review
Melissa Mandrup	CDFW, GMT	Nearshore fishery modeling, non-trawl RCA analysis, CCA analysis, App. B, document review
Lynn Mattes	ODFW, GMT	OR recreational fishery modeling and model documentation, App. B, document review, GMT chair
Sean Matson	NMFS WCR	IFQ modeling and model documentation, App. B
Caroline McKnight	CDFW, GMT	CA recreational fishery modeling and model documentation, CCA analysis, App. B, document review
Patrick Mirick	ODFW, GMT	Nearshore and non-nearshore modeling, sablefish and lingcod DMRs analysis, salmon mitigation measures analysis, App. B, document review
Karen Palmigiano	NMFS WCR, GMT	App. B, document review
Joe Peterson	Makah Tribe, GMT	Tribal fishery modeling and documentation, App. B, document review
Todd Phillips	PFMC	Document review
Heather Reed	WDFW, GMT	WA recreational fishery modeling and model documentation, App. B, document review
Maggie Smith	NOAA GC	Document review
Kayleigh Somers	NMFS NWFSC, GMT	Total mortality estimates, document review
Andi Stephens	NMFS NWFSC, GMT	App. B, document review

Name	Affiliation	Contribution
Aja Szumylo	NMFS WCR	Document review
Andrew Thompson	NMFS SWFSC, GMT	Document review
Ed Waters	Private contractor	Socioeconomics analysis and write-up

Chapter 10 Literature Cited

Dick, E. J. and A. D. MacCall. 2013. Status and productivity of cowcod, *Sebastes levis*, in the Southern California Bight, 2013. Pacific Fishery Management Council, Portland, OR.

Eschmeyer, W. N., E. S. Herald, and H. Hammon. 1983. A Field Guide to Pacific Coast Fishes of North America. Houghton Mifflin, Boston.

Frey, H. W. 1971. California's living marine resources and their utilization. Calif. Dept. Fish Game.

Gertseva, V. and J. M. Cope. 2017a. Rebuilding analysis for yelloweye rockfish (*Sebastes ruberrimus*) based on the 2017 stock assessment. Pacific Fishery Management Council, Portland, OR.

Gertseva, V. and J. M. Cope. 2017b. Stock assessment of the yelloweye rockfish (*Sebastes ruberrimus*) in state and Federal waters off California, Oregon and Washington. Pacific Fishery Management Council, Portland, OR.

Gladics, A. J., E. F. Melvin, R. M. Suryan, T. P. Good, J. E. Jannot, and T. J. Guy. 2017. Fishery-specific solutions to seabird bycatch in the U.S. West Coast sablefish fishery. Fisheries Research 196:85-95.

Haltuch, M. A., J. Wallace, C. A. Akselrud, J. Nowlis, L. A. K. Barnett, J. L. Valero, and coauthors. 2018. 2017 Lingcod Stock Assessment. Pacific Fishery Management Council, Portland, OR.

Hamel, O. and K. Ono. 2011. Stock Assessment of Pacific Ocean Perch in Waters off of the U.S. West Coast in 2011. NWFSC, Seattle, WA, September 20, 2011.

Hamel, O. S. 2015. A method for calculating the meta-analytical prior for the natural mortality rate using multiple life history correlates. ICES J.of Mar.Sci. 72:62-69.

Hamel, O. S., S. A. Sethi, and T. F. Wadsworth. 2009. Status and future prospects for Lingcod in waters off Washington, Oregon, and California as assessed in 2009. Pacific Fishery Management Council, Portland, OR.

He, X. and J. C. Field. 2018. Stock Assessment Update: Status of Bocaccio, *Sebastes paucispinis*, in the Conception, Monterey and Eureka INPFC areas for 2017. Pacific Fishery Management Council, Portland, OR.

Hicks, A. C. and C. R. Wetzel. 2015. The Status of Widow Rockfish (*Sebastes entomelas*) Along the U.S. West Coast in 2015. Pacific Fishery Management Council, Portland, OR.

Leonard, J. and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., Seattle, June 2011.

Love, M. S. 2011. Certainly more than you want to know about the fishes of the Pacific Coast. A postmodern experience. Really Big Press, Santa Barbara, CA.

Love, M. S., B. Axell, P. Morris, R. Collins, and A. Brooks. 1987. Life history and fishery of the California scorpionfish, Scorpaena guttata , within the Southern California Bight. Fishery Bulletin 85:90-116.

