Agenda Item F.4
Attachment 2 (Electronic Only)
April 2016

AN ELECTRONIC MONITORING PROGRAM FOR THE LIMITED ENTRY GROUNDFISH TRAWL FISHERY

DRAFT ENVIRONMENTAL ASSESSMENT FOR A REGULATORY AMENDMENT TO THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

APRIL 2016

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GLOSSARY

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

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

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

Electronic Reporting (ER) – The use of technologies – such as smart phones, computers and tablets – to record, transmit, receive, and store fishery data. Electronic fish tickets and logbooks are most common electronic reporting tools.

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

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

Individual Bycatch Quota – means the amount of bycatch quota for an individual species/species group and area expressed as a percentage of the annual allocation of allowable bycatch mortality to the Shorebased IFQ Program. IBQ is used as the basis for the annual calculation and allocation of a QS permit owner's IBQ pounds in the Shorebased IFQ Program. Both IBQ and QS may be listed on a QS permit and in the associated QS account. Species for which IBQ will be issued for the Shorebased IFQ Program are listed at §660.140, subpart D.

Maximized Retention – A type of fishery where total catch is retained and brought to shore, except for minor operational amounts of catch lost by a catcher vessel. . Except where prohibited by law, a vessel is generally required to retain all catch share species, non-catch share groundfish species, non-groundfish species, non-FMP and prohibited species.

Mothership Cooperative Program – The mothership cooperative program consists of one or more cooperatives and the non-cooperative fishery. The cooperative portion of the fishery includes: owners of mothership catcher vessel (MS/CV) endorsed limited entry trawl permits that are members of a cooperative, and harvesting vessels registered to those permits; owners of mothership permits and processing vessels registered to those permits; and vessels authorized to fish for the cooperative but are not members and are registered to a limited entry trawl permit (but not necessarily one with an MS/CV endorsement).

Operational Discards – Pacific whiting removed from the deck and fishing gear during cleaning may be discarded, provided that the total operational discards must not exceed one basket from any single haul, with the maximum dimensions of the basket being 24 inches by 16 inches by 16 inches. If net cleaning results in a greater amount, all catch in excess of the one basket must be placed into the fish hold. Discarding operational discards of more than one basket of Pacific whiting per haul is prohibited. Discarding any quantity of groundfish species other than Pacific whiting is prohibited

Quota Pound – (QP) means the quotas, expressed in round weight of fish that are issued annually to each QS permit owner in the Shorebased IFQ Program based on the amount of QS they own and the amount of fish allocated to the Shorebased IFQ Program. QP have the same species/species group and area designations as the QS from which they are issued.

Quota Shares – (QS) means the amount of fishing quota for an individual species/species group and area expressed as a percentage of the annual allocation of fish to the Shorebased IFQ Program. The QS is used as the basis for the annual calculation and allocation of a QS permit owner's QP in the Shorebased IFQ Program. Both QS and IBQ may be listed on a QS permit and in the associated QS account. Species for which QS will be issued for the Shorebased IFQ Program are listed at §660.140, subpart D.

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

Retained catch for fixed gear and trawl – Retained catch is any portion of the total catch that is delivered to a buyer or processor either at se or on shore.

West Coast Groundfish Individual Fishermen's Quota System (IFQ): The new catch shares system divides the total amount of an overall allowable catch or quota into shares controlled by individual fishermen. These shares can be harvested at the fishermen's discretion. The program holds fishermen accountable for their deliberate catch as well as bycatch. This means that all fish harvested are deducted from the fisherman's personal quota including fish that are discarded.

Acronyms

DOC ..... Department of Commerce
EFH ..... essential fish habitat
ESA ..... Endangered Species Act
FG.....fixed gear
FMP .....fishery management plan
IFQ .....individual fishing quota
MMPA ..... Marine Mammal Protection Act
MSA ..... Magnuson-Stevens Fishery Conservation and Management Act
NEPA ..... National Environmental Policy Act

NOAA ..... National Oceanic and Atmospheric Administration
NOAA Fisheries or NMFS ..... National Marine Fisheries Service
NWFSC ..... Northwest Fisheries Science Center
PFMC ..... Pacific Fishery Management Council
PSMFC ..... Pacific States Marine Fisheries Commission
SWFSC ..... Southwest Fisheries Science Center
WCR ..... NMFS West Coast Region

CHAPTER 1 INTRODUCTION

The proposed action would implement an Electronic Monitoring (EM) program for Limited Entry (LE) midwater trawl vessels that fish in the mothership co-op and Shorebased Individual Fishing Quota (IFQ) sectors of the Pacific whiting fishery (midwater trawl whiting fishery), and for LE trawl vessels that use Fixed Gear (FG)to deliver fish under the Shorebased IFQ program (IFQ FG fishery). Electronic Monitoring refers to the use of technologies – such as vessel monitoring systems or video cameras – to passively monitor fishing operations through observing or tracking. Video monitoring is often referred to as EM. An EM program for bottomtrawl and non-whiting midwater trawl vessels is currently under development and is not part of this action. Vessel owners would have the option to obtain an exemption from the requirement to have 100 percent human observer coverage, provided that their vessels carry an EM system (cameras and associated sensors). Vessel operators and crew would need to comply with new catch handling requirements, species retention and discard requirements, reporting requirements, and other conditions. Logbooks and EM data would be used to account for IFQ and mothership catcher vessel discard at sea in lieu of human observer estimates.

This document is an Environmental Assessment (EA), which provides an assessment of the environmental impacts of the proposed action and its reasonable alternatives compared to the No Action alternative. This EA addresses the statutory requirements of the National Environmental Policy Act and other laws and Executive Orders. The purposes of an EA are to aid decision making by federal agencies and to provide the public an opportunity to participate in these decisions.

This document analyzes the effects of establishing an EM program for midwater trawl whiting catcher vessels and for IFQ FG vessels only. The proposed EM program would be established to monitor vessels for compliance with IFQ and individual bycatch quotas (IBQ) assigned to quota share (QS) permit holders under the Shorebased IFQ program, and assist in monitoring groundfish allocations provided to the shoreside and mothership fishing sectors. The main purpose of EM is to monitor discard of catch using video cameras and logbooks, and includes speciation and weight estimations of discards. Logbooks and EM data would be used to account for IFQ discard at sea in lieu of human observers, and for accounting purposes of mothership discard against the mothership sector quotas.

This document analyzes the effects of establishing an EM program for midwater trawl whiting catcher vessels and for IFQ FG vessels only. The proposed EM program would be established to monitor vessels for compliance with IFQ and individual bycatch quotas (IBQ) assigned to quota share (QS) permit holders under the Shorebased IFQ program, and assist in monitoring groundfish allocations provided to the shoreside and mothership fishing sectors. The main purpose of EM is to monitor discard of catch using video cameras and logbooks, and includes speciation and weight estimations of discards. Logbooks and EM data would be used to account for IFQ discard at sea in lieu of human observers, and for accounting purposes of mothership discard against the mothership sector quotas.

This document analyzes the effects an EM program would have on the socioeconomic, biological, and physical environments. The alternatives considered are intended to maintain the full accountability of IFQs, individual bycatch quotas (IBQs), and groundfish allocations managed under the Shorebased catch share program and Mothership Coop Program. The proposed program is a new administrative program to collect, verify, and document discard data. No additional allocations of fish resources would be required

(i.e., no changes to IFQ or catch allocation distribution rules), regulations associated with fishing operations (area fished, effort, or gear used) would remain unchanged under the proposed program. Impacts to the biological and physical environment are not expected to change and would likely be similar to those realized under the current Shorebased IFQ program and Mothership Co-op programs. Through giving fishermen a choice of whether to carry an observer or to deploy EM, i's expected that the EM program would provide positive socioeconomic benefits for the industry. However, because EM results in a new program, the, administrative costs to administer the new program may increase for NMFS.

1.1 Background of this Action

The Council's Pacific Coast Groundfish Fishery Management Plan (FMP) limited entry groundfish trawl fishery includes an LE midwater trawl and an LE bottom trawl fishery (Figure 1-1).

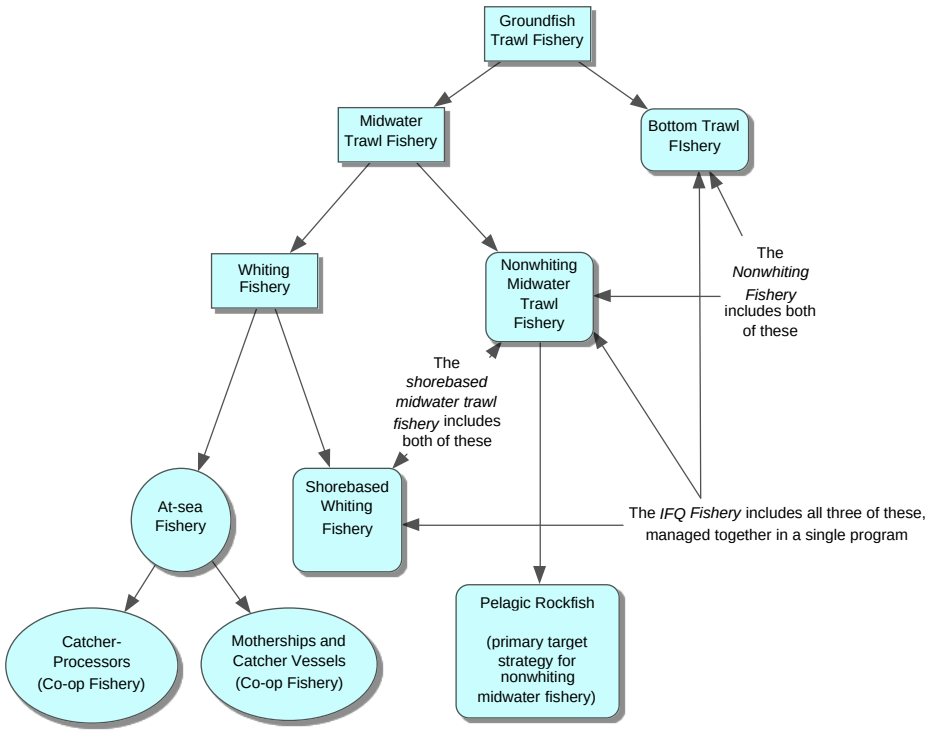

Figure 1-1.Schematic of groundfish trawl fishery sectors.

Catcher vessels in LE midwater trawl fishery mainly target Pacific whiting and operate in the at-sea mothership fishery and the shorebased fishery. In this document we refer to these vessels as the midwater trawl whiting fishery and does not include the catcher/processor vessels. Typically 29 to 32 shorebased vessels and 26 mothership catcher vessels operate annually in the midwater trawl whiting fishery. However up to 26 vessels operate in both fisheries, for a total of 30 unique whiting vessels.

The LE trawl fishery regulations allow vessels to use a fixed gear (FG) endorsement with their LE trawl permit in order to fish non-trawl gear such as longline and pot gear. These vessels can efficiently, and with little bycatch, target sablefish and land them under the Shorebased IFQ program to fully utilize

their IFQ on an annual basis. In this document we refer to this fishery as the IFQ FG fishery. Up to 26 vessels per year use FG under the Shorebased IFQ program.

In 2011, National Marine Fisheries Service (NMFS) implemented the trawl catch share program for the West Coast limited entry groundfish trawl fishery (See Appendix E of the Pacific Coast Groundfish FMP for a description of the program and allocations, PFMC 2010). The program replaced most cumulative landing limits (in both whiting and non-whiting shoreside limited entry trawl sectors) with individual fishing quotas. The catch share program includes a Shorebased Individual Fishing Quota Program (Shorebased IFQ program) and a whiting Co-op program for the mothership sector. Catch and discard are monitored using vessel observers and this information is used to debit IFQ program accounts under the Shorebased IFQ program, and monitor total catch for the mothership whiting fishery sector.

The catch share program also includes a requirement for human observers on all fishing trips (100% observer coverage) for compliance monitoring and the collection of scientific information. Observer data, in combination with landings data, enable shoreside fishermen to track their individual fishing quotas and provide managers with near real-time data to monitor the progress of sector allocations and individual quota share accounts. 100% observer coverage is required to provide for the individual accountability on which the program relies, to fully achieve the potential program benefits, and to prevent a complex and challenging enforcement/management circumstances which would arise if some vessels were monitored and others were not.

When the catch share program was implemented, NMFS subsidized for the observer coverage with the understanding that at some point in the near future the industry would be responsible for full payment of the observer coverage. The average daily cost for an observer in 2015 ranged from $450 to $600 per day; and the 2015 the Federal government subsidy to offset the cost for an observer per day of fishing activity was $108 per day. This subsidy program ended in 2015. Therefore in 2016, the industry is responsible for the full cost of human observer coverage.

From 2004 to 2010, electronic monitoring (EM) was tested on midwater whiting trawl catcher vessels operating in the shorebased sector. The goal of the program was to monitor vessels for compliance with maximized retention regulations; generally no discards were allowed prior to delivery and EM was used to account for the discards that occurred. In 2010, EM was proposed to be permanently implemented in the shorebased and MS sectors; however, in 2011 NMFS implemented the catch share program with 100% observer coverage. Therefore, the proposed EM program was not implemented.

Participants in the catch share program have indicated that the rising cost for observer coverage and other operating costs are hindering participation in groundfish fisheries and lowering profitability. There are logistical issues with obtaining observers. For example, vessels must provide 72 hour notice to secure an observer prior to departure on a fishing trip.

The fishing industry would like more flexibility in the decision making process of when to go fishing and prefer not to wait up to 72 hours for an observer to start a trip. Although there are different logistical issues with EM, EM is viewed by the fleet, especially by the mothership and shoreside whiting vessels as an economical and flexible substitute for human observers. EM is not being considered for use on whiting catcher/processor vessels or the mothership processing vessels.

The proposed program would be voluntary and includes eligibility requirements to use EM and a process for vessels to declare their intention to use EM prior to fishing. Other components would include but are not limited to individual vessel monitoring plans, equipment and installation requirements for a

video monitoring system, video data processing protocols, and compliance measures. Under the proposed EM program, the regulatory requirement of 100 percent human observer coverage on all fishing trips would be maintained; however, if a vessel qualifies for and chooses to fish using an EM system on a trip, the vessel would be exempt from the requirement for a human observer on the trip for compliance monitoring.

The proposed EM program is not intended to meet the needs for collecting biological data or monitoring for other scientific information. Human observers would still be necessary to collect this information at an appropriate level to support scientific needs; therefore, on EM trips the vessel could be randomly selected by NMFS to carry an observer for the purpose of collecting scientific information. Vessel operators would continue to make arrangements with third party observer providers to secure an observer if required to do so; however, NMFS would revert to pre-TIQ/Mothership Co-op levels of 20 to 25 percent, NMFS would bear the cost of the scientific observers.

1.1.1 What is Electronic monitoring?

Electronic monitoring (EM)) is the use of technologies – such as vessel monitoring systems or video cameras – to passively monitor fishing operations through tracking location and speed or observing gear and deck activity. Video monitoring is often referred to as EM. Figure 1-2 provides an example of a closed video system with cameras, sensors, Global Positioning System (GPS receiver, and a control center. A computer hard drive stores the video images, location data, and the sensor information for review at a later date at a mainland facility. The hard drive can be removed and a new one loaded to continue storing data while at sea or in port by a fisherman or technical staff. The sensor data provides an accurate account of vessel activity that could be used to develop a distinctive digital "signature" of vessel activities including transit, gear setting, net towing, net retrieval, and catch stowage (McElderry et, al. 2014). The video images record all fishing activities from several angles (up to four cameras) to capture the handling of fish and any discard activity.

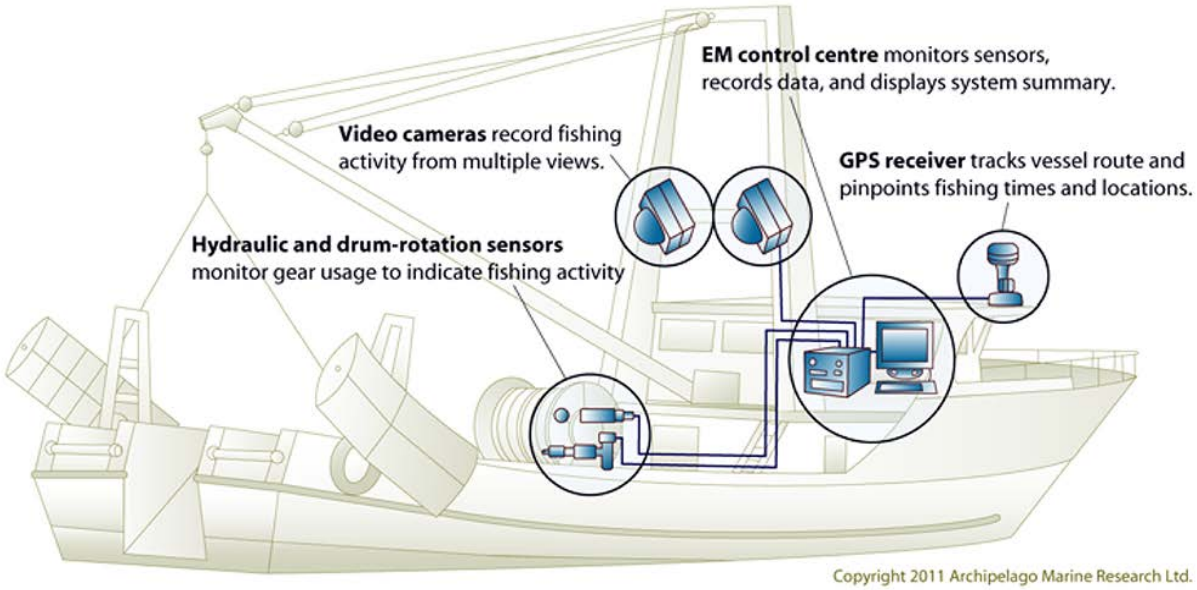

Figure 1-2. General EM system schematic for a trawl vessel.

1.2 Purpose and Need for the Proposed Action

There is a need to adequately monitor the catch share program for compliance in an economical and flexible manner while meeting the goals and objectives of national policies and standards, the Pacific Coast Groundfish FMP, the trawl rationalization program, and all applicable laws and acts including the Magnuson-Stevens Act (MSA) and Endangered Species Act (ESA). NMFS and the Council considers EM as a viable option to monitor the catch share program for compliance with IFQs and individual and mothership coop sector allocations. As discussed below, this action is supported by the NMFS Policy on Electronic Technologies and Fishery-Dependent Data (http://www.nmfs.noaa.gov/op/pds/documents/30/30-133.pdf) and the associated WCR/PFMC Regional Electronic Technologies Plan (http://www.pcouncil.org/2015/03/35239/nmfs-releases-regional-electronic-technology-implementation-plans/).

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

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

1.3 Description of the Management Area

The west coast groundfish trawl fishery is jointly managed by state and Federal authorities under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), which was passed in 1976 to "Americanize" U.S. fisheries. In addition to establishing eight regional fishery management councils, the MSA extended U.S. fishery management authority in territorial waters from 12 miles out to 200 miles from the shore. This created the exclusive economic zone (EEZ), which, including U.S. Federal territorial waters, extends from 3 to 200 miles off shore. For the west coast (California, Oregon, and Washington), the Pacific Fishery Management Council (the Council) coordinates Federal management of fisheries in the Federal EEZ with state management of fisheries occurring in state waters (i.e., between the shoreline and 3 miles offshore). The groundfish trawl fishery is subject to a Federal license limitation program (referred to as LE), implemented in 1994; currently there are 178 groundfish LE trawl permits.

The activities covered under this document occur within the California current system off the West Coast (Figure 3-2). A more detailed description of the physical and biological oceanography of Pacific Coast marine ecosystems can be found in PFMC 2013b.

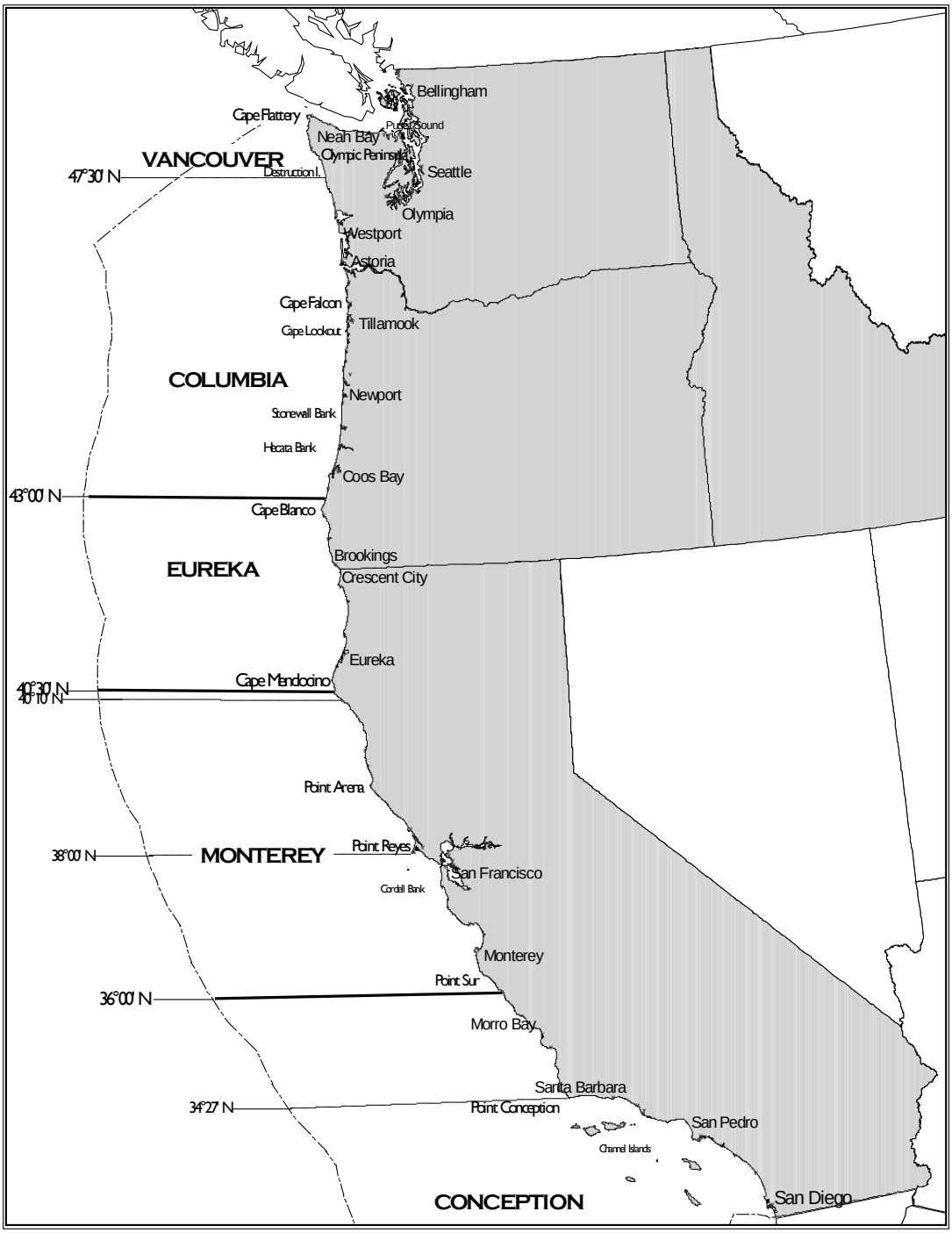

Figure 1-3. Fishery management lines on the U.S. west coast. Source: PFMC 2014, SAFE.

1.4 Scoping Process for EM use in the Catch Shares Program

1.4.1 How the Council Reached the Decision to Consider EM

Based on rising costs for observer coverage and the potential opportunity to increase flexibility in planning fishing activity, the industry requested that the Council consider the use of EM in monitoring catch share program for compliance with IFQs and sector allocations. In 2012, the Council began the public scoping process to analyze EM use for the midwater trawl and bottom trawl fisheries, including

those vessels that use longline and pots (see Sections 0 and 4.5 for further discussion). However, in September 2014 the Council chose to move forward with the intent to implement EM for use in the whiting fishery first, and consider implementation of EM for other catch share fisheries in the near future. Then, in November 2015 the Council decided to move whiting and FG fisheries forward for possible implementation in January 2017.

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

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

Therefore, NMFS Policy Directive supports the Council's decision to consider EM for the catch share program. Background on NMFS Policy Directive, Regional Electronic Technology Implementation Plans, and other information can be found at: (https://www.st.nmfs.noaa.gov/advanced-technology/electronic-monitoring-and-reporting).

1.4.2 Development of the Current Proposal

Development of an EM program m initially included all limited entry fisheries under the catch share program: midwater trawl (whiting and non-whiting), bottom trawl, and FG endorsed vessels using longline and pots. The following information documents the timeline whereby the Council considered the use of EM.

Date	Meeting/Action
November 2012	Council directed an EM workshop be held to begin developing a policy context and identify necessary elements; PFMC EM field studies began in summer 2012.
February 2013	EM workshop held; group identified several goals and objectives (See Section 0).
April 2013	Council decided to move forward with consideration of the possible use of EM for the catch share program; recommendations on the 2013 EM field study was approved for forwarding to PFMC.
June 2013	Council established two EM committees: Groundfish Electronic Monitoring (GEM) Policy Advisory Committee (GEMPAC) and the GEM Technical Advisory Committee to focus on the development of options for EM use in the trawl catch share program.
August 2013	GEMPAC/GEMTAC 1st meeting; further the Council scoping process; developed draft set of alternatives.

September 2013	Council meeting; GEMPAC presents report of draft set of EM program alternatives for Council consideration; Council provided guidance to the GEMPAC for continued development of EM program alternatives.
October 2013	GEMPAC/GEMTAC 2nd meeting; refined the draft alternatives and developed a GEMPAC report.
November 2013	Council revised the alternatives with the modifications recommended in the Enforcement Consultants report and to move forward with an impact analysis of the draft alternatives.
May 2014	GEMPAC/GEMTAC 3rd meeting; discuss initial EM program alternatives and options adopted by the Council for analysis.
June 2014	The Council reviewed the draft analysis of the alternatives and decided to modify some of the regulatory options. Also at the June meeting, the Council received four revised EFPs and recommended that NMFS implement them for the whiting midwater trawl, non-whiting midwater trawl, FG, and bottom trawl fisheries in 2015 and 2016. Specifically, the Council recommended the EM EFPs be issued to test EM in the fisheries on in limited capacity with some additional permit conditions.
September 2014	GEMPAC/GEMTAC met at Council meeting; their 4th meeting. The Council reviewed the draft analysis, the GEMPAC Report and other Advisory Body Reports. The Council picked its final preferred alternatives for an EM program for all groundfish fisheries operating under the trawl catch shares program.
November 2015	The Council revised the final preferred alternative for electronic monitoring for the whiting fishery; added consideration of moving FG forward for implementation.
April 2016	TBD

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

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

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

Why is 100% Monitoring Needed for the LE Trawl Fishery?

The trawl fishery is a multispecies fishery in which the allowable harvest levels for some stocks (potentially including overfished species) constrain total harvest. If a vessel were not monitored on a particular trip, the elimination of individual accountability would generate an incentive to alter fishing behavior and target stocks that are more difficult to catch without encountering high levels of

constraining species. The trawl rationalization program has helped the fleet make tremendous gains in bycatch avoidance. During an unmonitored trip the incentive to avoid bycatch would be minimal.

Why Monitor With Observers?

Currently 100% monitoring is achieved through the use of observers on the vessels. The Council's final action in 2010 on trawl rationalization included a provision allowing vessel observes to be supplemented with cameras (one of the most common forms of electronic monitoring), but not allowing the use of cameras to completely fulfill the monitoring function.

The trawl rationalization program entailed a major change to the fishery and, while the change was expected to be positive, there was concern about the potential for unexpected consequences. Even though cameras had been successfully used to monitor the whiting fleet on an experimental basis, the incentives provided by individual accountability also create an incentive to avoid detection, which was not present during the development of the camera monitoring program for the whiting fishery. Prior to trawl rationalization, the West Coast Groundfish Observer Program was successfully monitoring about 20 percent of the trips and, thus providing a familiar tool. While the incentives to avoid detection could also lead to behaviors frustrating the observer's role, a human observer has more ability than a camera system to detect and respond to contingencies and collect information useful to modifying the monitoring program. Thus, the decision to not include cameras as an alternative to observes was made in the context of uncertainties about the performance of the overall program and cameras.

For further information regarding the Council's public scoping timeline to consider EM and the rational for the preferred alternatives and options see Section 4.5.

Why Monitor With EM?

The circumstances, under which electronic monitoring was originally rejected, have changed. Fishery managers have now had five years of experience under the trawl rationalization program, which has provided a better understanding of how the fishery performs and how fishermen operate under the program. This has reduced some of the uncertainty about potential unintended consequences. Now, increasing information is available on the performance of electronic monitoring in the whiting fishery (from 2004 to 2010 by Archipelago Marine Research Ltd, McElderry et al. 2014) and additional field studies by the Pacific States Marine Fisheries Commission in 2012 and 2013 (Al-Humaidhi et al. 2013 and 2014). At the November 2015 Pacific Council Meeting, the Council presentation on the 2015 whiting season and at the March 2016 Council meeting, a presentation on use of EM in the 2016 by fixed gear vessels. Based on this information and other information, this EA considers the utility of electronic monitoring relative to human observers in both the fixed gear and whiting IFQ fisheries.

CHAPTER 2 **ALTERNATIVES**

2.1 Overview

This chapter describes alternative management actions that could be implemented to monitor the catch share program for compliance with IFQs and individual and mothership coop sector allocations in lieu of an observer. The alternatives would establish an EM program for LE midwater trawl vessels that fish in the mothership and Shorebased IFQ sectors of the Pacific whiting fishery (midwater trawl whiting fishery), and fixed gear vessels that participate in the shorebased IFQ program(IFQ FG fishery). These alternatives do not address the mid-water non whiting trawl fishery or the bottomtrawl fishery. Under the National Environmental Policy Act, a reasonable range of alternatives must be identified for a federal action, and includes the "no-action" alternative or status quo (one for whiting and one for fixed gear). The action alternatives (alternatives 1a, 1b, 2a, and 2b) were developed to examine an alternative to using human observers to observe discard events in each fishery.

The alternatives are summarized here but further described in two sections:

1) Alternatives and Options for Midwater Trawl Whiting Fishery (See Section 2.2)
2) Alternatives and Options for Fixed Gear IFQ Fishery (See Section 2.32.2)

Chapter 4 provides an impact analysis for selecting an alternative. The impacts section analyzes each alternative, including the No Action alternative.

The Council selected their final preferred alternative for each fishery separately. In November 2015, the Council selected its final preferred alternative for the midwater trawl whiting fishery (Alternative 1b), and in April 2016, selected their final preferred alternative for the IFQ FG fishery (Alternative 2b).

2.1.1 Alternatives for Midwater Trawl Whiting Fishery

No Action Alternative (status quo): Do not implement an EM program for the midwater trawl whiting fishery. All catcher vessels would continue to be monitored for compliance using human observers on all trips (100% observer coverage).

Alternative 1a: **Use Camera Recordings to Estimate Discard**
Implement a voluntary EM program for the midwater trawl whiting fishery and require discard to be documented in a federally approved logbook. Qualified participants could choose to use EM or an observer to monitor their compliance with IFQ and sector allocations in lieu of a human observers. The video data would be the primary source for discard monitoring and accounting. Those that choose not to use EM would continue fishing under the regulations associated with the No Action Alternative.

Alternative 1b: **Use Logbooks to Estimate Discard, (Audit Logbooks with Camera)** ***(Council Preferred)***
Implement a voluntary EM program for the midwater trawl whiting fishery. Qualified participants could choose to use EM or an observer to monitor their compliance with IFQ and sector allocations in lieu of a human observers. Logbook data would be the primary source for discard monitoring and accounting. Logbook data would be audited using video data to ensure compliance with the catch share program.

Those that choose not to use EM would continue fishing under the regulations associated with the No Action Alternative.

2.1.2 Alternatives for IFQ Fixed Gear Fishery

No Action Alternative (status quo): Do not implement an EM program for the IFQ FG fishery. All catcher vessels would continue to be monitored for compliance using human observers on all trips (100% observer coverage).

Alternative 2a: **Use Camera Recordings to Estimate Discard**
Implement a voluntary EM program for the IFQ FG fishery. Same as Alternative 1a except for IFQ FG fishery.

Alternative 2b: **Use Logbooks to Estimate Discard, (Audit Logbooks with Camera)** ***(Council Preferred)***
Implement a voluntary EM program for the IFQ FG fishery. Same as Alternative 1b, except for IFQ FG fishery.

2.2 Detailed Description of Alternatives and Options for Whiting Fishery

2.2.1 No Action

No Action (status quo) defines the default management structure if no Federal action was taken. Under No Action, NMFS would maintain the existing LE permit and licensing requirements, the catch share program requirements, and the current observer program requirements.

Under the No Action all catch share program regulatory requirements would remain in place (See Section 50 of the Code of Federal Regulations Part 660 Subpart A, C and D). This includes but is not limited to:

- Mandatory 100% human observer coverage to monitor fishery participants for compliance with IFQs, IBQs, and allocated groundfish;
- Requirements for vessel operators to secure and pay for compliance observers for each trip;
- Maximized retention requirements and exemptions for retaining prohibited species;
- Third party observer providers providing compliance observers and shorebased catch monitors to the industry;
- NMFS training of third party compliance observers for data collection and biological sampling at sea; and
- Vessel operator requirements to use a vessel monitoring system (VMS), document catch in logbooks, and to discard bycatch if whiting is sorted at sea.

Currently, all at-sea discards from whiting trips must be monitored by a human observer in order to monitor the fisheries for compliance with the catch share program and estimate total discard. Under No Action, all midwater trawl whiting trips would continue to be monitored with a third party catch share program observer to provide the necessary data to debit QP accounts and sector catch allocations (see Section 3.3.1). Catch that is landed at shoreside processors would continue to be monitored with catch monitors that are paid for by the industry and secured through a third-party observer provider. Catch that

is landed onto motherships are monitored by at-sea observers that estimate catch and bycatch totals; this activity would continue under the No Action Alternative.

Under No Action, fishermen will be responsible for hiring observers. The cost for at-sea observer coverage is no longer federally subsidized. In 2015, Federal government subsidy to offset the cost for an observer per day of fishing activity was $108 per day. It's expected that in 2016, the average cost for at-sea observers will range from $450 to $600 per day.

The Northwest Fisheries Science Center trains, certifies, and equips IFQ program observers, ensures data quality, and stores, maintains, and analyzes data collected by observers. It's expected that third-party observer providers would continue to provide human at-sea and shoreside monitoring for vessels in the whiting fishery and NMFS would continue to provide the training of observers for deployment.

Currently, under the trawl rationalization program the midwater whiting catcher vessels in the shorebased and MS sectors may retain all species caught, with limited exceptions. Vessels are allowed to retain prohibited species (i.e. salmon, halibut, and Dungeness crab) if the vessel does not sort their fish at sea. Although the option to sort at sea currently exists in regulation, vessels that target whiting for delivery to shoreside processors do not sort their fish.

The following requirements, among others in federal regulations, would continue to apply:

- Mid-water trawl IFQ trips for whiting that deliver to shoreside processors and motherships must retain prohibited species (halibut, salmon, and Dungeness crab), and protected species unless sorting at sea.
- Current regulation at 660.140(g)(2): (2) *Whiting maximized retention vessels.* Maximized retention vessels participating in the Pacific whiting IFQ fishery may discard minor operational amounts of catch at sea if the observer has accounted for the discard (i.e., a maximized retention fishery).
- Current regulation at 660.150(i): (i) *Retention requirements.* Catcher vessels participating in the MS Coop Program may discard minor operational amounts of catch at sea if the observer has accounted for the discard (i.e., a maximized retention fishery).

Since midwater trawl gear is a prohibited gear to catch Pacific halibut, an exemption to retain and land halibut is needed from the International Pacific Halibut Commission's (IPHC). Under No Action, NMFS would maintain the status quo to implement an IPHC exemption to allow retention of halibut caught in midwater gear and continue to apply a 100% mortality rate for all halibut caught, regardless if it is discarded at sea unintentionally.

During fishing operations, vessels may intentionally or unintentionally discard fish for various reasons. For example, when retrieving a midwater trawl net, fish may "bleed" out of the net as it surfaces because it is too full or part of the net is open. In addition, some vessels may dump fish for safety reasons (i.e., rough seas or remove fish from deck when the hold is full). These events would still need to be documented in logbooks by vessel operators. This type of fishing activity is expected to continue under No Action.

2.2.2 Alternative 1a - Camera Recordings Used to Estimate Discard

Under Alternative 1a, the video images are the primary data source for estimating discards. The video is reviewed for fish discarded by fishermen, the species are identified, assign an estimated weight, and the QP account is debited.

Alternative 1a would implement a voluntary EM program for the midwater trawl whiting fishery and requires discard to be documented in a federally approved logbook. Qualified participants could choose to use EM in lieu of a human observer or use an observer to monitor their compliance with IFQ and sector allocations. The video data would be the primary source for discard monitoring and accounting. Those that choose not to use EM would continue fishing under the regulations associated with the No Action Alternative.

Description of Discard Accounting Under Alternative 1a

Under Alternative 1a, discard events at sea would be monitored with video cameras to provide necessary information to enumerate the weight of fish discarded at sea so that IFQ accounts and sector allocations could be debited. The primary data source for this information would be video data. Video data would be reviewed at a shoreside facility by a video reviewer to estimate the total weight of the discard for each trip. Since the whiting fishery is a large volume fishery and several species can be mixed in with whiting, discard estimates are made as one weight estimate. Video reviewers would not be able to identify discards by species and enumerated them on an individual basis, so species compostion for retained and landed fish would be applied to discarded weight estimates to account for each fish species.

Under Alternative 1a, the requirement for 100% at-sea observation (EM or an observer) of all whiting trips would continue. Those that choose not to use EM would be required to have an observer and fish under the regulations and requirements as described under the No Action Alternative.

The descriptions of the alternatives above are the overarching description of the alternatives. What follow below are detail description of the many components of the alternatives. They embody the current Council thinking as to what should be in the initial guidelines for this fishery. These EM guidelines document guidance, policies, and best practices for the EM Program related to EM system specifications, catch handling, catch accounting, vessel monitoring plan contents, data confidentiality, recordkeeping, standards for video review, and formats for reports. NMFS will develop the EM Program guidelines, in consultation with the Council, and publish them for public comment in the Federal Register. NMFS will maintain the EM Program guidelines on its website and consult with the Council, and publish for public comment, any modifications with at least 3-months' notice prior to the start of the fishing year.

Description of EM Components under Alternative 1a

The following sections provide detailed descriptions of all available "Options" to build the EM Program Components under Alternative 1a. The Council adopted these components as necessary elements to create the framework of an EM program. A summary table is provide that contains a detailed list of all EM Program Components with cross references to their descriptions (Table 2-1). Table 2-1 has one column for Alternative 1a and includes all Council preferred options that would be implemented as part of the EM program under Alternative 1a. A second column contains all other options that were considered when the Council selected the preferred option.

Each component is described in detail with discussion and rationale for development of the component. The main EM Components, 2.2.2.1 through 2.2.2.9, have options for the Council to choose from to

develop the policy for that EM component. EM components 2.2.2.10 through 2.2.2.13 do not have options but were adopted by the Council as necessary components for an EM program. NMFS would develop and implement these components as appropriate in consultation with the Council, state agencies, and the industry.

Main EM components that contain options for policy development are:

- 2.2.2.1 - Video Reading Protocol (**Unique to Alternative 1a**)
- 2.2.2.2 - Discard Accounting – Individual or Fleetwide
- 2.2.2.5 - EM Individual Vessel Monitoring Plan – Expiration
- 2.2.2.6 - Declaration of EM Use
- 2.2.2.7 - Data Transfer Process
- 2.2.2.8 - Video and Data Processing
- 2.2.2.9 - Payment for Scientific data collection/observations

While working through the development of the alternatives and EM Component Options, certain components of the EM program were identified as basic elements that would be necessary for an EM program to run efficiently and to conduct an orderly fishery. However, there are no policy options to choose from under these components. The Council delegated development and implementation of them to NMFS. For example, NMFS has set up a process for applicants to qualify and submit an "Observer Exemption Application" to NMFS that requests the use of EM in lieu of an observer. NMFS developed regulations to specify the requirements for fishermen, EM providers, and observer providers (e.g., applications, individual vessel monitoring plans, or compliance program rules).

The following list provides an overview of the EM components that would be implemented by NMFS upon approval of the proposed action. These components do not have options to choose from but contain topics of information that could be used to develop processes or protocols.

EM components that do not have options to choose from include:

- 2.2.2.10 - Observer Exemption Process (Possible PRA Approval)
    - Application and Approval Process (including an application for fishermen)
    - Eligibility Criteria (Initial and continued eligibility criteria)
- 2.2.2.11 - EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)(including a form for submission to NMFS for review)
- 2.2.2.12 - EM Equipment and Protocol Provisions
    - EM Equipment Requirements (e.g., data format, video hardware products, logbook data source, on-vessel data storage, onboard operational standards and practices)
    - NMFS Type-Approval Process for EM Equipment (including a list of specifications for EM providers and submission process to receive type-approval) - Possible PRA Approval
    - Approved EM Provider List (including a list of specific criteria for providers to demonstrate their capability and standards) - Possible PRA Approval
- 2.2.2.13 - Data Confidentiality/Accessibility/Ownership

Summary Table of Alternative 1a and EM Components

Table 2-1 is a summary of components that would be implemented as part of the EM program under Alternative 1a. The Council adopted these components as necessary elements to create the framework of an EM program. The summary table provides the Council preferred options and then lists other options

that were considered when the Council selected the preferred option (see column “Other Available Options”).

Table 2-1. Summary of Alternative 1a and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 1a - Camera Recordings Used to Estimate Discard	Other Available Options
2.2.2.1	Video Reading Protocol	**The following video reading protocol options are unique to Alternative 1a:** **Option A**: 100% with a mandatory logbook (census all video footage and estimate discard).	**Option B**: Subsample Video and expand discard estimate to whole trip (% review must be developed) **Option C**: Subsample Video with a mandatory logbook requirement to document discard (% to review must be developed)
2.2.2.2	Discard Accounting – Individual or Fleetwide	**Estimation of discard may be done through EM, WCGOP observer program, or other data sources.** **Option A – *(Council Preferred)*** Estimate Discard with EM and Count against IFQ and sector allocations Under this option all discard events would be estimated with EM and total discard would be debited from IFQ accounts or sector allocations. One discard category and all discards are estimated using EM and counted against IFQ: Dumped off deck (e.g., shoveled, picked out of net) Dumped for safety reasons (e.g., pull zipper) Floating fish (bleeding net/washed out of net) Lost gear (not captured by EM, estimate using WCGOP protocol) Consumed/used as bait (not captured by EM) Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)	**Option B –** Split into two discard categories; discard Category 1 events count against IFQ, discard Category 2 events count against sector or ACL; for some types of discard events the estimate is based on trips with observer coverage (events in each category described below). **Option C –** Split into two discard categories; discard Category 1 events count against IFQ, no accounting for discard Category 2: *Discard 1:* • Dumped off deck (e.g., shoveled, picked out of net) • Dumped for safety reasons (e.g., pull zipper) • Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP protocol) *Discard 2:* • Floating fish (bleeding net/washed out of net) • Lost gear (not captured by EM, estimate using WCGOP protocol) • Consumed/used as bait (not captured by EM) **Option D –**Deduct unintentional discards of whiting preseason from the MS Coop allocation. No category is used and only unintentional minor discards of whiting would be deducted preseason from the MS co-op allocation of whiting. All other events would be estimated using EM and deducted from IFQ accounts and sector allocations in-season. A proxy of the average percentage of discard from 2011, 2012, 2013, 2014, and any additional averaging from future years would be used for the deduction. Discard of bycatch species would be determined by pro-rating the observer data from the MS processor.

Table 2-1. Summary of Alternative 1a and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 1a - Camera Recordings Used to Estimate Discard	Other Available Options
2.2.2.3	Retention Requirements	**Option A: Maximized Retention**	**none**
2.2.2.4	Halibut Retention/Discard	**Option A: Discard Exemption (100% retained, 100% mortality)**	**none**
2.2.2.5	EM Individual Vessel Monitoring Plan – Expiration	**Option B – *(Council Preferred)* Annual Expiration or if modifications are made** Same as Option A but with annual expiration	**Option A – No Expiration unless modifications are made** • Approval of plans by NMFS • Plan modification provisions: (NMFS to decide how this is done) 1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes) 2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)
2.2.2.6	Declaration of EM Use	**Option C – *(Council Preferred)*** Declare Until Changed with Some Limit on Frequen***y*** For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer however a limit would be imposed on the number of times a vessel could switch from using EM to using an observer and then back to using EM. **Exception for Emergency Situation** For example, camera broke so need an observer tomorrow, vice versa	**Option A – Annual Declaration** Use EM all year; no observer coverage needed unless EM fails **Option B – Annual Declaration with Intermittent U**se For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer (e.g. monthly or quarterly). **Option D – Declare until Changed with No Limit on Frequency** Same as Option C but with no limit on the number of times a vessel could switch back and for the between using EM and an observer.
2.2.2.7	Data Transfer Process	Includes secure transfer for data and chain of custody requirements. **Options** (not mutually exclusive): **C. *(Council Preferred)* Shoreside catch monitor** **D. *(Council Preferred)*Vessel operator/Crew**	**Options** (not mutually exclusive): **A. PSMFC** **B. EM Provider** **E. Third Party (hired by processor, port, or fisher)**
2.2.2.8	Video and Data Processing	Potential video reviewers **Option D - *(Council Preferred)* Third Party**	**Options** (not mutually exclusive): **Option A -NMFS** **Option B -PSMFC** **Option C - EM Provider**

Table 2-1. Summary of Alternative 1a and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 1a - Camera Recordings Used to Estimate Discard	Other Available Options
2.2.2.9	Payment for Scientific data collection/observations	**Option A**: **Government funded, same as pre IFQ *(Council Preferred)***	**Option B**: **Industry Funded** **Option C: Combination of both Government and Industry**

Table 2-1. Summary of Alternative 1a and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 1a
These components do not have options to choose from but would be implemented as part of an EM Program

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

2.2.2.10	Observer Exemption Process - Eligibility Requirements	A vessel must be in good standing and has approved equipment and operational plan certifications. **Eligibility Requirements** **Initial eligibility criteria**: 1. Limited entry groundfish trawl permit2. Quota share permit 3. No IFQ deficits 4. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP) a. IVMP unique for each vessel b. Multiple IVMPs included if submitted by group of vessels 5. Self-Governing Plan (if applicable, not required) a. Data Delivery and Analysis (DDA) specifications b. submitted by either a group of vessels or an individual vessel **Continued eligibility for all fisheries**: 1. Participants must be in compliance with their IVMP 2. Demonstrate proper documentation of the discards in logbooks or on video
2.2.2.11	EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)	**Required EM IVMP Plan** Potential categories of information in an IVMP: a) Type of system b) Hardware c) Software d) Emergency protocols e) Back-up equipment use protocols f) Catch handling protocols g) Layout of vessel h) Screen shots of all camera views i) Number of cameras needed with placement specifications j) Care and maintenance of the EM system k) Types of sensors and data for sensors to capture l) Download/maintenance schedule m) Logbook format (electronic or paper) n) Tamper Resistant/Taper Evident o) Lighting Locations (Stern, Deck, Discard Shoot, etc.) p) Bridge Mounted Computer Interface/Monitors q) GPS Receiver r) Winch Sensors s) Hydraulic Pressure Transducers t) Power Supply / Backup u) Wire Runs v) Geo Fencing (NMFS supplied) w) System's Check Certification x) Data logger
2.2.2.12	EM Equipment and Protocol Provisions	Type-Approval Process, EM Equipment Requirements (Data formats, Video Hardware, Logbook Data Source, On-Vessel Data Storage, Onboard operations)
2.2.2.13	Data Confidentiality /Accessibility/ Ownership	All data collected under the EM program (e.g., video, logbooks, and applications) would be considered confidential. Current confidentiality rules may need to be clarified to include this information.