Matson, S. and D. L. Erickson. 2017. Analysis of the west coast groundfish fisheries for the 2017 salmon ESA Biological Opinion. National Marine Fisheries Service, West Coast Region, Seattle, WA. October 2017. Unpublished Document. 81 pages.

Monk, M. H., X. He, and J. Budrick. 2018. Status of California scorpionfish (*Scorpaena guttata*) off southern California in 2017. Pacific Fishery Management Council, Portland, OR.

NMFS (National Marine Fisheries Service). 2012a. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Section 7(a)(2) "Not Likely to Adversely Affect" Determination; Continuing Operation of the Pacific Coast Groundfish Fishery. National Marine Fisheries Service Northwest Region, Seattle, December 7, 2012, PCTS Number: NWR-2012-876.

NMFS (National Marine Fisheries Service). 2012b. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion on the Operation of the Pacific Coast Groundfish Fishery in 2012. National Marine Fisheries Service, Seattle, February 9, 2012.

NMFS (National Marine Fisheries Service). 2013. Groundfish Essential Fish Habitat Synthesis: A Report to the Pacific Fishery Management Council. NOAA NMFS Northwest Fisheries Science Center, Seattle, April 2013.

NMFS. 2016. Amendment 27 to the Pacific Coast Groundfish Fishery Management Plan and 2017-2018 Harvest Specifications and Management Measures Final Environmental Assessment. National Marine Fisheries Service, West Coast Region, Seattle, December 2016.

NMFS. 2017. Endangred Species Act (ESA) Section 7(a)(2) Biological Opinion; Reinitiation of Section 7 Consultation Regarding the Pacific Fisheries Management Council's Groundfish Fishery Management Plan, December 11, 2017.

NOAA Fisheries. 2017. 2016 West Coast Entanglement Summary, March 2017.

NOAA Fisheries. 2018. 2017 West Coast Entanglement Summary, May 2018.

National Marine Fisheries Service (NMFS) and Pacific Fishery Management Council (PFMC). 2017. West coast groundfish trawl catch share program five-year review – Draft. National Marine Fisheries Service, Seattle WA and Pacific Fishery Management Council, Portland OR. August 2017. Available at https://www.pcouncil.org/groundfish/fishery-management-plan/trailing-actions/public-review-draft-of-the-groundfish-trawl-catch-share-program-five-year-review/. Web site accessed July 20, 2018.

PFMC (Pacific Fishery Management Council). 2018. Status of the Pacific Coast Groundfish Fishery, Stock Assessment and Fishery Evaluation (SAFE), Description of the Fishery, Portland (OR), April 2018.

PFMC and NMFS (Pacific Fishery Management Council and National Marine Fisheries Service). 2015. Final Environmental Impact Statement for Harvest Specifications And Management Measures for 2015-2016 and Biennial Periods Thereafter; Includes the Reorganization of Groundfish Stock Complexes, Designation of Ecosystem Component Species and Amendment 24 to the Pacific Coast Groundfish Fishery Management Plan to Establish a Process for Determining Default Harvest Specifications, Portland and Seattle, January 2015.

Taylor, I. G. 2011. Rebuilding analysis for yelloweye rockfish based on the 2011 update stock assessment. NMFS, Seattle, WA, October 13, 2011.

Taylor, I. G. and C. Wetzel. 2011. Status of the U.S. yelloweye rockfish resource in 2011 (Update of 2009 assessment model). Pacific Fishery Management Council, Portland, OR.

Thorson, J. T. and C. Wetzel. 2015. The status of canary rockfish (*Sebastes pinniger*) in the California Current on 2015. Pacific Fishery Management Council, Portland, OR.

USFWS (United States Fish and Wildlife Service). 2017. Biological Opinion Regarding the Effects of the Continued Operation of the Pacific Coast Groundfish Fishery as Governed by the Pacific Coast Fishery Management Plan and Implementing Regulations at 50 CFR Part 660 by the National Marine Fisheries Service on California Least Tern (*Sterna antillarum browni*), Southern Sea Otter (*Enhydra lutris nereis*), Bull trout (*Salvelinus confluentus*), Marbled Murrelet (*Brachyramphus marmoratus*), and Short-tailed Albatross (*Phoebastria albatrus*). United States Fish and Wildlife Service, Oregon Fish and Wildlife Office, Portland (OR), May 2, 2017, FWS Reference Number 01EOFW00-2017-F-0316.

Wetzel, C. R., L. Cronin-Fine, and K. F. Johnson. 2017. Status of Pacific ocean perch (*Sebastes alutus*) along the U.S. west coast in 2017. Pacific Fishery Management Council, Portland, OR.