2.2.2.1 Video Reading Protocol

Since Alternative 1a uses video as the data a source, a method for reading the video and creating discard estimates must be chosen (Video Reading Protocol). There are three separate ways to use the video for discard estimation. These options are unique to Alternative 1a.

Option A: 100% - census all video footage and estimate discard, includes a mandatory logbook requirement to document discard. (*Council Preferred*)
Option A is to conduct a census of all video images and estimate the total discard for each set or haul that occurred in a trip. The discarded species would need to be accurately identified, assigned a weight, and debit the QP account in a timely manner. Option A includes a mandatory logbook requirement. Although midwater trawl vessels are currently required to submit a trawl logbook, additional information regarding species discards (for each species if known) would be required.

Discussion and Rationale for Option A: A full census of the video images would provide the most data for discard estimates and reduce the risk of missing discard events. Compared to Option B and C, this option would provide the most accurate estimate for debiting IFQ accounts and sector allocations.

Option B: Subsample Video and expand discard estimate to whole trip; percent subsample for the review must be developed.
Option B is to subsample the video images at some predetermined percent of video review (e.g., 10%, 25% and 50%), speciate the discard, estimate the weight of the discard, then expand the discard rate to the entire trip to provide a total estimated discard for the trip.

Discussion and Rationale for Option B: Cross comparison of full census and subsampling would be needed to determine if it is sufficiently accurate for catch accounting purposes.

Rather than review all video (Option A), under Option B the total discard would be estimated by random sampling of the video data, which would then be expanded to estimate discards for the whole trip. The sampling rate necessary to accurately estimate total discard would need to be determined prior to implementation. There are several problems with this method that will need to be resolved before implementation. First, if discards are rare events, the sample rate may need to be quite high or the expanded estimate of discard may be greater than or less than the actual discard.

The fishery will initially start with the expectation of 100% video review, However, as experience is gained, it may be more appropriate for data managers to determine the optimum sample rate, balancing government and industry costs and accuracy for accounting purposes. If this option is chosen, the Council expects NMFS to develop and implement the appropriate level of review necessary for accurate and cost effective catch accounting.

Option C: Same as Alternative B but includes a mandatory logbook requirement to document discard.
Option C is the same as Option B, however additional logbook information would be required to document discard. Option B is to subsample the video images at some predetermined percent of video review (e.g., 10%, 25% and 50%), speciate the discard, estimate the weight of the discard, then expand the discard rate to the entire trip to provide a total estimated discard for the trip

Discussion and Rationale for Option C
Option C is the same as Option B, however a logbook would be required to document discard data. Logbook information provides a back-up data source to verify discard if an EM system fails to capture the necessary data because of equipment failure or environmental conditions. Logbooks depend on accurate self-reporting of discard events and there is an incentive to underreport.

2.2.2.2 Discard Accounting – Individual or Fleetwide

Discard events occur in a several ways. These events need to be captured by EM in order to account for them. Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls.

The discard accounting options were developed in the following way:
1) Discard events were grouped into discard categories 1 and 2 (type of discard events);
2) Accountability was established (i.e., IFQ, Fleetwide, or not accounted); and
3) Data sources were identified as either EM or the WCGOP.

Option A: **Estimate Discard with EM and Count against IFQ *(Council Preferred)***

Under this option all discard events would be estimated with EM and total discard would be debited from IFQ accounts or sector allocations.

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

Option B: **Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage**
Under Option B, two discard categories would be created. Category 1 events would be debited from IFQ accounts and sector allocations. Category 2 events would be estimated annually and debited from the fishery sector allocation preseason or from the annual catch limit (ACL).

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

Discard 2 Sector or ACL accounting:
- Floating fish (bleeding net/washed out of net)
- Lost gear (not captured by EM, estimate using WCGOP protocol)
- Consumed/used as bait (not captured by EM)

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

Under Option C, two discard categories would be created and each category. Category 1 events would be debited from IFQ accounts and sector allocations. Category 2 events would not be estimated or debited from sector allocations or the ACL. Council staff note that in order for Option C to be valid it would have to comply with MSA national standards. National Standard 9 requires accounting for all catch and discard to estimate total mortality estimates and ensure annual catch limits are not exceeded. Option C would not comport with the MSA National Standard 9.

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

Discard 2 No accounting:
• Floating fish (bleeding net/washed out of net)
• Lost gear (not captured by EM, estimate using WCGOP protocol)
• Consumed/used as bait (not captured by EM)

Option D: Deduct unintentional discards of whiting preseason from the MS\Coop allocation.

Under Option D, no discard category is used and only unintentional minor discards of whiting would be deducted preseason from the MS co-op allocation of whiting. All other events would be estimated using EM and deducted from IFQ accounts and sector allocations in-season.

Discussion and Rationale for Option D: The Council developed this option for the mothership fishery only. The intent was to deduct the aggregate accumulated unintentional minor discards (spillage estimated to be less than 0.5 percent of the mothership allocation) from the mothership allocation preseason and species composition would be calculated using status quo methods. Unintentional discards of whiting are estimated to be between 200 and 500 mt annually. A proxy of the average percentage of discard from 2011, 2012, 2013, 2014, and any additional averaging from future years could be used for the deduction. Discard of bycatch species would be determined by pro-rating the observer data from the MS processor. The Council would defer to NMFS to implement the most appropriate way to annually estimate the discard and deduct the amount preseason during the biennial specifications process for groundfish.

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

Total catch accounting in the shoreside and the MS fishery sectors is simplified in Figure 2-1. There are several ways that discard can occur and be documented in both sectors.

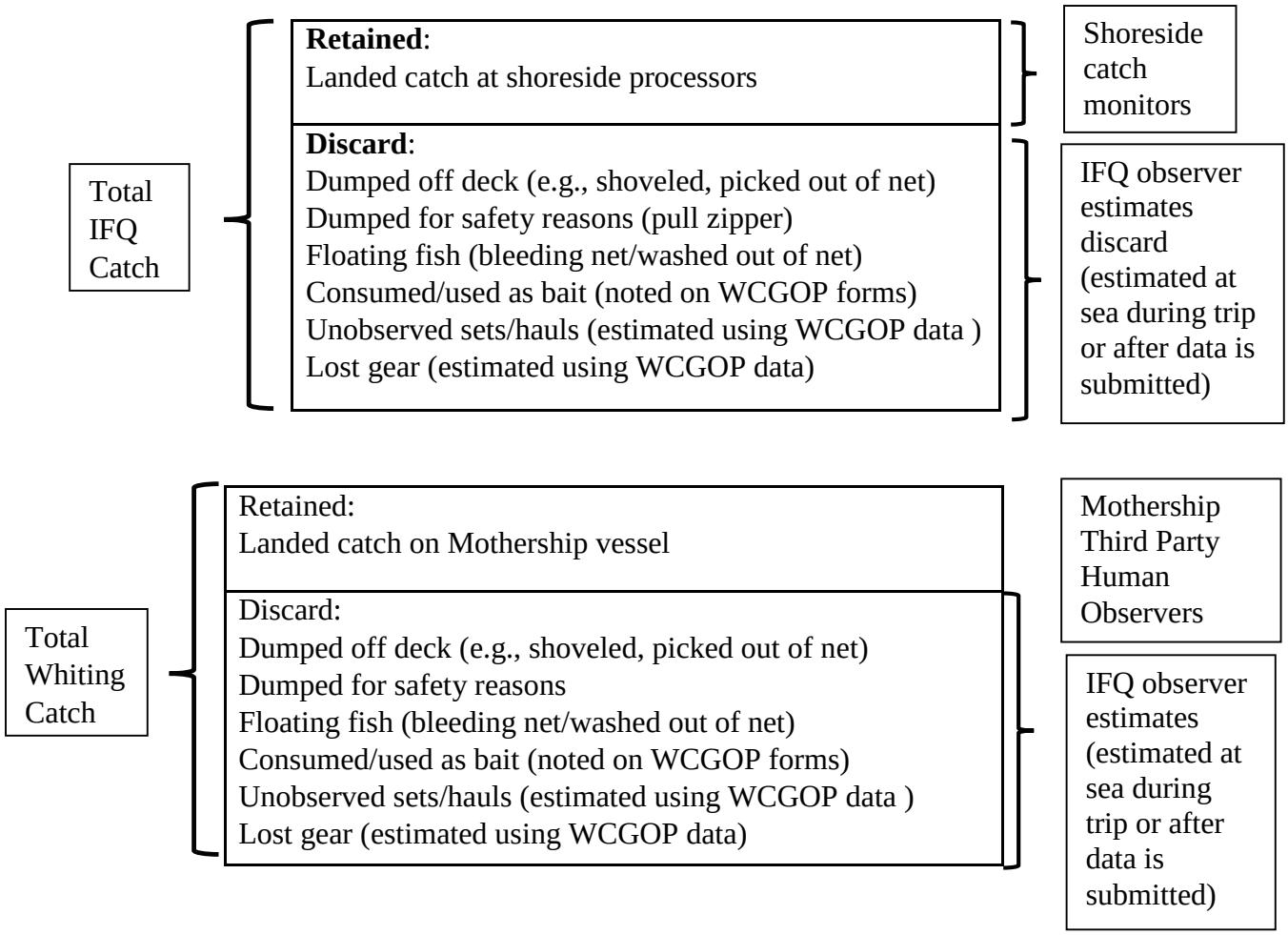

Figure 2-1. General depiction of total catch accounting in the Shorebased catch share program (upper figure) and Mothership Coop fishery (lower figure).

Under an EM program, the estimation (speciation and weight) for these discard events would be conducted using EM rather than the WCGOP. However some of the discard events may not be captured by EM, such as lost gear, crew consuming fish onboard the vessel, using fish caught as bait, and unobserved hauls/sets that had discard (i.e., EM failed to record the discard); therefore, some other source of data may be needed to account for the discard activity.

In addition, some events may be captured by EM but are difficult to quantify, such as floating fish on the surface of the water and some events may be minor amounts (less than 2,000 lbs of whiting). Rather than accounting for these discards at the individual level (IFQ), it's possible to account for it during the specification process for Annual Catch Limits (ACL), at the sector level, The estimated mortality could be deducted from the ACL prior to allocation to each sector or at the sector level to be taken "off-the-top" prior to IFQ distribution and catch allocation distributions.

2.2.2.3 Retention Requirements

Currently, under the trawl rationalization program the midwater trawl fishery is generally required to retain all species caught, including prohibited species (i.e. salmon, halibut, and Dungeness crab) if the vessel does not sort their fish at sea. Therefore only one alternative has been identified for the EM program, Alternative A - Maximize Retention. Under the proposed EM program and all alternatives, maximized retention would be required.

During fishing operations, vessels may intentionally or unintentionally discard fish for various reasons. For example, when retrieving a midwater trawl net, fish may "bleed" out of the net as it surfaces because it is too full or part of the net is open. Therefore, some exceptions are made for these discard events under Alternative A. These events would still need to be documented in logbooks by vessel operators and verified through video review.

In addition, some statutory management measures such as the Endangered Species Act (ESA) or the Marine Mammal Protection Act (MMPA) may require vessels to discard species, such as marine mammals. Therefore, exceptions are provided as part of the description of alternative. **Error! Reference source not found.** contain species lists of IFQ (catch share), non-IFQ (non-catch share), and ESA-listed species that may be caught in the midwater trawl whiting fishery.

Maximize Retention

For the whiting fishery, other retention options were considered. However, based on current practices and regulations in the fishery including those that address fish quality, and salmon accounting, and retention requirements, maximized retention is the only practicable alternative. To inform the reader and to provide the reader a contrast with the retention options associated with fixed gear, the following description of maximized retention in the whiting fishery is presented.

Definition: A vessel is generally required to retain all catch including IFQ and non-IFQ species, non-groundfish, non-FMP, prohibited species and protected species.

The following regulatory requirements or discard exceptions would apply:

Existing Regulatory Requirements
Vessels must retain prohibited, ESA-listed, and marine mammal species unless otherwise required by regulation to discard them. The following regulatory requirements apply:

- Mid-water trawl IFQ trips for whiting that deliver to shoreside processors must retain prohibited species (halibut, salmon, and Dungeness crab), and protected species unless sorting at sea.
- Mid-water trawl catcher vessels delivering to motherships must retain prohibited species (halibut, salmon, and Dungeness crab) and protected species.
- Midwater trawl whiting trips may discard minor amounts of catch not delivered to shoreside or mothership processors.
    - Current regulation at 660.140(g)(2): (2) *Whiting maximized retention vessels.* Maximized retention vessels participating in the Pacific whiting IFQ fishery may discard minor operational amounts of catch at sea if the observer has accounted for the discard (i.e., a maximized retention fishery).
    - Current regulation at 660.150(i): (i) *Retention requirements.* Catcher vessels participating in the MS Coop Program may discard minor operational amounts of catch at sea if the observer has accounted for the discard (i.e., a maximized retention fishery).

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

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

2.2.2.4 Halibut Retention/Discard

NMFS would continue to implement the International Pacific Halibut Commission's (IPHC) exemption to allow full retention of halibut caught in midwater gear (a prohibited gear to catch halibut) and apply a 100% mortality rate for all halibut caught. Current regulations allow fishermen to sort whiting at sea, and if a fishermen chose to do so, would be required to discard halibut. However, the Council chose a policy that if a fishermen chose to use EM then maximized retention would be required and a vessel operator would not be allowed to sort whiting at sea and discard halibut. Therefore, only one option was available for halibut retention.

Option A *(Council Preferred Option)*: Discard Exemption (100% retained, 100% mortality)

2.2.2.5 EM Individual Vessel Monitoring Plan – Expiration

An individual vessel monitoring plan (IVMP) would be required (see Section 2.2.2.11 for a description of the elements of an IVMP). Each vessel operator/owner would be responsible for developing an IVMP for the vessel and acquiring the needed approval from NMFS to use EM. IVMPs would play a major role as part of the EM program. These plans would help facilitate an effective program and serve as a clear, written plan for discard documentation, installation and maintenance of an EM system, protocols for data storage and transfer, among other things. However, the duration of the IVMP must be determined.

Option A – No Expiration unless modifications are made
Approval of plans by NMFS with no expiration

1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes)
2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)

Option B *(Council Preferred Option)* – Annual Expiration or if modifications are made
Same as Option A but with annual expiration or if modifications are made

Discussion and Rationale: IVMPs will be vessel specific and provide NMFS, video reviewers and EM providers important information regarding EM performance, ensure accountability and place responsibility on vessel operators to follow the protocols of the plan. The plans must be submitted for approval and NMFS must be able to track each vessel. The plan could be left in place until modifications are needed (Option A) or an expiration could be added to allow NMFS to review each plan on an annual basis.

Program management may change with advances in technology or a change in the type-approved EM systems could trigger the need to modify plans. An IVMP may need to be modified, for example, to accommodate changes in fish handing protocols or the number of cameras needed to get more accurate information. These modifications could be initiated by the vessel operator, EM provider or the Government. If modifications to the IVMP are necessary, changes must be made in agreement between the vessel representative and the EM provider. Some changes may require re-approval by NMFS; therefore, criteria and protocols that trigger re-approval will need to be developed by NMFS upon implementation. The Council would defer to NMFS for the development of this process.

2.2.2.6 Declaration of EM Use

Vessel operators would be required to declare their intended use of EM. A declaration system would be developed along with protocols for submitting information to NMFS, EM providers, and observer providers (private third-party and WCGOP). The Council would expect NMFS to implement a declaration system that is appropriate for all entities involved.

Option A - Annual Declaration
For the coming year the participant would declare that they will use EM for the next 12 months and no observer coverage is needed unless EM fails.

Option B - Annual Declaration with Intermittent Use
For the coming year, participants must indicate when they will use EM and when it will use an observer (e.g. monthly or quarterly). The IVMP would include a description of the responsibility for vessel operator to notify NMFS, EM provider, and NMFS observer program when EM will be used and when observer will be used. The time period for EM use would be adhered to unless EM fails and observer is needed.

Option C - Declare Until Changed with Some Limit on Frequency *(Council Preferred Option)*
Under this option, the vessel and the observer provider would need to schedule when observers are needed or available on a per trip basis. The IVMP would provide a description of the responsibility for vessel operator to notify NMFS, EM provider, and NMFS observer program when EM will be used and when observer will be used. However a limit would be imposed on the number of times a vessel could switch from using EM to using an observer and then back to using EM.

Option D - Declare Until Changed with No Limit on Frequency
Same as Option C but with no limit on the number of times a vessel could switch back and for the between using EM and an observer.

An exception for Emergency situations would be provided under all options (e.g., camera broke so need an observer tomorrow, vice versa)

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

submit their intent to use EM via the IVMP. The Council would rely on NMFS to implement a limit on the frequency that vessels cold change their declaration in a given year.

2.2.2.7 Data Transfer Process

The video and logbook data would need to be transferred from the vessel to the video reviewer. Several options have been identified:

Options (not mutually exclusive):
A. PSMFC
B. EM Provider
C. Shoreside catch monitor *(Council Preferred Option)*
D. Vessel operator/Crew *(Council Preferred Option)*
E. Third Party (hired by processor, port, or fisher)

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

Data transfer protocols and frequency will vary by fishing sector (shoreside vessels vs. MS catcher vessels). For example, mothership catcher vessels may seldom return to port; this would increase the volume of data to store and affect the frequency of data transfer. If the data transfer processes are to be included in the Council recommended policy then both generic provisions that apply to all vessels or all vessels of a sector, and individual provisions may need to be specified. Again, this would be developed by NMFS during implementation.

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

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

The list of options include the trusted entities that could securely transfer the data. Ultimately, the vessel owner is responsible for transferring the data, and thus, should have the flexibility to determine who is responsible for transferring their data. The Council chose Options C and D with the understanding that these may be more efficient and less costly than the others.

2.2.2.8 Video and Data Processing

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

Potential reviewers for discard events (not mutually exclusive):

Option A: NMFS
Option B: Pacific States Marine Fisheries Commission
Option C: EM Provider
Option D *(Council Preferred)*: Third Party

Discussion and Rationale: The Council preferred that a Certified Third party (Option D) conduct the video reviews. However, until a certification process has been established the Government (Option A) – NMFS or their agent (e.g. PSMFC) would conduct the video reviews.

Video review could be conducted by several entities. One obvious choice is for the EM provider to conduct the review and provide the information to NMFS. However, it's possible that NMFS, PSMFC or some other third party could conduct the reviews. The benefit of an EM provider conducting the review is that it has an acute understanding of its software and video analysis tools, such as Archipelago Marine Research Inc. It may also be more cost effective for a fishing vessel to contract a "package" of an EM system and video review analysis from an EM provider. However, NMFS would need to conduct an audit of the EM provider or third party contractor to ensure all parties are in compliance with review protocols and IFQ accountability.

PSMFC is a trusted entity for fisheries management and support of fisheries program and conducted field studies therefore the agency has gained experience in the process. In addition, the agency is currently responsible for transferring total catch accounting data to NMFS in order to debit IFQ accounts. NMFS and PSMFC would need to develop a program to accommodate the work load.

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

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

An analysis of this information can be found in Section 4.2.1.2, Impact Analysis of the Alternatives.

2.2.2.9 Payment for Scientific data collection/observations--

The Council initially reviewed various options but NMFS has determined that only option A is legal.

There are two types of duties for observers in the IFQ fishery, compliance observations and scientific observations. Compliance observations are needed to support catch and discard monitoring in the IFQ fishery to estimate total catch by a fishermen. Scientific observations are conducted to collect data to support stock assessments and estimate protected species interactions, amongst other things.

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

Option A ***(Council Preferred Option)***: Government funded, same as pre catch share program
Option B: Industry Funded
Option C: Combination of both Government and Industry

Discussion and Rationale: If EM is used on IFQ trips and the observer is removed from the vessel without making other program adjustments, scientific information would be lost. A continuous need exists for at least some level of scientific observer coverage to collect biological samples and other scientific data on EM trips; therefore this portion of the sampling program would continue.

Previous to the catch share program NMFS provided scientific data collection on roughly 20 percent of the limited entry trawl fleet. This cost was covered by the Government. It's estimated that the WCGOP will sample roughly 20-25 percent of the EM fleet; however, these rates will need to be examined and a sampling scheme developed by NMFS in the future.

2.2.2.10 Observer Exemption Process

The following discussion provides the background of what may be required and the rationale for developing these components.

Currently vessels are required to carry human observers during an IFQ trip. Under the proposed EM program, a vessel would need to apply for an exemption to this regulation. Applicants would need to follow specific regulations and provide adequate information for NMFS to evaluate the application. An applicant would need to meet certain qualification standards to be eligible for EM use in lieu of an observer. However, even if an applicant qualifies and receives the option to choose EM, the vessel will still be subject to NMFS observer coverage to collect scientific data.

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

The following sections describe potential observer exemption process, eligibility for using EM, individual vessel monitoring plans (IVMP) requirements, duration of effectiveness of the IVMP, and participant's

requirements to declare when a vessel will use EM. As appropriate, regulations will be prescriptive or performance based for these topics.

Application Approval and Required Information

The following is a list of potential information that NMFS may require from applicants.

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

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

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

If NMFS deems the application incomplete, it would provide the applicant an opportunity to revise it appropriately. Specifics regarding denial of an exemption would be provided on a case by case basis. Existing regulations would be revised to incorporate this process for EM.

Eligibility Requirements

Participants would need to meet certain "eligibility requirements" and NMFS would review the application for approval. The application would also include a NMFS approved individual vessel monitoring plan (IVMP, See Section 2.2.2.11).

Initial eligibility criteria:

1. Limited entry groundfish trawl permit with trawl endorsement, and/or MS/CV endorsement (and an MS coop endorsement if fishing in an MS Coop)
2. Quota share permit
3. No IFQ deficits
4. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP)
   a. IVMP unique for each vessel
   b. Multiple IVMPs included if submitted by group of vessels

5. Self-Governing Plan (if applicable, not required)
    a. Data Delivery and Analysis (DDA) specifications
    b. submitted by either a group of vessels or an individual vessel

Continued eligibility:

1. Participants must be in compliance with their IVMP
2. Demonstrate proper documentation of the discards in logbooks or on video

Discussion and Rationale: Qualification criteria would be needed to ensure that new applicants understand the program and follow the protocols that are set forth in regulation. Since the program is intended to be a privilege, the Council would expect that vessel operators comply with the EM program to ensure its utility for accurate accounting of IFQ accounts and sector allocations. Vessels that continue to comply would be eligible the following year. The criteria would encourage vessels to improve their efforts in order to qualify for the exemption.

Self-Governing Plan Elements

In a future fishing year, NMFS may implement requirements for a voluntary self-enforcing agreement that would allow a group of eligible vessels to encourage compliance with the requirements of this part through a private contractual arrangement. Participating vessel owners would submit the proposed agreement for review by NMFS as part of the initial application. NMFS will specify the requirements of a self-enforcing agreement through a proposed and final rulemaking. If vessels choose to develop and join group or self-governing agreements, then the following information may be required.

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

a. Comply with all Federal and State Regulations
b. Retention / Discard Requirements
c. Time and Area Restrictions
d. Data Collection Equipment Criteria
e. Data Collection Requirements
f. Data Analysis Agreement Clause
g. Discard Assessment Protocols and Procedures
h. Vessel / Operator Performance Standards
i. Vessel / Operator Responsibility
j. Compliance Criteria
    i. By Example: escalation of consequences (to be defined by group)
    ii. No Further use of Camera Use Alternative Criteria
k. Escape Clause

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

a. Comply with all Federal and State Regulations
b. Retention / Discard Requirements
c. Time and Area Restrictions
d. Data Collection Equipment Criteria
e. Data Collection Requirements
f. Data Analysis Agreement Clause
g. Discard Assessment Protocols and Procedures
h. Vessel / Operator Performance Standards
i. Vessel / Operator Responsibility
j. Compliance Criteria

i. By Example: fail to demonstrate compliance, vessel must use observer for rest of the year.

k. Escape Clause

Discussion and Rationale: A self-governing plan was discussed as part of coop agreements to add an element of self-enforcement among members. This would provide an opportunity for vessels to work together to ensure compliance, potentially reduce costs, and lesson the need for enforcement actions on an individual level.

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

NMFS would specify IVMP requirements in regulation. This process is identified as a NMFS process; therefore, the standards would likely involve a Council deeming process. As described above, NMFS will develop EM Program guidelines, in consultation with the Council, and publish them for public comment in the Federal Register. NMFS will maintain the EM Program guidelines on its website and consult with the Council, and publish for public comment, any modifications with at least 3 months' notice prior to the start of the fishing year

A general list of potential categories of information that would be included in the IVMP is provided:

a) Type of system
b) Hardware
c) Software
d) Emergency protocols
e) Back-up equipment use protocols
f) Catch handling protocols
g) Layout of vessel
h) Screen shots of all camera views
i) Number of cameras needed with placement specifications
j) Care and maintenance of the EM system
k) Types of sensors and data for sensors to capture
l) Download/maintenance schedule
m) Logbook format (electronic or paper)
n) Tamper Resistant/Taper Evident
o) Lighting Locations (Stern, Deck, Discard Shoot, etc.)
p) Bridge Mounted Computer Interface/Monitors
q) GPS Receiver
r) Winch Sensors
s) Hydraulic Pressure Transducers
t) Power Supply / Backup
u) Wire Runs
v) Geo Fencing (NMFS supplied)
w) System's Check Certification
x) Data logger

Discussion and Rationale: Each vessel operator/owner would be responsible for developing an IVMP for the vessel and acquiring the needed approval from NMFS. IVMPs would play a major role as part of the EM program. These plans would help facilitate an effective program and serve as a clear, written plan for discard documentation, installation and maintenance of an EM system, protocols for data storage and transfer, among other things. It also serves as the main document for reference between the vessel, EM Providers, and NMFS.

An IVMP that is approved by NMFS would likely be part of the application and approval process to use EM in lieu of an observer (see Section 2.2.2.10**Error! Reference source not found.**).

2.2.2.12 EM Equipment and Protocol Provisions

The success of an EM program relies on the ability to capture the data and process it in a timely manner so EM equipment that provides the necessary data for efficient processing and accurate review is

critical. The following discussion provides the background of what may be required by NMFS upon implementation and the rationale for developing these components.

Type-Approval Process

NMFS may specify the use of EM equipment through a type-approval process. If so, the EM equipment would undergo an NMFS internal review process to set the standard by which all third party EM equipment providers would need to follow to get their equipment approved. Fishermen would then choose the unit that is suitable for their vessel and available through a provider. A type approval process will need to be developed by NMFS with the aid of current experience and technology.

It's expected that participants would need to secure an EM provider, purchase or lease an approved EM system, and incur the cost for its maintenance and the video review. This information is analyzed in Section 4.3, under subsections on costs and impacts to different segments of the fishery and communities.

Discussion and Rationale: NMFS has experience conducting type-approvals for vessel monitoring systems (VMS) therefore the EM equipment would likely undergo a similar approval process. Having a standard set of equipment that vessels could use would provide consistency for video data formats and review. In addition, providers of the equipment may compete with one another and keep industry cost low.

EM Equipment Requirements

The following topics may need to be worked out between technical advisors from NMFS, PSMFC, EM providers and the states of CA, OR and WA.

Discussion and Rationale: Although the NMFS policy requests the use of open source software so that common platforms can use the data generated or multiple users can access the data, allowing both open source and proprietary equipment/software could be allowed if they meet the objectives of the type approval performance standards. Some of this information would ensure data is collected in a timely manner and that technical issues are identified quickly then communicated between vessel operators, NMFS, and EM providers.

Data formats

A standardized set of data formats could be developed by NMFS so that data that can be used by multiple users such as PSMFC and NMFS to analyze data or video without a cumbersome conversion process to access the data. This would need to be specified in the future during implementation with the advice of NMFS, PSMFC, states, and other technical advisors such as EM providers.

Video Hardware

Image quality must be sufficient to allow clear identification of species or species categories being discarded; therefore, performance standards of the video hardware would be developed during implementation between NMFS, PSMFC, states, and EM providers. For example, two types of video cameras are currently used by EM providers, digital and analog. Both have benefits and drawbacks. For example, if a very sharp video image is needed at a close range to identify fish and other species such as sponges then a digital camera may be necessary; however, the use of a digital format will increase the need to for more memory storage of the video files. An analog video could be used for the same purpose to capture images in the same manner and lessen the need for data storage.

Logbook Data Source

The EM program could allow either paper or electronic logbooks to be used as required under Alternative 1a (Option A and C) or Alternative 1b. Electronic logbooks may increase efficiencies in the EM analysis by eliminating the need to convert paper logbooks to an electronic format. It may be possible to link the electronic logbook data set to the video data set to increase efficiencies of video review. For example, random selection of the logbook discard events will be necessary under Alternative 1b. After the selection is made, a list of those events could be tied to the video events so that reviewers can "jump" to the event in the video data. At this time, the Council expects NMFS to continue the requirement for vessels to submit paper logbooks however the logbooks would need to be modified to include discard information. PSMFC has developed an interim logbook that was used during field trials for EM. This information could be used to implement this component of the EM program to support either alternative as needed. The Council defers to NMFS on efficiencies that can be gained and the most expedient way to conduct logbook analysis and implement logbook provision.

On-Vessel Data Storage

Video hardware, sensor data, vessel location data, and logbook data/data logger would likely be integrated together in a secure format and stored on a hard drive. The hard drive would be removed and a new one replaced. Storage capacity will need to be large (1 terabyte or more). Dependent on the amount of data generated for storage, it's possible that some vessels may need to carry multiple hard drives and be trained to replace them at sea as needed or return to shore for replacement. See section 2.2.2.7 for potential data transfer processes.

Onboard operations

Some onboard operations will need to be standardized for the all vessel under the EM program. Topic examples include:

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

2.2.2.13 Data Confidentiality/Accessibility/Ownership

All data collected in the EM system (e.g., video, logbooks, and applications) would be considered confidential.

Discussion and Rationale: The Magnuson-Stevens Fishery Conservation and Management Act, NMFS internal confidentiality rules, and any new or revised rules that are proposed by NMFS would guide the protection of the data that is collected under the EM program. This includes access, ownership, and public dissemination of the information. Implementation of confidentiality rules that are specific to EM data would be developed by NMFS.

2.2.3 Alternative 1b - Use Logbooks to Estimate Discard (Audit logbook with Camera) (*Council Preferred Alternative)*

Alternative 1b provides the opportunity for the fishermen to speciate and estimate the total discarded weight of the fish for each set or haul and provide this information in a logbook. Then, the video images would be reviewed to verify discard events and the species/weight estimates for the trip."

Description of Discard Accounting Under Alternative 1b

Under Alternative 1b the logbooks would be the data source while the video recordings would be used to verify the logbook data (logbook-audit method). The video images would be reviewed to verify the discard events and the species/weight estimates recorded by fishermen for the trip. Under Alternative 1b, the requirement for 100% at-sea observation of all whiting trips would continue. The Council chose, as a policy, that at least 10% of the fishing events in a trip should be audited for compliance with logbook reporting requirements.

The logbook-audit method is similar to an EM program conducted in British Columbia, which is considered a success. The method relies on fishermen to accurately report their discard and places accountability on the vessel operator. A review of all video images would be conducted to verify the discard documented in logbooks. In the future the audit rate of 100% may be reduced based on compliance rates and program performance. The Council would rely on NMFS to choose an appropriate level of video review based on risk of error in catch accounting, especially for rare events such as large discards of overfished species, and report to the Council for consideration. However, upon implementation, the audit rate will be 100% until changed by NMFS and the Council.

Description of EM Components under Alternative 1b

The Council's preferred options were added to Alternative 1b (Table 2-2). A second column, "Other Available Options", was added to the table to show other potential options that could be chosen under Alternative 1b. The only difference between the list of options for Alternative 1a and 1b is the Video Reading Protocol; Under Alternative 1b all video would be reviewed to audit the logbooks for compliance. See section 2.2.3.1 for a detailed description. All remaining descriptions of EM components for 1b are identical to Alternative 1a, therefore; please refer to Sections 2.2.2.2 through 2.2.2.13 under Alternative 1a for a complete description.

Summary Table of Alternative 1b and EM Components

Table 2-2 is a summary of components that would be implemented as part of the EM program under Alternative 1b. The Council adopted these components as necessary elements to create the framework of an EM program. The summary table provides the Council preferred options and then lists other options that were considered when the Council selected the preferred option (see column "Other Available Options").

Table 2-2. Summary of Alternative 1b and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 1b – Use Logbooks to Estimate Discard (Audit logbook with Camera) *Council Preferred Alternative and Options*	Other Available Options
2.2.3	Video Reading Protocol	The Council chose, as a policy, that at least 100% of the fishing events in a trip should be audited for compliance with logbook reporting requirements.	None
2.2.2.2	Discard Accounting – Individual or Fleetwide	**Estimation of discard may be done through EM, WCGOP observer program, or other data sources.** **Option A –** ***(Council Preferred)*** Estimate Discard with EM and Count against IFQ and sector allocations Under this option all discard events would be estimated with EM and total discard would be debited from IFQ accounts or sector allocations. One discard category and all discards are estimated using EM and counted against IFQ: Dumped off deck (e.g., shoveled, picked out of net) Dumped for safety reasons (e.g., pull zipper) Floating fish (bleeding net/washed out of net) Lost gear (not captured by EM, estimate using WCGOP protocol) Consumed/used as bait (not captured by EM) Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)	**Option B –** Split into two discard categories; discard Category 1 events count against IFQ, discard Category 2 events count against sector or ACL; for some types of discard events the estimate is based on trips with observer coverage (events in each category described below). **Option C –** Split into two discard categories; discard Category 1 events count against IFQ, no accounting for discard Category 2: *Discard 1:* • Dumped off deck (e.g., shoveled, picked out of net) • Dumped for safety reasons (e.g., pull zipper) • Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP protocol) *Discard 2:* • Floating fish (bleeding net/washed out of net) • Lost gear (not captured by EM, estimate using WCGOP protocol) Consumed/used as bait (not captured by EM)
2.2.2.5	EM Individual Vessel Monitoring Plan – Expiration	**Option B –** ***(Council Preferred)*** **Annual Expiration or if modifications are made** Same as Option A but with annual expiration	**Option A – No Expiration unless modifications are made** • Approval of plans by NMFS • Plan modification provisions: (NMFS to decide how this is done) 1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes) 2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)

Table 2-2. Summary of Alternative 1b and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 1b – Use Logbooks to Estimate Discard (Audit logbook with Camera) *Council Preferred Alternative and Options*	Other Available Options
2.2.2.6	Declaration of EM Use	**Option C – *(Council Preferred)*** Declare Until Changed with Some Limit on Frequency For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer however a limit would be imposed on the number of times a vessel could switch from using EM to using an observer and then back to using EM. **Exception for Emergency Situation** For example, camera broke so need an observer tomorrow, vice versa	**Option A – Annual Declaration** Use EM all year; no observer coverage needed unless EM fails **Option B – Annual Declaration with Intermittent U**se For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer (e.g. monthly or quarterly). **Option D – Declare until Changed with No Limit on Frequency** Same as Option C but with no limit on the number of times a vessel could switch back and for the between using EM and an observer.
2.2.2.7	Data Transfer Process	Includes secure transfer for data and chain of custody requirements. **Options** (not mutually exclusive): **C. *(Council Preferred)* Shoreside catch monitor** **D. *(Council Preferred)*Vessel operator/Crew**	**Options** (not mutually exclusive): **A. PSMFC** **B. EM Provider** **E. Third Party (hired by processor, port, or fisher)**
2.2.2.8	Video and Data Processing	Potential video reviewers **Option D - *(Council Preferred)* Third Party**	**Options** (not mutually exclusive): **Option A -NMFS** **Option B -PSMFC** **Option C - EM Provider**
2.2.2.9	Payment for Scientific data collection/observations	**Option A**: **Government funded, same as pre IFQ *(Council Preferred)***	**Option B**: **Industry Funded** **Option C: Combination of both Government and Industry**

Table 2-2. Summary of Alternative 1b and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 1b These components do not have options to choose from but would be implemented as part of an EM Program		
2.2.2.10	Observer Exemption Process - Application Approval and Required Information	**Requires application to NMFS to use EM; the application could include the following information**: 1. Operational information. a. Installation by certified EMS Provider b. EMS service provider responsibilities c. Data Confidentiality Standards d. Data Storage and Delivery Standards e. EMS Coverage Requirements f. Monitoring Requirements g. Vessel Responsibilities 2. Data Sources a. Digital Camera(s) b. Winch Sensors c. Hydraulic Sensors d. Log Book e. VMS f. GPS c. Storage Standards d. Date and Time Stamp and Counter e. Digital File Format f. Minimum Frame Rate g. Minimum Resolution h. Accepted Delivery Methods i. Time Frames j. Color Optics k. Lighting Standards l. Power Supply Standards
2.2.2.10	Observer Exemption Process - Eligibility Requirements	A vessel must be in good standing and has approved equipment and operational plan certifications. **Eligibility Requirements** **Initial eligibility criteria**: 1. Limited entry groundfish trawl permit2. Quota share permit 3. No IFQ deficits 4. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP) a. IVMP unique for each vessel b. Multiple IVMPs included if submitted by group of vessels 5. Self-Governing Plan (if applicable, not required) a. Data Delivery and Analysis (DDA) specifications b. submitted by either a group of vessels or an individual vessel **Continued eligibility for all fisheries**: 1. Participants must be in compliance with their IVMP 2. Demonstrate proper documentation of the discards in logbooks or on video

Table 2-2. Summary of Alternative 1b and EM Program Components for Whiting Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 1b These components do not have options to choose from but would be implemented as part of an EM Program			
2.2.2.11	EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)	**Required EM IVMP Plan** Potential categories of information in an IVMP: a) Type of system b) Hardware c) Software d) Emergency protocols e) Back-up equipment use protocols f) Catch handling protocols g) Layout of vessel h) Screen shots of all camera views i) Number of cameras needed with placement specifications j) Care and maintenance of the EM system k) Types of sensors and data for sensors to capture	l) Download/maintenance schedule m) Logbook format (electronic or paper) n) Tamper Resistant/Taper Evident o) Lighting Locations (Stern, Deck, Discard Shoot, etc.) p) Bridge Mounted Computer Interface/Monitors q) GPS Receiver r) Winch Sensors s) Hydraulic Pressure Transducers t) Power Supply / Backup u) Wire Runs v) Geo Fencing (NMFS supplied) w) System's Check Certification x) Data logger
2.2.2.12	EM Equipment and Protocol Provisions	Type-Approval Process, EM Equipment Requirements (Data formats, Video Hardware, Logbook Data Source, On-Vessel Data Storage, Onboard operations)	
2.2.2.13	Data Confidentiality /Accessibility/ Ownership	All data collected under the EM program (e.g., video, logbooks, and applications) would be considered confidential. Current confidentiality rules may need to be clarified to include this information.	

2.2.3.1 Video Reading Protocols

Discard Species List

2.3 Detailed Description of Alternatives and Options for IFQ Fixed Gear Fishery

2.3.1 No Action

The following descriptions of the alternatives contained detail description of the many components of the alternatives. They embody the current Council thinking as to what should be in the initial guidelines for this fishery. These EM guidelines document guidance, policies, and best practices for the EM Program related to EM system specifications, catch handling, catch accounting, vessel monitoring plan contents, data confidentiality, recordkeeping, standards for video review, and formats for reports. NMFS will develop the EM Program guidelines, in consultation with the Council, and publish them for public comment in the Federal Register. NMFS will maintain the EM Program guidelines on its website and consult with the Council, and publish for public comment, any modifications with at least 3months' notice prior to the start of the fishing year.

This section repeats many of the program elements reported above the whiting fishery. This repetition is provided to aid those reviewers who are mainly concerned about the fixed gear alternatives. The No Action Alternative or status quo (the No Action Alternative) defines the default management structure if no Federal action was taken. Under the No Action Alternative, NMFS would maintain the existing LE permit and licensing requirements, the catch share program requirements, and the current observer program requirements.

Under the No Action Alternative:

- All catch share program regulatory requirements would remain in place (See Section 50 of the Code of Federal Regulations Part 660 Subpart A, C and D);
- Maintain current mandatory 100% human observer coverage to monitor fishery participants for compliance with IFQs, IBQs, and allocated groundfish;
- Maintain requirements for vessels to secure and pay for compliance observers for each trip;
- Third party providers would continue to supply compliance observers and shoreside catch monitors to the industry;
- NMFS would continue to train third party compliance observers for data collection and biological sampling;
- Vessels would still be required to use a vessel monitoring system (VMS); and
- Maintain requirement to document catch in logbooks

Currently, all trips and at-sea discards from IFQ FG trips must be monitored by a human observer in order to monitor the fisheries compliance with the catch share program and estimate total discards. Under the No Action Alternative, all IFQ FG trips would continue to be monitored with a third-party observer to provide the necessary data to debit QP accounts (see Section 3.3.1).

The Northwest Fisheries Science Center trains, certifies, and equips IFQ program observers, ensures data quality, and stores, maintains, and analyzes data collected by observers. It's expected that third-party observer providers would continue to provide human at-sea and shoreside monitoring for vessels in the whiting fishery and NMFS would continue to provide the training of observers for deployment.

Under the No Action Alternative, vessel operators would still be allowed to discard any allowable species under the Shorebased IFQ program. Vessels operators would still be required to discard prohibited species (i.e. salmon, halibut, and Dungeness crab) and observers would document the discard. Halibut IBQ totals would be accounted for using observer estimates based on viability, length

measurements, and gear specific discard mortality rates (See Section 3.2.4.2). Specifically, observers would also continue to conduct a viability assessment and take length measurements for halibut that are discarded at sea on pot gear trips. Observers also would continue to conduct visual length estimates for vessels that use longline gear. This information is used to assess the total mortality for halibut in the fishery. NMFS would continue to apply a gar specific halibut mortality rates to derive annual mortality estimates for the FG fishery.

Under the No Action Alternative, the cost for at-sea observer coverage will no longer be federally subsidized. In 2015, the Federal government provided a subsidy of $108 per day to offset the cost for an observer. It's expected that in 2016, the average cost for at-sea observers will range from $450 to $600 per day.

Catch that is landed at shoreside processors or wholesalers would continue to be monitored with shoreside catch monitors that are paid for by the industry and secured through a third-party observer provider.

2.3.2 Alternative 2a - Camera Recordings Used to Estimate Discard

Under Alternative 2a, the video images are the primary data source for estimating discards and logbooks are used as a quality control/quality assurance tool. (Alternative 2b -logbooks are the primary source and video is used to as a quality control/assurance tool.). The video is reviewed for fish discarded by fishermen, the species are identified, assign an estimated weight, and the QP account is debited.

Alternative 2a would implement a voluntary EM program for the IFQ FG fishery and requires discard to be documented in a federally approved logbook. Qualified participants could choose to use EM in lieu of a human observer or use an observer to monitor their compliance with IFQ and sector allocations. The video data would be the primary source for discard monitoring and accounting. Those that choose not to use EM would continue fishing under the regulations associated with the No Action Alternative.

Description of Discard Accounting Under Alternative 2a

Under Alternative 2a, discard events at sea would be monitored with video cameras to provide sufficient information to enumerate the weight of fish discarded at sea so that IFQ accounts and sector allocations could be debited. The primary data source for this information would be video data. Video data would be reviewed at a shoreside facility by a video reviewer to estimate the total weight of the discard for each trip. Discard estimates would be identified by species and enumerated on an individual basis.

Under Alternative 2a, the requirement for 100% at-sea observation (EM or an observer) of all IFQ FG trips would continue. Those that choose not to use EM would be required to have an observer and fish under the regulations and requirements as described under the No Action Alternative.

Description of EM Components under Alternative 2a

The following sections provide detailed descriptions of all available "Options" to build the EM Program Components under Alternative 2a. The Council adopted these components as necessary elements to create the framework of an EM program. A summary table is provide that contains a detailed list of all EM Program Components with cross references to their descriptions (Table 2-3). Table 2-3 has one column for Alternative 2a and includes all Council preferred options that would be implemented as part of the EM program under Alternative 2a. A second column contains all other options that were considered when the Council selected the preferred option.

Each EM Component is described in detail with discussion and rationale for development of the component. The main EM Components, 2.2.2.1 through 2.2.2.9, have options for the Council to choose from to develop the policy for that EM component. EM components 2.2.2.10 through 2.2.2.13 do not have options but were adopted by the Council as necessary components for an EM program. NMFS would develop and implement these components as appropriate in consultation with the Council, state agencies, and the industry.

Main EM components that contain options for policy development are:

- 2.3.2.1 - Video Reading Protocol (**Unique to Alternative 2a**)
- 2.3.2.2 - Discard Accounting – Individual or Fleetwide
- 2.3.2.3 - Retention Requirements
- 2.3.2.4 - Halibut Retention/Discard
- 2.3.2.5 - Discard Species List Adjustments
- 2.3.2.6 - EM Individual Vessel Monitoring Plan – Expiration
- 2.3.2.7 - Declaration of EM Use
- 2.3.2.8 - Data Transfer Process
- 2.3.2.9 - Video and Data Processing and Analysis
- 2.3.2.10 - Payment for Scientific data collection/observations

While working through the development of the alternatives and EM Component Options, certain components of the EM program were identified as basic elements that would be necessary for an EM program to run efficiently and to conduct an orderly fishery. However, there are no policy options to choose from under these components. The Council delegated development and implementation of them to NMFS. For example, NMFS has set up a process for applicants to qualify and submit an "Observer Exemption Application" to NMFS that requests the use of EM in lieu of an observer. NMFS developed regulations to specify the requirements for fishermen, EM providers, and observer providers (e.g., applications, individual vessel monitoring plans, or compliance program rules).

The following list provides an overview of the EM components that would be implemented by NMFS upon approval of the proposed action. These components do not have options to choose from but contain topics of information that could be used to develop processes or protocols.

EM components that do not have options to choose from include:

- 2.3.2.11 - Observer Exemption Process (Possible PRA Approval)
    - Application and Approval Process (including an application for fishermen)
    - Eligibility Criteria (Initial and continued eligibility criteria)
- 2.3.2.12 - EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)(including a form for submission to NMFS for review)
- 2.3.2.13 - EM Equipment and Protocol Provisions
    - EM Equipment Requirements (e.g., data format, video hardware products, logbook data source, on-vessel data storage, onboard operational standards and practices)
    - NMFS Type-Approval Process for EM Equipment (including a list of specifications for EM providers and submission process to receive type-approval) - Possible PRA Approval
    - Approved EM Provider List (including a list of specific criteria for providers to demonstrate their capability and standards) - Possible PRA Approval
- 2.3.2.14 - Data Confidentiality/Accessibility/Ownership

Summary Table of Alternative 2a and EM Components

Table 2-3 is a summary of components that would be implemented as part of the EM program under Alternative 2a. The Council adopted these components as necessary elements to create the framework of an EM program. The Council selected Alternative 2b as their preferred Alternative. For analysis purposes, the summary table for Alternative 2a contains the Council preferred options listed under the Council preferred Alternative 2b and then lists other options that were considered when the Council selected the preferred options (see column “Other Available Options”).

Table 2-3. Summary of Alternative 2a and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 2a - Camera Recordings Used to Estimate Discard	Other Available Options
2.3.2.1	Video Reading Protocol	**The following video reading protocol options are unique to Alternative 2a:** **Option A**: 100% with a mandatory logbook (census all video footage and estimate discard).	**Option B**: Subsample Video and expand discard estimate to whole trip (% review must be developed) **Option C**: Subsample Video with a mandatory logbook requirement to document discard (% to review must be developed)
2.3.2.2	Discard Accounting – Individual or Fleetwide	**Estimation of discard may be done through EM, WCGOP observer program, or other data sources.** **Option A: (*Council Preferred*)** Estimate Discard with EM and Count against IFQ Under this option all discard events would be estimated with EM and total discard would be debited from IFQ accounts or sector allocations. One discard category and all discards are estimated using EM and counted against IFQ: Dumped off deck (e.g., shoveled, picked out of net) Dumped for safety reasons (e.g., pull zipper) Floating fish (bleeding net/washed out of net) Lost gear (not captured by EM, estimate using WCGOP protocol) Consumed/used as bait (not captured by EM) Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)	**Option B:** Split into two discard categories; discard Category 1 events count against IFQ, discard Category 2 events count against sector or ACL; for some types of discard events the estimate is based on trips with observer coverage (events in each category described below). **Option C:** Split into two discard categories; discard Category 1 events count against IFQ, no accounting for discard Category 2: *Discard 1:* • Dumped off deck (e.g., shoveled, picked out of net) • Dumped for safety reasons (e.g., pull zipper) • Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP protocol) *Discard 2:* • Floating fish (bleeding net/washed out of net) • Lost gear (not captured by EM, estimate using WCGOP protocol) • Consumed/used as bait (not captured by EM)
2.3.2.3	Retention Requirements	**Option B: Optimize Retention Retain Catch Share Species with Limited Discard Options (*Council Preferred*)**	**Option A: Maximize Retention**

Table 2-3. Summary of Alternative 2a and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 2a - Camera Recordings Used to Estimate Discard	Other Available Options
2.3.2.4	Halibut Retention/Discard	**Option A: (*Council Preferred*)** Use WCGOP mortality rate for specific gear type: 16% mortality if discarded from longline; 18% mortality rate if discarded from pots. **Option F**: **(*Council Preferred*)** Use an appropriate EM viability assessment (currently conducting study, need IPHC approval)	**Option B:** WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet **Option C:** Use vessel specific mortality rate (update rates periodically through application of third-party observer rates on non-EM vessels or through WCGOP random observations of EM vessels) **Option D:** IPHC exemption to allow full retention (need to examine the feasibility of this option) **Option E**: Captain and crew provide assessment (training would be required)
2.3.2.5	Discard Species List Adjustments	**Option B**: **(*Council Preferred*)** Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).	**Option A**: NMFS to make determination and provide list to fishers through the NMFS approval process to use EM. **Option C**: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.
2.3.2.6	EM Individual Vessel Monitoring Plan – Expiration	**Option B: (*Council Preferred*)** Annual Expiration or if modifications are made Same as Option A but with annual expiration	**Option A:** No Expiration unless modifications are made • Approval of plans by NMFS • Plan modification provisions: (NMFS to decide how this is done) 1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes) 2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)

Table 2-3. Summary of Alternative 2a and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 2a - Camera Recordings Used to Estimate Discard	Other Available Options
2.3.2.7	Declaration of EM Use	**Option A:** Annual Declaration **(*Council Preferred*)** Use EM all year; no observer coverage needed unless EM fails **Exception for Emergency Situation** For example, camera broke so need an observer tomorrow, vice versa	**Option B:** Annual Declaration with Intermittent Use For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer (e.g. monthly or quarterly). **Option C:** Declare Until Changed with Some Limit on Frequency For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer however a limit would be imposed on the number of times a vessel could switch from using EM to using an observer and then back to using EM. **Option D: Declare until Changed with No Limit on Frequency** Same as Option C but with no limit on the number of times a vessel could switch back and for the between using EM and an observer.
2.3.2.8	Data Transfer Process	Includes secure transfer for data and chain of custody requirements. **Options** (not mutually exclusive): **C. Shoreside catch monitor (*Council Preferred*)** **D. Vessel operator/Crew (*Council Preferred*)**	**Options** (not mutually exclusive): **A. PSMFC** **B. EM Provider** **E. Third Party (hired by processor, port, or fisher)**
2.3.2.9	Video and Data Processing and Analysis	Potential video reviewers **Option D: (*Council Preferred*)** Third Party	**Options** (not mutually exclusive): **Option A** -NMFS **Option B** -PSMFC **Option C** - EM Provider
2.3.2.10	Payment for Scientific data collection/observations	**Option A: (*Council Preferred*)** Government funded, same as pre IFQ ***(Council Preferred)***	**Option B**: Industry Funded **Option C**: Combination of both Government and Industry

Table 2-3. Summary of Alternative 2a and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 2a These components do not have options to choose from but would be implemented as part of an EM Program			
2.3.2.11	Observer Exemption Process- Application Approval and Required Information	**Requires application to NMFS to use EM; the application could include the following information**: 1. Operational information. a. Installation by certified EMS Provider b. EMS service provider responsibilities c. Data Confidentiality Standards d. Data Storage and Delivery Standards e. EMS Coverage Requirements f. Monitoring Requirements g. Vessel Responsibilities 2. Data Sources a. Digital Camera(s) b. Winch Sensors c. Hydraulic Sensors d. Log Book e. VMS f. GPS	3. EM Data Standards a. Secure Watertight Control Box Data Storage b. Encrypted Data c. Storage Standards d. Date and Time Stamp and Counter e. Digital File Format f. Minimum Frame Rate g. Minimum Resolution h. Accepted Delivery Methods i. Time Frames j. Color Optics k. Lighting Standards l. Power Supply Standards
2.3.2.11	Observer Exemption Process - Eligibility Requirements	A vessel must be in good standing and has approved equipment and operational plan certifications. **Eligibility Requirements** **Initial eligibility criteria**: 1. Limited entry groundfish trawl permit2. Quota share permit 3. No IFQ deficits 4. No civil or criminal penalties related to fishing activity exceeding a certain amount and timeframe 5. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP) a. IVMP unique for each vessel b. Multiple IVMPs included if submitted by group of vessels 6. Self-Governing Plan (if applicable, not required) a. Data Delivery and Analysis (DDA) specifications b. submitted by either a group of vessels or an individual vessel **Continued eligibility for all fisheries**: 1. Participants must be in compliance with their IVMP 2. Demonstrate proper documentation of the discards in logbooks or on video 3. No civil penalties related to fishing activity exceeding a certain amount within the time period of EM use	

Table 2-3. Summary of Alternative 2a and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 2a These components do not have options to choose from but would be implemented as part of an EM Program			
2.3.2.12	EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)	**Required EM IVMP Plan** Potential categories of information in an IVMP: a) Type of system b) Hardware c) Software d) Emergency protocols e) Back-up equipment use protocols f) Catch handling protocols g) Layout of vessel h) Screen shots of all camera views i) Number of cameras needed with placement specifications j) Care and maintenance of the EM system k) Types of sensors and data for sensors to capture	l) Download/maintenance schedule m) Logbook format (electronic or paper) n) Tamper Resistant/Taper Evident o) Lighting Locations (Stern, Deck, Discard Shoot, etc.) p) Bridge Mounted Computer Interface/Monitors q) GPS Receiver r) Winch Sensors s) Hydraulic Pressure Transducers t) Power Supply / Backup u) Wire Runs v) Geo Fencing (NMFS supplied) w) System's Check Certification x) Data logger
2.3.2.13	EM Equipment and Protocol Provisions	Type-Approval Process, EM Equipment Requirements (Data formats, Video Hardware, Logbook Data Source, On-Vessel Data Storage, Onboard operations)	
2.3.2.14	Data Confidentiality /Accessibility/ Ownership	All data collected under the EM program (e.g., video, logbooks, and applications) would be considered confidential. Current confidentiality rules may need to be clarified to include this information.	

2.3.2.1 Video Reading Protocol

Since Alternative 2a uses video as the data a source, a method for reading the video and creating discard estimates must be chosen (Video Reading Protocol). There are three separate ways to use the video for discard estimation. These options are unique to Alternative 2a.

Option A: 100% - census all video footage and estimate discard, includes a mandatory logbook requirement to document discard.
Option A is to conduct a census of all video images and estimate the total discard for each set or haul that occurred in a trip. The discarded species would need to be accurately identified, assigned a weight, and debit the QP account in a timely manner. Option A includes a mandatory logbook requirement. Although midwater trawl vessels are currently required to submit a trawl logbook, additional information regarding species discards (for each species if known) would be required.

Discussion and Rationale for Option A: A full census of the video images would provide the most data for discard estimates and reduce the risk of missing discard events. Compared to Option B and C, this option would provide the most accurate estimate for debiting IFQ accounts and sector allocations.

Option B: Subsample Video and expand discard estimate to whole trip; percent subsample for the review must be developed.
Option B is to subsample the video images at some predetermined percent of video review (e.g., 10%, 25% and 50%), speciate the discard, estimate the weight of the discard, then expand the discard rate to the entire trip to provide a total estimated discard for the trip.

Discussion and Rationale for Option B: Cross comparison of full census and subsampling would be needed to determine if it is sufficiently accurate for catch accounting purposes.

Rather than review all video (Option A), under Option B the total discard would be estimated by random sampling of the video data, which would then be expanded to estimate discards for the whole trip. The sampling rate necessary to accurately estimate total discard would need to be determined prior to implementation. There are several problems with this method that will need to be resolved before implementation. First, if discards are rare events, the sample rate may need to be quite high or the expanded estimate of discard may be greater than or less than the actual discard.

It may be more appropriate for data managers to determine the optimum sample rate, balancing government and industry costs and accuracy for accounting purposes. If this option is chosen, the Council expects NMFS to develop and implement the appropriate level of review necessary for accurate and cost effective catch accounting. As we learn from the application of EM to this fishery, sampling rates may be revised along with other features of the program. NMFS will develop revisions to the EM Program guidelines, in consultation with the Council, and publish them for public comment in the Federal Register. NMFS will maintain the EM Program guidelines on its website and consult with the Council, and publish for public comment, any modifications with at least 3 months' notice prior to the start of the fishing year.

Option C: Same as Alternative B but includes a mandatory logbook requirement to document discard.

Option C is the same as Option B, however additional logbook information would be required to document discard. Option B is to subsample the video images at some predetermined percent of video review (e.g., 10%, 25% and 50%), speciate the discard, estimate the weight of the discard, then expand the discard rate to the entire trip to provide a total estimated discard for the trip

Discussion and Rationale for Option C
Option C is the same as Option B, however a logbook would be required to document discard data. Logbook information provides a back-up data source to verify discard if an EM system fails to capture the necessary data because of equipment failure or environmental conditions. Logbooks depend on accurate self-reporting of discard events and there is an incentive to underreport.

2.3.2.2 Discard Accounting – Individual or Fleetwide

Discard events occur in a several ways. These events need to be captured by EM in order to account for them. Discard is any portion of the total catch that is not delivered to a buyer. Fish caught for bait or onboard consumption are considered discard. For gear that is lost or sets and hauls that are unobserved, discard rates will be applied based on similar sets and hauls.

The discard accounting options were developed in the following way:
1) Discard events were grouped into discard categories 1 and 2 (type of discard events);
2) Accountability was established (i.e., IFQ, Fleetwide, or not accounted); and
3) Data sources were identified as either EM or the WCGOP.

Option A: **Estimate Discard with EM and Count against IFQ *(Council Preferred)***

Under this option all discard events would be estimated with EM and total discard would be debited from IFQ accounts or sector allocations.

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

Option B: **Split into two discard categories; Category 1 count against IFQ, Category 2 count against sector or ACL; for some discard the estimate is based on trips with observer coverage**
Under Option B, two discard categories would be created. Category 1 events would be debited from IFQ accounts and sector allocations. Category 2 events would be estimated annually and debited from the fishery sector allocation preseason or from the annual catch limit (ACL).

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

Discard 2 Sector or ACL accounting:
• Floating fish (bleeding net/washed out of net)
• Lost gear (not captured by EM, estimate using WCGOP protocol)
• Consumed/used as bait (not captured by EM)

Option C: **Split into two discard categories; no accounting for discard 2 category**:
Under Option C, two discard categories would be created and each category. Category 1 events would be debited from IFQ accounts and sector allocations. Category 2 events would not be estimated or debited from sector allocations or the ACL. Council staff note that in order for Option C to be valid it would have to comply with MSA national standards. National Standard 9 requires accounting for all catch and discard to estimate total mortality estimates and ensure annual catch limits are not exceeded. Option C would not comport with the MSA National Standard 9.

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

Discard 2 No accounting:
• Floating fish (bleeding net/washed out of net)
• Lost gear (not captured by EM, estimate using WCGOP protocol)
• Consumed/used as bait (not captured by EM)

Total catch accounting in the IFQ FG fishery sectors is simplified in Figure 2-2.

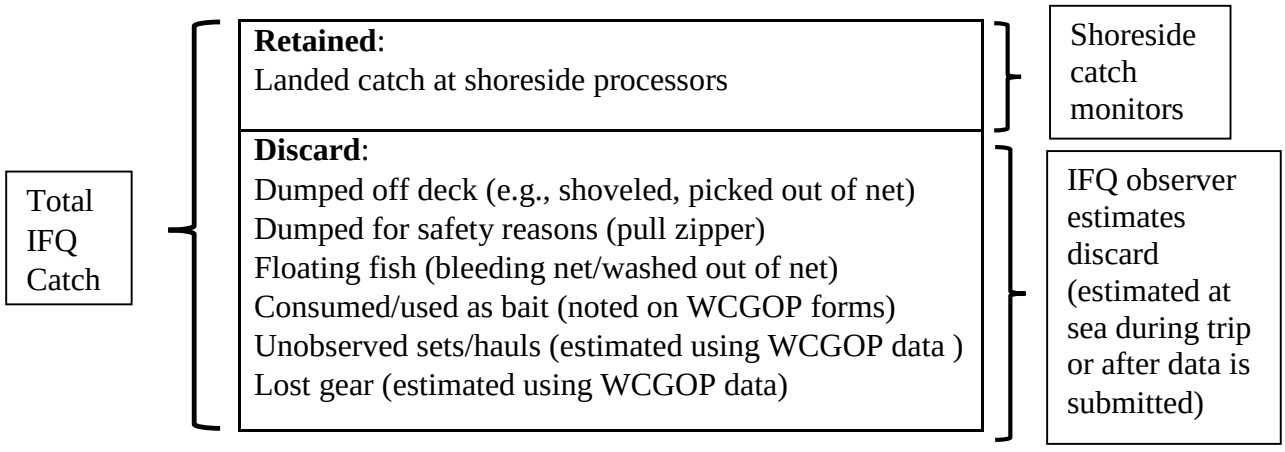

Figure 2-2. General depiction of total catch accounting in the Shorebased catch share program.

Under an EM program, the estimation (speciation and weight) for these discard events would be conducted using EM rather than the WCGOP. However some of the discard events may not be captured by EM, such as lost gear, crew consuming fish onboard the vessel, using fish caught as bait, and unobserved hauls/sets that had discard (i.e., EM failed to record the discard); therefore, some other source of data may be needed to account for the discard activity.

In addition, some events may be captured by EM but are difficult to quantify, such as floating fish on the surface of the water.). Rather than accounting for these discards at the individual level (IFQ), it's possible to account for it during the specification process for Annual Catch Limits (ACL), at the sector level, The estimated mortality could be deducted from the ACL prior to allocation to each sector or at the sector level to be taken "off-the-top" prior to IFQ distribution and catch allocation distributions.

2.3.2.3 Retention Requirements

Currently the IFQ FG fishery may discard at will any fish IFQ species and some statutory management measures such as the Endangered Species Act (ESA) or the Marine Mammal Protection Act (MMPA) may require vessels to discard protected species, such as marine mammals. Under EM, vessels would either be required to retain all species that are allowed to be retained under existing laws (maximize retention), or be allowed to discard certain species (optimize retention).

Option A: Maximize Retention
Definition: A vessel is generally required to retain all catch including IFQ and non-IFQ species, non-groundfish, non-FMP, prohibited species and protected species.

The following regulatory requirements or discard exceptions would apply:

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

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

Option B: Optimize Retention Retain Catch Share Species with Limited Discard Options (*Council Preferred*)
Under this option vessel operators would be allowed to discard only those species that are listed in the discard species list. This can include IFQ or non-IFQ species.

Definition: A vessel operator is generally required to retain all catch share species but may be discard some catch share, non-catch share, and groundfish species if verifiable with EM in accordance with an discard species list established in regulation by NMFS.

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

- For LE fixed gear 22 or 24 inch lingcod must be discarded or if the vessel exceeds their non-IFQ trip limit; i.e Regulatory discards. (The minimum size limit for lingcod is 22 inches (56 cm) total

length North of 42º N. lat. and 24 inches (61 cm) total length South of 42º N. lat.) This information would need to be verifiable under an EM system.
- Halibut
- Salmon
- ESA/MMPA species

2.3.2.4 Halibut Retention/Discard

NMFS would continue to implement the International Pacific Halibut Commission's (IPHC) exemption to allow full retention of halibut caught in midwater gear (a prohibited gear to catch halibut) and apply a 100% mortality rate for all halibut caught.

Option A *(Council Preferred)*: Use WCGOP mortality rate for specific gear type: 16% mortality if discarded from longline; 18% mortality rate if discarded from pots.
Option B: WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet
Option C: Use vessel specific mortality rate (update rates periodically through application of third-party observer rates on non-EM vessels or through WCGOP random observations of EM vessels)
Option D: IPHC exemption to allow full retention (need to examine the feasibility of this option)
Option E: Captain and crew provide assessment (training would be required)
Option F *(Council Preferred)*: Use an appropriate EM viability assessment (currently conducting study, need IPHC approval)

2.3.2.5 Discard Species List Adjustments

Under an EM program, and consistent with current fishing practices, the whiting fishery would continue to retain all species and generally not be allowed to discard fish. During the development of the EM program for all groundfish fisheries that operate under the Shorebased IFQ Program and receive catch allocations, discussions surrounded allowing certain species to be discarded once EM was able to positively identify them via video cameras. Therefore a species list for allowable discards of certain species would need to be developed at the initial stage of the EM program and for the implementing regulations.

During development, it seemed necessary to consider future changes to the species list for fisheries that would be allowed to discard species since it was expected that recognition software programs may assist in further refinement or expansion of a species discard list. Therefore a process that is efficient and flexible to change the species discard list was needed. This component was added to the EM program options.

Three options were created to account for technological changes and to streamline the revision of species discard lists for an EM program:

Option A: NMFS to make determination and provide list to fishers through the NMFS approval process to use EM.

Option B (***Council Preferred)***: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).

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

Challenges to Options A and B include the development of an objectively applicable performance standard, development of a NEPA analysis that would be adequate to allow routine action without further analysis and the effect of the change on the vessel accounting system and development of fleetwide mortality estimates for inseason management.

2.3.2.6 EM Individual Vessel Monitoring Plan – Expiration

An individual vessel monitoring plan (IVMP) would be required (see Section 2.2.2.11 for a description of the elements of an IVMP). Each vessel operator/owner would be responsible for developing an IVMP for the vessel and acquiring the needed approval from NMFS to use EM. IVMPs would play a major role as part of the EM program. These plans would help facilitate an effective program and serve as a clear, written plan for discard documentation, installation and maintenance of an EM system, protocols for data storage and transfer, among other things. However, the duration of the IVMP must be determined.

Option A – No Expiration unless modifications are made
Approval of plans by NMFS with no expiration

1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes)
2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)

Option B *(Council Preferred)* – Annual Expiration or if modifications are made
Same as Option A but with annual expiration or if modifications are made

Discussion and Rationale: IVMPs will be vessel specific and provide NMFS, video reviewers and EM provides important information regarding EM performance, ensure accountability and place responsibility on vessel operators to follow the protocols of the plan. The plans must be submitted for approval and NMFS must be able to track each vessel. The plan could be left in place until modifications are needed (Option A) or an expiration could be added to allow NMFS to review each plan on an annual basis.

Program management may change with advances in technology or a change in the type-approved EM systems could trigger the need to modify plans. An IVMP may need to be modified, for example, to accommodate changes in fish handing protocols or the number of cameras needed to get more accurate information. These modifications could be initiated by the vessel operator, EM provider or the Government. If modifications to the IVMP are necessary, changes must be made in agreement between the vessel representative and the EM provider. Some changes may require re-approval by NMFS; therefore, criteria and protocols that trigger re-approval will need to be developed by NMFS upon implementation. The Council would defer to NMFS for the development of this process.

2.3.2.7 Declaration of EM Use

Vessel operators would be required to declare their intended use of EM. A declaration system would be developed along with protocols for submitting information to NMFS, EM providers, and observer

providers (private third-party and WCGOP). The Council would expect NMFS to implement a declaration system that is appropriate for all entities involved.

Option A - Annual Declaration *(Council Preferred)*
For the coming year the participant would declare that they will use EM for the next 12 months and no observer coverage is needed unless EM fails.

Option B - Annual Declaration with Intermittent Use
For the coming year, participants must indicate when they will use EM and when it will use an observer (e.g. monthly or quarterly). The IVMP would include a description of the responsibility for vessel operator to notify NMFS, EM provider, and NMFS observer program when EM will be used and when observer will be used. The time period for EM use would be adhered to unless EM fails and observer is needed.

Option C - Declare Until Changed with Some Limit on Frequency
Under this option, the vessel and the observer provider would need to schedule when observers are needed or available on a per trip basis. The IVMP would provide a description of the responsibility for vessel operator to notify NMFS, EM provider, and NMFS observer program when EM will be used and when observer will be used. However a limit would be imposed on the number of times a vessel could switch from using EM to using an observer and then back to using EM.

Option D - Declare Until Changed with No Limit on Frequency
Same as Option C but with no limit on the number of times a vessel could switch back and for the between using EM and an observer.

An exception for Emergency situations would be provided under all options (e.g., camera broke so need an observer tomorrow, vice versa)

Discussion and Rationale: Agencies and contractors (i.e., NMFS, PSMFC, EM providers, enforcement, states, and observer providers) will need to know the level of participation for EM use. This will help determine employee workload needs (e.g., how many observers, video reviewers, or catch monitors are needed month to month or annually), scheduling data transfers, EM system maintenance needs, etc. In order to process the fisheries in an orderly way, IVMP must provide a "Declaration of EM Use" and specify when an EM system will be used and when the vessel would, if at all, need an observer for a specified period of time within fishing year. For example, NMFS could require vessel operators to call into a phone declaration system or submit their intent to use EM via the IVMP. The Council would rely on NMFS to implement a limit on the frequency that vessels cold change their declaration in a given year.

2.3.2.8 Data Transfer Process

The video and logbook data would need to be transferred from the vessel to the video reviewer. Several options have been identified:

Options (not mutually exclusive):
A. PSMFC
B. EM Provider
C. Shoreside catch monitor *(Council Preferred)*

D. Vessel operator/Crew *(Council Preferred)*
E. Third Party (hired by processor, port, or fisher)

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

Data transfer protocols and frequency will vary by fishing sector (shoreside vessels vs. MS catcher vessels). For example, mothership catcher vessels may seldom return to port; this would increase the volume of data to store and affect the frequency of data transfer. If the data transfer processes are to be included in the Council recommended policy then both generic provisions that apply to all vessels or all vessels of a sector, and individual provisions may need to be specified. Again, this would be developed by NMFS during implementation.

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

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

The list of options includes the trusted entities that could securely transfer the data. The Council chose Options C and D with the understanding that these may be more efficient and less costly than the others. Ultimately it is up to the vessel owner to be responsible for the data transfer method and to determine the person responsible for the data transfer.

2.3.2.9 Video and Data Processing and Analysis

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

Potential reviewers for discard events (not mutually exclusive):

Option A: NMFS
Option B: Pacific States Marine Fisheries Commission
Option C: EM Provider
Option D *(Council Preferred)*: Third Party

Discussion and Rationale: The Council preferred that a Certified Third party (Option D) conduct the video reviews. However, until a certification process has been established the Government(Option A) – NMFS or their agent (e.g. PSMFC) would conduct the video reviews.

Video review could be conducted by several entities. One obvious choice is for the EM provider to conduct the review and provide the information to NMFS. However, it's possible that NMFS, PSMFC or some other third party could conduct the reviews. The benefit of an EM provider conducting the review is that it has an acute understanding of its software and video analysis tools, such as Archipelago Marine Research Inc. It may also be more cost effective for a fishing vessel to contract a "package" of an EM system and video review analysis from an EM provider. However, NMFS would need to conduct an audit of the EM provider or third party contractor to ensure all parties are in compliance with review protocols and IFQ accountability.

PSMFC is a trusted entity for fisheries management and support of fisheries program and conducted field studies therefore the agency has gained experience in the process. In addition, the agency is currently responsible for transferring total catch accounting data to NMFS in order to debit IFQ accounts. NMFS and PSMFC would need to develop a program to accommodate the work load.

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

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

An analysis of this information can be found in Section 4.2.1.2, Impact Analysis of the Alternatives.

2.3.2.10 Payment for Scientific data collection/observations

There are two types of duties for observers in the IFQ fishery, compliance observations and scientific observations. Compliance observations are needed to support catch and discard monitoring in the IFQ fishery to estimate total catch by a fishermen. Scientific observations are conducted to collect data to support stock assessments and estimate protected species interactions, amongst other things.

A funding source to continue this task under an EM program must be identified to support the WCGOP efforts. NMFS has determined that only Option A (below) is legal.
Three options were developed:

Option A *(Council Preferred)*: Government funded, same as pre catch share program
Option B: Industry Funded

Option C: Combination of both Government and Industry

Discussion and Rationale: If EM is used on IFQ trips and the observer is removed from the vessel without making other program adjustments, significant scientific information would be lost. A continuous need exists for at least some level of scientific observer coverage to collect biological samples and other scientific data on EM trips; therefore this portion of the sampling program would continue.

Previous to the catch share program NMFS provided scientific data collection on roughly 20 percent of the limited entry trawl fleet. This cost was covered by the Government. It's estimated that the WCGOP will sample roughly 20-30 percent of the EM fleet; however, these rates will need to be examined and a sampling scheme developed by NMFS in the future.

2.3.2.11 Observer Exemption Process

The following discussion provides the background of what may be required and the rationale for developing these components.

Currently vessels are required to carry human observers during an IFQ trip. Under the proposed EM program, a vessel would need to apply for an exemption to this regulation. Applicants would need to follow specific regulations and provide adequate information for NMFS to evaluate the application. An applicant would need to meet certain qualification standards to be eligible for EM use in lieu of an observer. However, even if an applicant qualifies and receives the option to choose EM, the vessel will still be subject to NMFS observer coverage to collect scientific data.

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

The following sections describe potential observer exemption process, eligibility for using EM, individual vessel monitoring plans (IVMP) requirements, duration of effectiveness of the IVMP, and participant's requirements to declare when a vessel will use EM. As appropriate, regulations will be prescriptive or performance based for these topics.

Application Approval and Required Information

The following is a list of potential information that NMFS may require from applicants.

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

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

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

If NMFS deems the application incomplete, it would provide the applicant an opportunity to revise it appropriately. Specifics regarding denial of an exemption would be provided on a case by case basis but the decision would likely be based on set standards that would be developed by NMFS. This process is identified as a NMFS process; therefore, the standards would likely involve a Council deeming process.

Eligibility Requirements

Participants would need to meet certain "eligibility requirements" and NMFS would review the application for approval. The application would also include a NMFS approved individual vessel monitoring plan.

Initial eligibility criteria:

1. Limited entry groundfish trawl permit with trawl endorsement, and/or MS/CV endorsement (and an MS coop endorsement if fishing in an MS Coop)
2. Quota share permit
3. No IFQ deficits
4. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP)
   a. IVMP unique for each vessel
   b. Multiple IVMPs included if submitted by group of vessels
5. Self-Governing Plan (if applicable, not required)
   a. Data Delivery and Analysis (DDA) specifications
   b. submitted by either a group of vessels or an individual vessel

Continued eligibility:

1. Participants must be in compliance with their IVMP
2. Demonstrate proper documentation of the discards in logbooks or on video

Discussion and Rationale: Qualification criteria would be needed to ensure that new applicants understand the program and follow the protocols that are set forth in regulation. Since the program is intended to be a privilege, the Council would expect that vessel operators comply with the EM program to ensure its utility for accurate accounting of IFQ accounts and sector allocations. Vessels that continue to comply would be eligible the following year. The criteria would encourage vessels to improve their efforts in order to qualify for the exemption.

Self-Governing Plan Elements

If vessels choose to develop and join group or self-governing agreements, then the following information would also be required. (See similar discussion under the Whiting alternatives in Section 2.2.2.10)

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

a. Comply with all Federal and State Regulations
b. Retention / Discard Requirements
c. Time and Area Restrictions
d. Data Collection Equipment Criteria
e. Data Collection Requirements
f. Data Analysis Agreement Clause
g. Discard Assessment Protocols and Procedures
h. Vessel / Operator Performance Standards
i. Vessel / Operator Responsibility
j. Compliance Criteria
    i. By Example: escalation of consequences (to be defined by group)
    ii. No Further use of Camera Use Alternative Criteria
k. Escape Clause

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

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

Discussion and Rationale: A self-governing plan was discussed as part of coop agreements to add an element of self-enforcement among members. This would provide an opportunity for vessels to work together to ensure compliance and lesson the need for enforcement actions on an individual level.

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

NMFS would specify IVMP requirements in regulation. This process is identified as a NMFS process; therefore, the standards would likely involve a Council deeming process.

A general list of potential categories of information that would be included in the IVMP is provided:

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

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

Discussion and Rationale: Each vessel operator/owner would be responsible for developing an IVMP for the vessel and acquiring the needed approval from NMFS. IVMPs would play a major role as part of the EM program. These plans would help facilitate an effective program and serve as a clear, written plan for discard documentation, installation and maintenance of an EM system, protocols for data storage and transfer, among other things. It also serves as the main document for reference between the vessel, EM Providers, and NMFS.

An IVMP that is approved by NMFS would likely be part of the application and approval process to use EM in lieu of an observer (see Section 2.3.2.11**Error! Reference source not found.**).

2.3.2.13 EM Equipment and Protocol Provisions

The success of an EM program relies on the ability to capture the data and process it in a timely manner so EM equipment that provides the necessary data for efficient processing and accurate review is critical. The following discussion provides the background of what may be required by NMFS upon implementation and the rationale for developing these components.

Type-Approval Process

NMFS may specify the use of EM equipment through a type-approval process. If so, the EM equipment would undergo an NMFS internal review process to set the standard by which all third party EM equipment providers would need to follow to get their equipment approved. Fishermen would then choose the unit that is suitable for their vessel and available through a provider. A type approval process will need to be developed by NMFS with the aid of current experience and technology.

It's expected that participants would need to secure an EM provider, purchase or lease an approved EM system, and incur the cost for its maintenance and the video review. This information is analyzed in Section 4.3, under subsections on costs and impacts to different segments of the fishery and communities.

Discussion and Rationale: NMFS has experience conducting type-approvals for vessel monitoring systems (VMS) therefore the EM equipment would likely undergo a similar approval process. Having a standard set of equipment that vessels could use would provide consistency for video data formats and review. In addition, providers of the equipment may compete with one another and keep industry cost low.

EM Equipment Requirements

The following topics may need to be worked out between technical advisors from NMFS, PSMFC, EM providers and the states of CA, OR and WA.

Discussion and Rationale: Although the NMFS policy requests the use of open source software so that common platforms can use the data generated or multiple users can access the data, allowing both open source and proprietary equipment/software could be allowed if they meet the objectives of the type

approval performance standards. Some of this information would ensure data is collected in a timely manner and that technical issues are identified quickly then communicated between vessel operators, NMFS, and EM providers.

Data formats

A standardized set of data formats could be developed by NMFS so that data that can be used by multiple users such as PSMFC and NMFS to analyze data or video without a cumbersome conversion process to access the data. This would need to be specified in the future during implementation with the advice of NMFS, PSMFC, states, and other technical advisors such as EM providers.

Video Hardware

Image quality must be sufficient to allow clear identification of species or species categories being discarded; therefore, performance standards of the video hardware would be developed during implementation between NMFS, PSMFC, states, and EM providers. For example, two types of video cameras are currently used by EM providers, digital and analog. Both have benefits and drawbacks. For example, if a very sharp video image is needed at a close range to identify fish and other species such as sponges then a digital camera may be necessary; however, the use of a digital format will increase the need to for more memory storage of the video files. An analog video could be used for the same purpose to capture images in the same manner and lessen the need for data storage.

Logbook Data Source

The EM program could allow either paper or electronic logbooks to be used as required under Alternative 1a (Option A and C) or Alternative 1b. Electronic logbooks may increase efficiencies in the EM analysis by eliminating the need to convert paper logbooks to an electronic format. It may be possible to link the electronic logbook data set to the video data set to increase efficiencies of video review. For example, random selection of the logbook discard events will be necessary under Alternative 1b. After the selection is made, a list of those events could be tied to the video events so that reviewers can "jump" to the event in the video data. At this time, the Council expects NMFS to continue the requirement for vessels to submit paper logbooks however the logbooks would need to be modified to include discard information. PSMFC has developed an interim logbook that was used during field trials for EM. This information could be used to implement this component of the EM program to support either alternative as needed. The Council defers to NMFS on efficiencies that can be gained and the most expedient way to conduct logbook analysis and implement logbook provision.

On-Vessel Data Storage

Video hardware, sensor data, vessel location data, and logbook data/data logger would likely be integrated together in a secure format and stored on a hard drive. The hard drive would be removed and a new one replaced. Storage capacity will need to be large (1 terabyte or more). Dependent on the amount of data generated for storage, it's possible that some vessels may need to carry multiple hard drives and be trained to replace them at sea as needed or return to shore for replacement. See section 2.2.2.7 for potential data transfer processes.

Onboard operations

Some onboard operations will need to be standardized for the all vessel under the EM program. Topic examples include:

a) Self-check system to ensure proper functioning of EM system ("functionality test" within the EM system with a record that the test was performed)

b) EM system is powered on during entire trip, however cameras could be triggered to turn on at first hydraulic event and remain on for the duration of the trip.
c) Back-up-equipment-use protocols if EM unit or portions of it fail
d) Performance standards need to be developed during implementation between NMFS, PSMFC, states, and EM providers.

2.3.2.14 Data Confidentiality/Accessibility/Ownership

All data collected in the EM system (e.g., video, logbooks, and applications) would be considered confidential.

Discussion and Rationale: The Magnuson-Stevens Fishery Conservation and Management Act, other Federal laws, and NMFS confidentiality rules and policies that are proposed by NMFS would guide the protection of the data that is collected under the EM program. This includes access, ownership, and public dissemination of the information. Implementation of confidentiality rules that are specific to EM data would be developed by NMFS prior to implementation.

2.3.3 Alternative 2b - Use Logbooks to Estimate Discard (Audit logbook with Camera) *(Council Preferred Alternative)*

Alternative 2b is the Council's preferred alternative and provides the opportunity for the fishermen to speciate and estimate the total discarded weight of the fish for each set or haul and provide this information in a logbook. Then, the video images would be reviewed to verify discard events and the species/weight estimates for the trip. The percent review under Alternative 2b would be the minimum level determined by NMFS to be necessary to ensure compliance (no less than 10%) with an escalation clause for non-compliance.

2.3.3.1 Video Reading Protocol

Under Alternative 2b the logbooks would be the data source while the video recordings would be used to verify the logbook data (logbook-audit method). The video images would be reviewed to verify the discard events and the species/weight estimates recorded by fishermen for the trip. Under Alternative 2b, the requirement for 100% at-sea observation of all IFQ FG trips would continue. The Council chose, as a policy, that at least 10% of the fishing events in a trip should be audited for compliance with logbook reporting requirements.

The logbook-audit method is similar to an EM program conducted in British Columbia, which is considered a success. The method relies on fishermen to accurately report their discard and puts accountability on the vessel operator. A review of all video images would be conducted to verify the discard documented in logbooks.

Description of EM Components under Alternative 2b

The Council's preferred options were added to Alternative 2b (Table 2-4). A second column, "Other Available Options", was added to the table to show other potential options that could be chosen under Alternative 2b. The only difference between the list of options for Alternative 2a (Table 2-3) and 2b is the Video Reading Protocol. Recall under alternative 2a, the video is reviewed for compliance with

options for different levels of review to enumerate the discard. Under Alternative 2b a minimum of 10% of the logbooks would be reviewed with video to audit the logbooks for compliance and verify the amount of discard documented in the logbooks. All other EM Program Components under Alternative 2b are identical to Alternative 2a. Please refer to sections 2.3.2.2 through 2.3.2.14 for complete descriptions.

Summary Table of Alternative 2b and EM Components

Table 2-4 is a summary of the Alternative and components that would be implemented as part of the EM program under Alternative 2b. The Council adopted these components as necessary elements to create the framework of an EM program. The summary table provides the Council preferred options and then lists other options that were considered when the Council selected the preferred option (see column "Other Available Options").

Table 2-4. Summary of Alternative 2b and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 2b – Use Logbooks to Estimate Discard (Audit logbook with Camera) *Council Preferred Alternative and Options*	Other Available Options
Error! Reference source not found.	**Error! Reference source not found.**	The Council chose, as a policy, that at least 10% of the fishing events in a trip should be audited for compliance with logbook reporting requirements.	**none**
2.3.2.2	Discard Accounting – Individual or Fleetwide	**Estimation of discard may be done through EM, WCGOP observer program, or other data sources.** **Option A –** ***(Council Preferred)*** Estimate Discard with EM and Count against IFQ Under this option all discard events would be estimated with EM and total discard would be debited from IFQ accounts or sector allocations. One discard category and all discards are estimated using EM and counted against IFQ: Dumped off deck (e.g., shoveled, picked out of net) Dumped for safety reasons (e.g., pull zipper) Floating fish (bleeding net/washed out of net) Lost gear (not captured by EM, estimate using WCGOP protocol) Consumed/used as bait (not captured by EM) Unobserved sets/hauls (not captured by EM, maybe apply discard rate using EM estimates from previous sets/hauls)	**Option B –** Split into two discard categories; discard Category 1 events count against IFQ, discard Category 2 events count against sector or ACL; for some types of discard events the estimate is based on trips with observer coverage (events in each category described below). **Option C –** Split into two discard categories; discard Category 1 events count against IFQ, no accounting for discard Category 2: *Discard 1:* • Dumped off deck (e.g., shoveled, picked out of net) • Dumped for safety reasons (e.g., pull zipper) • Unobserved sets/hauls (not captured by EM, apply discard rate using WCGOP protocol) *Discard 2:* • Floating fish (bleeding net/washed out of net) • Lost gear (not captured by EM, estimate using WCGOP protocol) • Consumed/used as bait (not captured by EM)
2.3.2.3	Retention Requirements	**Option B:** ***Optimize Retention Retain*** **Catch Share Species with Limited Discard Options**	**Option A: Maximize Retention**

Table 2-4. Summary of Alternative 2b and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 2b – Use Logbooks to Estimate Discard (Audit logbook with Camera) *Council Preferred Alternative and Options*	Other Available Options
2.3.2.4	Halibut Retention/Discard	**Option A *(Council Preferred Option)*:** Use WCGOP mortality rate for specific gear type: 16% mortality if discarded from longline; 18% mortality rate if discarded from pots. **Option F *(Council Preferred Option)***: Use an appropriate EM viability assessment (currently conducting study, need IPHC approval)	**Option B:** WCGOP scientific observations (assumed 20-30% coverage) is applied to fleet **Option C:** Use vessel specific mortality rate (update rates periodically through application of third-party observer rates on non-EM vessels or through WCGOP random observations of EM vessels) **Option D:** IPHC exemption to allow full retention (need to examine the feasibility of this option) **Option E**: Captain and crew provide assessment (training would be required)
2.3.2.5	Discard Species List Adjustments	**Option B**: ***(Council Preferred)*** Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).	**Option A**: NMFS to make determination and provide list to fishers through the NMFS approval process to use EM. **Option C**: Set initial lists in regulation and change at some future point through Council process with proposed/final rule making.
2.3.2.6	EM Individual Vessel Monitoring Plan – Expiration	**Option B – *(Council Preferred)*** Annual Expiration or if modifications are made Same as Option A but with annual expiration	**Option A –** No Expiration unless modifications are made • Approval of plans by NMFS • Plan modification provisions: (NMFS to decide how this is done) 1. EM Provider and vessel operator provisions – changes that do not need re-approval by NMFS (e.g. camera position changes) 2. NMFS provisions - changes that trigger the need for re-approval by NMFS (e.g. operator will use a different vessel)

Table 2-4. Summary of Alternative 2b and EM Program Components for Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

Section Reference	Component	Alternative 2b – Use Logbooks to Estimate Discard (Audit logbook with Camera) *Council Preferred Alternative and Options*	Other Available Options
2.3.2.7	Declaration of EM Use	**Option A -** Annual Declaration ***(Council Preferred)*** Use EM all year; no observer coverage needed unless EM fails **Exception for Emergency Situation** For example, camera broke so need an observer tomorrow, vice versa	**Option B –** Annual Declaration with Intermittent Use For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer (e.g. monthly or quarterly). **Option C –** Declare Until Changed with Some Limit on Frequency For the coming year participants must notify NMFS, EM provider, and observer provider when it will use EM and when it will use an observer however a limit would be imposed on the number of times a vessel could switch from using EM to using an observer and then back to using EM. **Option D – Declare until Changed with No Limit on Frequency** Same as Option C but with no limit on the number of times a vessel could switch back and for the between using EM and an observer.
2.3.2.8	Data Transfer Process	Includes secure transfer for data and chain of custody requirements. **Options** (not mutually exclusive): **C. *(Council Preferred)* Shoreside catch monitor** **D. *(Council Preferred)*Vessel operator/Crew**	**Options** (not mutually exclusive): **A. PSMFC** **B. EM Provider** **E. Third Party (hired by processor, port, or fisher)**
2.3.2.9	Video and Data Processing and Analysis	Potential video reviewers **Option D - *(Council Preferred)*** Third Party	**Options** (not mutually exclusive): **Option A -**NMFS **Option B -**PSMFC **Option C** - EM Provider
2.3.2.10	Payment for Scientific data collection/observations	**Option A**: Government funded, same as pre IFQ ***(Council Preferred)***	**Option B**: Industry Funded **Option C**: Combination of both Government and Industry

Table 2-4. Summary of Alternative 2b and EM Program Components For Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 2b These components do not have options to choose from but would be implemented as part of an EM Program			
2.3.2.11	Observer Exemption Process - Application Approval and Required Information	**Requires application to NMFS to use EM; the application could include the following information**: 1. Operational information. a. Installation by certified EMS Provider b. EMS service provider responsibilities c. Data Confidentiality Standards d. Data Storage and Delivery Standards e. EMS Coverage Requirements f. Monitoring Requirements g. Vessel Responsibilities 2. Data Sources a. Digital Camera(s) b. Winch Sensors c. Hydraulic Sensors d. Log Book e. VMS f. GPS	c. Storage Standards d. Date and Time Stamp and Counter e. Digital File Format f. Minimum Frame Rate g. Minimum Resolution h. Accepted Delivery Methods i. Time Frames j. Color Optics k. Lighting Standards l. Power Supply Standards

Table 2-4. Summary of Alternative 2b and EM Program Components For Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 2b These components do not have options to choose from but would be implemented as part of an EM Program		
2.3.2.11	Observer Exemption Process - Eligibility Requirements	A vessel must be in good standing and has approved equipment and operational plan certifications. **Eligibility Requirements** **Initial eligibility criteria**: 1. Limited entry groundfish trawl permit2. Quota share permit 3. No IFQ deficits 4. No civil or criminal penalties related to fishing activity exceeding a certain amount and timeframe 5. Schematic and Description of NMFS approved Individual Vessel Monitoring Plan (IVMP) a. IVMP unique for each vessel b. Multiple IVMPs included if submitted by group of vessels 6. Self-Governing Plan (if applicable, not required) a. Data Delivery and Analysis (DDA) specifications b. submitted by either a group of vessels or an individual vessel **Continued eligibility for all fisheries**: 1. Participants must be in compliance with their IVMP 2. Demonstrate proper documentation of the discards in logbooks or on video 3. No civil penalties related to fishing activity exceeding a certain amount within the time period of EM use
2.3.2.12	EM Vessel Operational Plan - Individual Vessel Monitoring Plans (IVMP)	**Required EM IVMP Plan** Potential categories of information in an IVMP: a) Type of system b) Hardware c) Software d) Emergency protocols e) Back-up equipment use protocols f) Catch handling protocols g) Layout of vessel h) Screen shots of all camera views i) Number of cameras needed with placement specifications j) Care and maintenance of the EM system k) Types of sensors and data for sensors to capture l) Download/maintenance schedule m) Logbook format (electronic or paper) n) Tamper Resistant/Taper Evident o) Lighting Locations (Stern, Deck, Discard Shoot, etc.) p) Bridge Mounted Computer Interface/Monitors q) GPS Receiver r) Winch Sensors s) Hydraulic Pressure Transducers t) Power Supply / Backup u) Wire Runs v) Geo Fencing (NMFS supplied) w) System's Check Certification x) Data logger

Table 2-4. Summary of Alternative 2b and EM Program Components For Fixed Gear Fishery. NOTE: Section references in the table coincide with descriptions in the document.

EM Components under Alternative 2b These components do not have options to choose from but would be implemented as part of an EM Program		
2.3.2.13	EM Equipment and Protocol Provisions	Type-Approval Process, EM Equipment Requirements (Data formats, Video Hardware, Logbook Data Source, On-Vessel Data Storage, Onboard operations)
2.3.2.14	Data Confidentiality /Accessibility/ Ownership	All data collected under the EM program (e.g., video, logbooks, and applications) would be considered confidential. Current confidentiality rules may need to be clarified to include this information.

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2.4 Alternatives Considered but Eliminated from the Detailed Analysis

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

2.4.1 Mandatory Use of an EM program

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

2.4.2 Full retention of All Catch under EM Alternatives 1a, 1b, 2a, and 2b

Under this option, vessels would be required to retain all catch share species and non-catch share groundfish species, non-groundfish species, prohibited species; and ESA and MMPA species. Vessels would not be allowed to discard species for safety reasons, bleeding nets or any other reason.

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

2.4.3 No declaration of EM use under EM Alternatives 1a, 1b, 2a, and 2b

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

2.4.4 Spatial Variation for High Bycatch Areas under EM Alternatives 1a, 1b, 2a, and 2b

These management options could be applied to allow the use of EM based on ocean areas that are known for high or low bycatch and would only apply to bottom trawl activity under the IFQ program. Under these options, management areas would need to be identified and designed for explicit use of EM. It's possible to use preexisting areas such as the Rockfish Conservation Area or Essential Fish Habitats.

Option A - No special provisions

Option B - Under this option, fishing activity in areas that are likely to have lower bycatch could be monitored with EM rather than using observers; no EM would be allowed in high bycatch areas. Vessels would declare their fishing area prior to departure and be required to follow the appropriate fishing protocols for that area.

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

This type of additional spatial management would add too much complexity to the management of the IFQ fishery and would require identifying additional management areas which in turn may be difficult and costly to manage.

2.4.5 Sort At Sea for Whiting Fishery under EM Alternatives 1a and 1b

The whiting fishery is allowed to sort their whiting catch at sea and discard fish. There are existing requirements to discard prohibited species when sorting at sea. The Council considered allowing the use of EM to document discards when sorting at sea, however; no whiting vessels currently sort at sea. In addition, under this option the current capabilities of EM to positively identify fish species and their total weights prior to discard is limited and vessels

2.4.6 Discard at Will under EM Alternatives 2a and 2b

The following option was removed for further consideration under the IFQ FG Fishery alternatives 2a and 2b:

Option C: Discard At Will (Status Quo)
Vessels would be allowed to fish in the same manner as they currently do and may discard any species or be required to retain species according to current regulations.

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

This option was removed from further consideration because the Council believes at this time, the fisheries would not be able to discard at will under the current EM capabilities. Species identification under video monitoring is currently difficult to conduct using the current video systems and review techniques. It's thought that in the future, advances in EM system software and technology may provide an opportunity for some fisheries to discard at will and the Council could continue to refine the list of species that may be discarded under the current EM program considerations.

CHAPTER 3 **AFFECTED ENVIRONMENT**

National Marine Fisheries Service (NMFS) and Council staff scoped the range of environmental components that could be significantly affected by the proposed actions. This chapter describes the affected environment in terms of these components. The affected environment reflects conditions as they exist before the proposed actions are implemented and provides a baseline for considering effects. This chapter is organized into the following sections:

Section 3.1 Physical
Section 3.2 Biological
Section 3.3 Socio-Economic

Rather than repeat information detailed in the other NEPA documents, information has been summarized in this document and the reader is referred to the appropriate sections in the other NEPA documents for further detail. This outline closely follows the outline used in the immediately preceding whiting season and chafing gear Environmental Assessments (EA) (PFMC 2014 and PFMC 2015) and incorporates information in the affected environments section of those documents by reference.

Marine habitat information is also described in detail in the Council's Pacific Coast Groundfish Fishery Management Plan, and the 2014 Groundfish Harvest Specifications and Management Measures and Amendment 24: Environmental Impact Statement (hereafter referred to as 2014 Specification EIS) (CITE REFERENCE).

3.1 Physical Resources

3.1.1 North Pacific Ocean

The activities covered under this document occur within the California current system off the West Coast (Figure 3-2). A more detailed description of the physical and biological oceanography of Pacific Coast marine ecosystems can be found in PFMC 2013b.

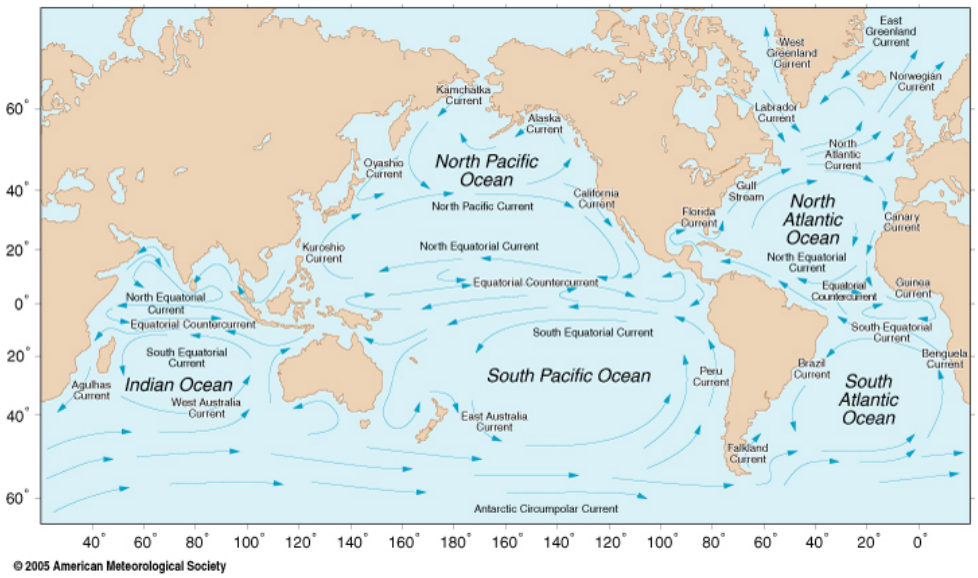


Figure 3-1. Location map of the major ocean currents of the world, including the California Current of the Council management area.

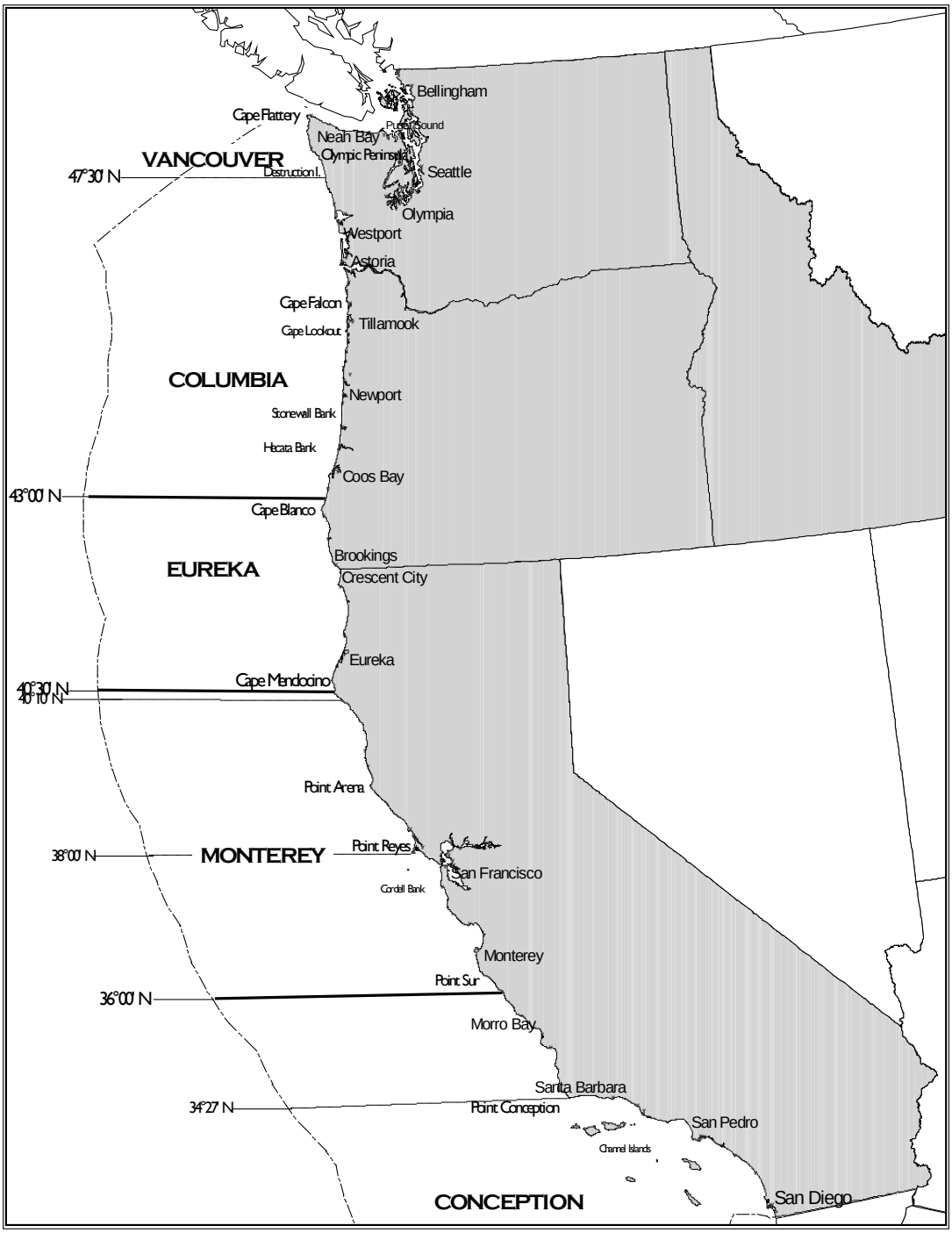


Figure 3-2. Fishery management lines on the U.S. west coast. Source: PFMC 2014, SAFE.

The coastal ocean off Washington, Oregon, and California is a biogeographic region that is referred to as the Coastal Upwelling Domain (Ware and McFarlane 1989, Figure 3-2. Fishery management lines on the U.S. west coast. Source: PFMC 2014, SAFE.). Coastal upwelling results in high production of phytoplankton from April through September fueled by the nearly continuous supply of nutrients, and a high biomass of copepods, euphausiids and other zooplankton during summer. The Coastal Upwelling Domain is part of the California Current system. The California Current is a broad, slow, meandering current that moves toward the equator. In deep waters offshore of the continental shelf, the currents flow southward all year round; however, over the continental shelf, southward flows occur only in

spring, summer, and fall. During winter months, the flow over the shelf reverses, and the water moves northward as the Davidson Current.

The physical environment is more fully described in Chapter 3 of the 2014 FEIS "Groundfish Harvest Specifications and Management Measures And Amendment 24." A copy of the Final Environmental Impact Statement can be obtained by contacting the Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, OR, 97220; or viewing the internet posting at: http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-20/. In addition, general information regarding fisheries are described in the Pacific Coast groundfish FMP at: http://www.pcouncil.org/groundfish/fishery-management-plan/ and the Council's 2014 SAFE document.

3.1.2 California Current Ecosystem

In April 2013, the Council adopted the Pacific Coast Fishery Ecosystem Plan for the U.S. Portion of the California Current Large Marine Ecosystem (PFMC 2013, Pacific Coast FEP). This document contains a wealth of information on characteristics of the California Current large marine ecosystem (CCE), where the groundfish fishery occurs, and on the types of impacts fisheries and other anthropogenic activities have on ecosystem dynamics and marine habitat. The FEP is available on line at http://www.pcouncil.org/ecosystem-based-management/fep/. NMFS Northwest and Southwest Fisheries Science Centers provide yearly updates on the state of the CCE. The 2014 update can be found at http://www.pcouncil.org/wp-content/uploads/C1a_ATT1_IEA_STATE_of_CA_CURRENT2013b_MAR2014BB.pdf.
Information from this document is incorporated by reference from the FEP. The information in sections 3.1.2 is based on sections 3.1 and 3.2 in the Pacific Coast FEP.

Chapter 4 in the Pacific Coast FEP (PFMC 2013) describes the effects of human activities and climate on the CCE. Coincident with the development of the Pacific Coast FEP, NMFS has been developing the Integrated Ecosystem Assessment (IEA) of the CCE. This is "a formal synthesis and quantitative analysis of all relevant scientific information—biological, geological, physical, economic, and social—in relation to ecosystem management objectives" (Levin and Schwing 2011b). The IEA includes the development of a suite of indicators used to periodically report on the status of the CCE.

For the purpose of impact analysis, ecosystem is characterized as the web of trophic relationships within the system and how system structure (relative abundance of constituent organisms) may change in response to human activities, specifically fisheries targeting groundfish.[1]

The CCE is composed of a major eastern boundary current, the California Current, which is dominated by strong coastal upwelling, and is characterized by fluctuations in physical conditions and productivity over multiple time scales (Mann and Lazier 1996; Parrish, *et al.* 1981). Food webs in these types of ecosystems tend to be structured around coastal pelagic species that exhibit boom-bust cycles over decadal time scales (Bakun 1996; Checkley and Barth 2009; Fréon, *et al.* 2009). By contrast, the top trophic levels of such ecosystems are often dominated by highly migratory species such as salmon, tuna, billfish and marine mammals, whose dynamics may be partially or wholly driven by processes in entirely different ecosystems, even different hemispheres. Ecosystems analogous to the CCE include other shelf and coastal systems, such as the currents off the western coasts of South America and Spain.

[1] The *trophic level* of an organism is the position it occupies in a food chain or food web. Trophic relationships express the pattern of consumption and by extension the flow of energy through the system.

3.1.3 Essential Fish Habitat and Habitats of Particular Concern

The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Each of the Council's four FMPs has defined EFH for FMP species. Taken together, EFH of Council-managed species ranges from the salmon streams of Idaho to the outer boundary of the U.S. EEZ. Figure 3-3 shows salmon and groundfish EFH, which together encompass a wide variety of terrestrial, coastal, and marine habitats. EFH for Council-managed species also ranges from the near-surface waters used by CPS and HMS, through the mid-water domain of salmon and some groundfish species, down to the diverse bottom habitats used by many groundfish species.

The MSA (sec. 303(a)(7)) requires Councils to include in each FMP a description of essential fish habitat (EFH) for all managed species and measures to minimize to the extent practicable adverse effects on such habitat caused by fishing (Figure 3-3, Figure 3-4 and Figure 3-5).[2] The Pacific Council has described EFH for all species managed under its four FMPs (Coastal Pelagic Species, Highly Migratory Species, Groundfish, and Salmon). EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (MSA sec. 3). Regulatory guidelines (50 CFR 600, Subpart J) elaborate that the words "essential" and "necessary" mean EFH should be sufficient to "support a population adequate to maintain a sustainable fishery and the managed species' contributions to a healthy ecosystem."

Groundfish EFH is described in the FMP as:

- Depths less than or equal to 3,500 m (1,914 fm) to mean higher high water level (MHHW) or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 ppt during the period of average annual low flow.
- Seamounts in depths greater than 3,500 m as mapped in the EFH assessment geographic information system (GIS).
- Areas designated as Habitat Areas of Particular Concern (HAPC) not already identified by the above criteria.

[2] A Federal agency authorizing, funding, or undertaking actions that may adversely affect EFH must consult with NMFS on measures to mitigate such impacts. Councils or Federal or state agencies may also advise NMFS on such actions.

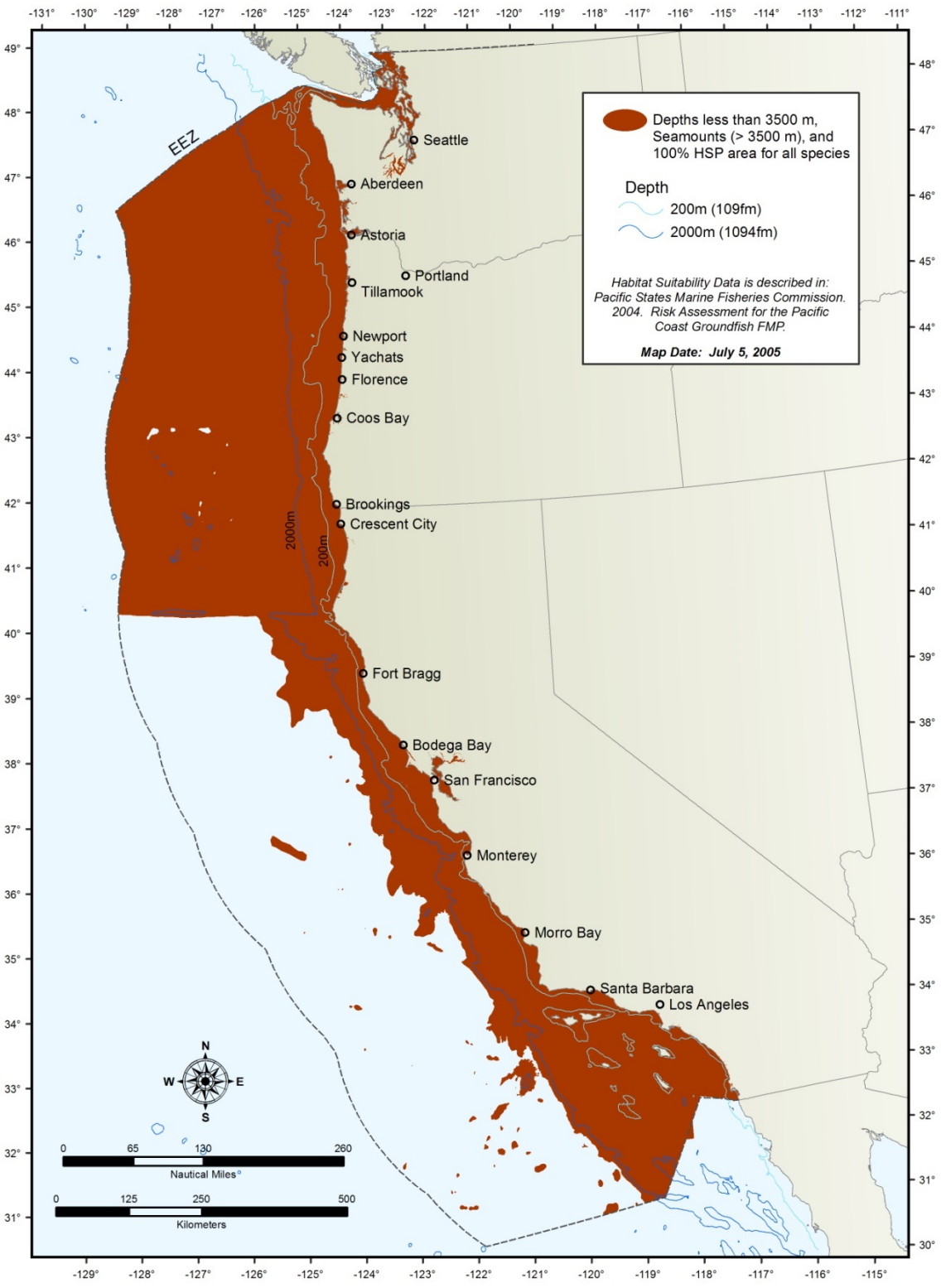


Figure 3-3. Designated Groundfish EFH.

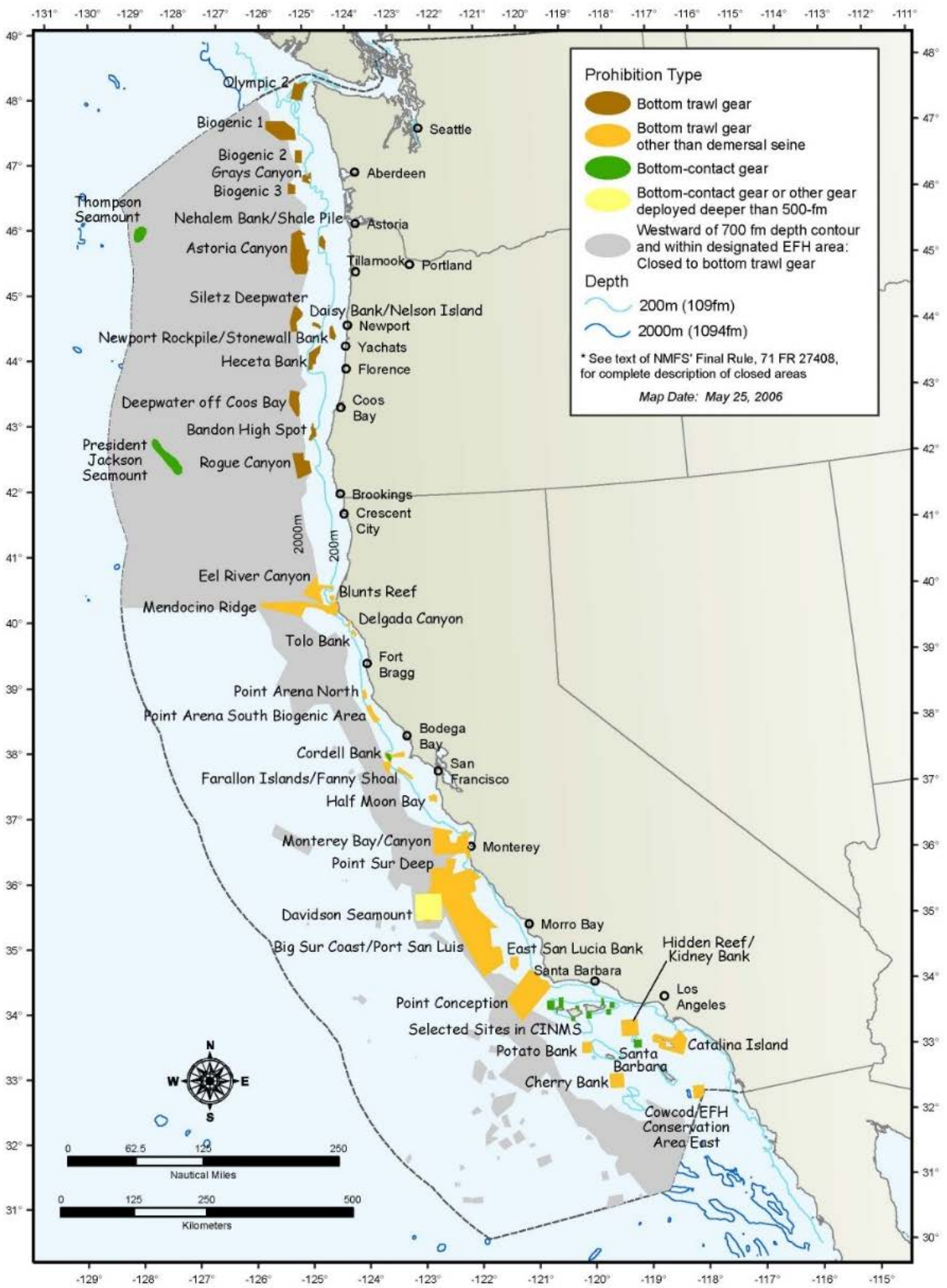


Figure 3-4. EFH and EFH closed areas of the West Coast.

Source: NWFSC

The regulatory guidelines also establish authority for Councils to designate HAPC, based on the vulnerability and ecological value of specific habitat types. The Groundfish FMP identifies these HAPCs:

- Estuaries
- Canopy kelp
- Seagrass
- Rocky reefs
- Specified "areas of interest"

Habitats of Particular Concern (HAPC) are areas of interest are discrete areas that are of special interest due to their unique geological and ecological characteristics (Figure 3-5). The following areas of interest are designated HAPCs:

- Off of Washington: All waters and sea bottom in state waters from the three nautical mile boundary of the territorial sea shoreward to MHHW;
- Off of Oregon: Daisy Bank/Nelson Island, Thompson Seamount, President Jackson Seamount; and
- Off of California: all seamounts, including Gumdrop Seamount, Pioneer Seamount, Guide Seamount, Taney Seamount, Davidson Seamount, and San Juan Seamount; Mendocino Ridge; Cordell Bank; Monterey Canyon; specific areas in the Federal waters of the Channel Islands National Marine Sanctuary; specific areas of the Cowcod Conservation Area.

Chapter 7 in the Groundfish FMP describes groundfish EFH (Section 7.2) and HAPCs (Section 7.3). The current EFH and HAPC descriptions were incorporated into the FMP in 2006 through Amendment 19 to the FMP. The Council also established measures to mitigate the adverse impacts of fishing on groundfish EFH, which are described in FMP Chapter 6 (Management Measures). These mitigation measures include gear restrictions (Section 6.6), time/area closures (Section 6.8), and measures to control fishing capacity (Section 6.9). As acknowledged in Section 7.4 of the FMP, "Some of the management measures … have been implemented specifically to mitigate adverse impacts to EFH while others may have another primary purpose … but may have a corollary mitigating effect on adverse impacts to EFH."

To mitigate the adverse impacts of fishing on groundfish EFH, bottom trawl gear and bottom-contact gear are prohibited in specific EFH conservation areas. Bottom-contact gear includes gear types that are designed or modified to make contact with the sea floor during normal use. Although midwater trawl gear may occasionally make contact with the sea floor, it is exempt from the EFH conservation area restrictions. Section 4.1.2 discusses potential impacts of the proposed EM program.

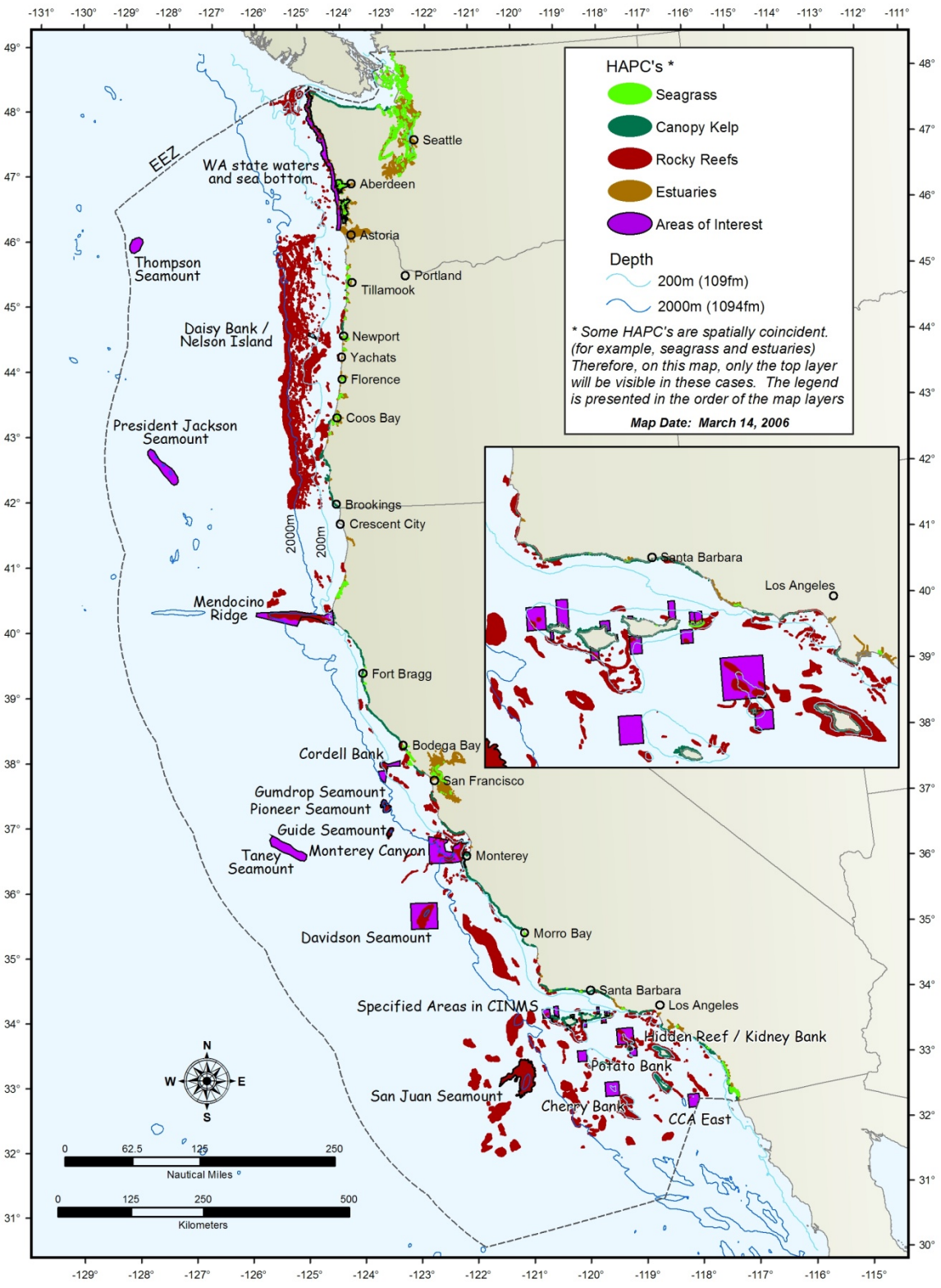


Figure 3-5. Groundfish HAPCs.

The adverse impacts of fishing based on the gear type and configuration, and the vulnerability of a particular habitat types was done in the Amendment 19 FEIS (NMFS 2005). Section 3.5 in that document is a comprehensive and detailed description of fishing gear that is, or has been, used in the fishery management area and how they interact with benthic habitat. Generally, midwater trawl does not does not come in contact with the ocean floor.

Table 3-1 summarizes information from Table 4a.2 in the synthesis report on the distribution of fishing effort by habitat type.[3] For all gear types most fishing effort occurred on soft substrate on the upper slope, ranging from 77 percent for midwater trawl to 55 percent for FG. Table 3-2 displays relative fishing effort. This metric was derived by dividing the amount of fishing effort in percent by area of each habitat type by percent and rescaling the values in percent (meaning the resulting values sum to 100 percent for each gear type). By this measure the biggest relative impact has been on mixed substrate on the upper slope. However, mixed substrate comprises only 1 percent of the total area by substrate type while soft substrate accounts for 91 percent. The lower slope is essentially unaffected, because, aside from the difficulty of fishing at greater depth, Amendment 19 included a mitigation measure prohibiting bottom trawling in depths greater than 700 fathoms, which for the depth zones used in the synthesis report constitutes the shoreward boundary of the lower slope. FG effort is more evenly distributed across habitat types; measured relative to habitat area, a larger proportion of the FG effort/habitat area ratio occurs on hard substrate.

Table 3-1. Distribution of fishing effort, 2002-2010, (percent) by gear type and habitat type (substrate x depth zone) summarized from Tables A3a.5, A3a.6, and A3.a7 in NMFS (2013b).

[3] The synthesis report includes the Salish Sea (Puget Sound region) in its summary; this region is excluded here because it is outside the fishery management area. Reported depth zones refer to the continental shelf and slope. The break between the shelf and slope, measured by depth, is 140 meters (Gross 1972). Bottom and midwater trawl fishing effort is measured by trawl distance in meters; fixed gear effort is measured in number of fishing events.

	Depth Zone			
Substrate	Shelf	Upper slope	Lower slope	All Depths
Bottom Trawl				
Hard	0.3%	1.5%	0.0%	1.8%
Mixed	0.2%	1.9%	0.0%	2.1%
Soft	37.0%	59.0%	0.1%	96.1%
All Substrates	**37.6%**	**62.4%**	**0.1%**	**100.0%**
Midwater Trawl				
Hard	0.2%	3.1%	0.0%	3.3%
Mixed	1.2%	5.5%	0.0%	6.8%
Soft	12.6%	76.7%	0.6%	89.9%
All Substrates	**14.1%**	**85.2%**	**0.7%**	**100.0%**
Fixed Gear				
Hard	9.3%	6.5%	0.5%	16.3%
Mixed	3.4%	5.7%	0.5%	9.6%
Soft	19.0%	55.0%	0.1%	74.1%
All Substrates	**31.7%**	**67.3%**	**1.1%**	**100.0%**

Table 3-2. Relative fishing impact metric by gear type and habitat type derived from Table 2.1 (distribution of habitat types) and Tables A3a.5, A3a.6, and A3.a7 in NMFS (2013b).

	Depth Zone		
Substrate	Shelf	Upper slope	Lower slope
Bottom Trawl			
Hard	2.9%	7.3%	<0.1%
Mixed	6.0%	43.5%	0%
Soft	21.2%	18.9%	<0.1%
Midwater Trawl			
Hard	0.9%	7.1%	<0.1%
Mixed	15.3%	61.5%	0%
Soft	3.4%	11.6%	<0.1%
Fixed Gear			
Hard	23.0%	8.7%	0.4%
Mixed	24.0%	36.2%	*
Soft	3.0%	4.8%	<0.1%

*FG fishing events are reported for lower slope mixed substrate while the area of this habitat type is reported as zero. Therefore, FG fishing effort in that habitat type is excluded from the calculation.

Midwater trawls are designed to fish in the water column above the seafloor to minimize drag and net wear. Regulations require the midwater trawl gear be very lightly constructed so that when they come in contact with hard structures they would likely cause damage to the net.

Because of this, fishermen generally try to avoid contact with hard habitat structures but there may be more incidental contact with soft bottom. Fishermen do not want nets to catch hold of large structures on the bottom and tend to keep nets at least XX fathoms from the sea floor.

Trawl gears may impact physical habitat primarily when the trawl doors and the sweep of the trawl net (NRC 2002). On occasion a net may sink low enough when a vessel slows and the operator is fishing close to the bottom to target whiting near the bottom (NMFS Informational Report 4, April 2015). Occasionally nets may come in contact with the bottom and the loss of a whole net is rare (one net lost per year in the all groundfish fisheries, Pers. Comm. Jon McVeigh WCGOP).

Fixed gear comes in contact with the substrate therefore it may have some adverse impacts due to gear loss or some habitat forming structure loss when pots land or drag across the sea floor. However, bottom contact gear is not allowed in certain closed areas for EFH or HAPC preservation. The impact of fixed gear has been analyzed in a previous NEPA document (PFMC 2006). Section 3.25 of Amendment 1-8-19 Final Environmental Impact Statement (FEIS) provides a summary of habitat sensitivity to fishing impacts. Generally, the sensitivity index is low and recovery time for habitat is short, less than 1 year.

In 2010 the Council developed a process and schedule for a 5-year review of "…the EFH description and identification, HAPC designations, and information on fishing impacts and nonfishing impacts…" as specified in Section 7.6 of the Groundfish FMP. This review began in 2011 under the auspices of the Council's Ad Hoc EFH Review Committee (EFHRC). During the first phase of the review the EFHRC and NMFS scientists updated and compiled available ecological, habitat, and fishing effort data, and used this information to develop a set of maps intended to support Council decision-making related to EFH (NMFS 2013b). A synthesis report based on these data was published in April 2013 (NMFS 2013b), completing the second phase.

In the third phase of the review, now underway, the Council is considering proposals for potential modifications to EFH conservation areas, which were implemented as part of Amendment 19 to the Groundfish FMP.

3.1.4 Biodiversity and Ecosystem Function, including Climate Effects

- *Consider what is needed here in this section to describe the added pressures on biological resources (e.g., cumulative effects).*

3.2 Biological Resources

There are over 100 stocks managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). The actual number of FMP stocks is equivocal since all endemic species of the genus *Sebastes* are included and new species of this diverse genus are periodically described in the literature providing results of genetic/taxonomic research. These species include over 64 species of rockfish in the family *Scorpaenidae*, 7 roundfish species, 12 flatfish species, assorted

sharks, all endemic skates, all endemic grenadiers, ratfish, and a few miscellaneous bottom-dwelling marine fish species.

The species managed under the FMP are distributed throughout the EEZ and occupy diverse habitats at all stages in their life history.[4] In addition, many of the stocks have geographic ranges that extend beyond the U.S. EEZ into Canadian or Mexican waters. The life history traits of the groundfish species have important implications on stock assessments and how the stocks are managed. This is because fishing changes population abundance of the target species, as well as affects life-history traits and population dynamics and may also affect yield.

Under the catch share program, and subject to the proposed action, are those species that need to be documented by EM when they are discarded (Table 3-3). Only two species are considered the target species, sablefish and pacific whiting.

Table 3-3. Species managed under the catch share program.

Pacific whiting	Pacific Ocean perch
Canary rockfish	Widow rockfish
Darkblotched rockfish	
Arrowtooth Flounder	Minor Slope Rockfish, N. of 40°10 N. lat.
Bocaccio, S. of 40°10 N. lat.	Minor Slope Rockfish, S. of 40°10 N. lat.
Chilipepper, S. of 40°10 N. lat.	Other Fish, Coastwide
Cowcod, S. of 40°10 N. lat.	Other Flatfish, Coastwide
Dover Sole, Coastwide	Pacific Cod, Coastwide
English Sole, Coastwide	Pacific Halibut, Coastwide
Lingcod, N. of 40°10 N. lat. 15	Petrale Sole, Coastwide
Lingcod, S. of 40°10 N. lat.	Sablefish, N. of 36° N. lat.
Longnose Skate, Coastwide	Sablefish, S. of 36° N. lat.
Longspine Thornyhead, N. of 34°27 N. lat.	Shortspine Thornyhead, N. of 34°27 N. lat.
Longspine Thornyhead, S. of 34°27 N. lat.	Shortspine Thornyhead, S. of 34°27 N. lat.
Minor Nearshore Rockfish, N. of 40°10 N. lat.	Starry Flounder, Coastwide
Minor Nearshore Rockfish, S. of 40°10 N. lat.	Yelloweye, Coastwide
Minor Shelf Rockfish, N. of 40°10 N. lat.	Yellowtail, N. of 40°10 N. lat.
Minor Shelf Rockfish, S. of 40°10 N. lat.	

There are other species that are incidentally caught or could be affected by the fisheries, therefore this section describes non-target, ESA-listed, protected and prohibited species. The description of these species provides a baseline of information in order to analyze the impact of the proposed action (negative or positive) on these species and species groups (See Section 4 Environmental Consequences).

[4] For management purposes species occurrence and habitat are identified at a gross level according to latitudinal and depth boundaries. Nearshore and continental shelf and slope zones define depth-habitat regions (with the latter two commonly referred to as the shelf and the slope). Important latitudinal biogeographic boundaries incorporated into management include Point Conception (34°27' N. lat.) and Cape Mendocino including the undersea Cape Mendocino Ridge (for management, a line just south of the Cape at 40°10' N. lat. is a primary boundary).

3.2.1 **Target Species**

This section only describes the targeted resources that are the focus of the two fisheries proposed for EM use; the midwater trawl whiting fishery targets Pacific whiting and the fixed gear fishery targets sablefish. Even though much of the bycatch that is incidentally caught can be utilized and are subject to IFQ quotas and allocation management, these species are considered non-target species. Therefore they are discussed in the next section.

3.2.1.1 Pacific whiting

The coastal Pacific whiting stock is the most abundant groundfish species in the California Current system (Stewart, et al. 2011a). Pacific whiting are distributed from the Gulf of Alaska to the Gulf of California and are an important contributor to ecosystem dynamics due to their relatively large total biomass and potentially large role as both prey and predator. The stock is characterized by highly variable recruitment patterns and a relatively short lifespan, resulting in large and rapid changes in stock biomass. Although there is considerable variability in the biomass estimates for Pacific whiting, the stock is currently considered to be at a healthy biomass level.

Pacific whiting spawn between central California and northern Baja California during the winter. In late winter, adult whiting migrate north to the summer feeding grounds off northern California, Oregon, Washington, and Vancouver Island. The peak period of northward migration begins in March and April in deep water overlying the continental slope. In summer, Pacific whiting often form extensive pelagic aggregations in association with the continental shelf break, with highest densities located over bottom depths of 200–300 meter (656-984 feet(ft)) (Dorn 1991). The southward spawning migrations of adults occur in November and December, prior to spawn. Pacific whiting undertake a diurnal vertical migration and tend to form extensive midwater aggregations during the day, these dense schools occur between the depths of 100 and 250 meters (Stauffer 1985).

These species are managed with catch allocations for the shorebased fishery and the at-sea mothership fishery. All discard is estimated by fishermen, entered into logbooks as a whole number (aggregated estimate, not species specific) and entered in to the fishery data. Then a species composition is derived (ratio of all species in a landing) from all landed catch and is applied to the aggregate estimate made in the logbook. Based on these final estimates, the IFQ accounts for each individual are debited or applied to the coop management system.

All final catch estimates (landed and discarded) are used for stock assessment purposes.

3.2.1.2 Sablefish

Sablefish, or black cod, (*Anoplopoma fimbria*) are distributed in the northeastern Pacific ocean from the southern tip of Baja California, northward to the north-central Bering Sea and in the Northwestern Pacific ocean from Kamchatka, southward to the northeastern coast of Japan.

Although few studies have critically evaluated issues regarding the stock structure of this species, it appears there may exist at least three different stocks of sablefish along the west coast of North America: (1) a stock that exhibits relatively slow growth and small maximum size that is found south of Monterey Bay (Cailliet, *et al.* 1988; Phillips and Inamura 1954); (2) a stock that is characterized by moderately fast growth and large maximum size that occurs from northern California to Washington; and (3) a stock that grows very quickly and contains individuals that reach the largest maximum size of all sablefish in the northeastern Pacific ocean, distributed off British Columbia, Canada and in the Gulf of Alaska (Mason, *et al.* 1983; McFarlane and Beamish 1983a).

Spawning occurs annually in the late fall through winter in waters greater than 300 m (Hart 1988; NOAA 1990). Sablefish are oviparous with external fertilization (NOAA 1990). Eggs hatch in about 15 days (Mason, *et al.* 1983; NOAA 1990) and are demersal until the yolk sac is absorbed (Mason, *et al.* 1983). Age-zero juveniles become pelagic after the yolk sac is absorbed. Older juveniles and adults are benthopelagic. Larvae and small juveniles move inshore after spawning and may rear for up to four years (Boehlert and Yoklavich 1985; Mason, *et al.* 1983). Older juveniles and adults inhabit progressively deeper waters. Estimates indicate that 50 percent of females are mature at five years to six years (24 inches) and 50 percent of males are mature at five years (20 inches).

Since 2001, the total estimated dead catch has been only 79 percent of the sum of the OFLs (ABCs at the time) and 87 percent of the ACLs (OYs at the time). In only one year of the last 10, 2008, did the estimated dead catch exceed the ACL (and OFL) by 5% (3%).

The fixed gear fishery mainly targets sable fish with pot gear to efficiently catch these fish with little bycatch. Mortality of sablefish is low when pots are retrieved within three days, however when pots are left for more than a week mortality can be high due to predation by hagfish. At-sea discards may occur for dead, predated fish, or under sized fish. Discard estimates are conducted by on-board observers to provide the data for total stock catch. This information is used to debit IFQ accounts and conduct stock assessments.

3.2.2 **Non-Target Species**

This section provides a general overview of species that are caught and discarded by the midwater trawl and fixed gear fishery. This includes IFQ and non-IFQ species. A comprehensive list of all species caught by the two fisheries is provided to establish the baseline of total mortality for both fisheries. Catch and discard totals are also provided. Only those species that are managed under the IFQs are described.

3.2.2.1 Widow rockfish (Sebastes entomelas)

Widow rockfish is an important commercial groundfish species belonging to the scorpionfish family (*Scorpaenidae*). Widow rockfish range from southeastern Alaska to northern Baja California, with adults common found from 100 meter (328 ft) to 350 meter (1,148 ft)

(Eschmeyer et al. 1983, NOAA 1990, Orr et al. 2000, Love et al. 2002). Peak abundance is off northern Oregon and southern Washington, with significant aggregations occurring south to central California. Widow rockfish form midwater schools at night over bottom features such as ridges or large mounds near the shelf break (Tagart 1987). Stock spawning biomass of widow rockfish steadily decline between 1980 and 2001. The stock was declared overfished in 2001, and a rebuilding plan was put in place. The most recent stock assessment shows that the stock has rebuilt to a depletion level of 51 percent of its unfished biomass level (He et al. 2011).

3.2.2.2 Yellowtail rockfish

Yellowtail rockfish are found from Kodiak Island, Alaska to San Diego, California, however they are rare south of Point Conception. The species is wide-ranging occur from the surface to 549 m (1,800 feet or 300 fm). Yellowtail rockfish form large schools, either alone or in association with other rockfish, including widow rockfish, canary rockfish, redstripe rockfish, and silvergray rockfish. They are primarily distributed over deep reefs on the continental shelf, especially near the shelf break, where they feed on krill and other micronekton. The most recent stock assessment for yellowtail rockfish estimated that the spawning biomass has been above 40 percent of unfished spawning biomass since 1995. Restrictive regulations needed to rebuild overfished have resulted in annual fishing mortalities less than F_{MSY} since 1997 (Wallace and Lai 2005).

3.2.2.3 Non-groundfish

Because midwater trawling for Pacific whiting primarily occurs on dense aggregations during daylight hours only a small percentage of the catch is non-whiting and an even smaller portion is non-groundfish species. Coastal pelagic species (CPS) (mackerels, market squid, northern anchovy, Pacific sardine, and Pacific herring) made up approximately 22 percent of the non-groundfish landings in the four year period. CPS are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. For further information on CPS, see the 2011 CPS Stock Assessment and Fishery Evaluation (SAFE) document prepared by the Council (http://www.pcouncil.org/wp-content/uploads/2011_CPS_SAFE_Text_FINAL.pdf.) Notable landings of other non-groundfish species included brown cat shark, unidentified squids, and shad. Small amounts of sharks managed under the Highly Migratory Species (HMS) FMP were also caught. For further information on HMS see the 2013 SAFE document prepared by the Council (http://www.pcouncil.org/highly-migratory-species/stock-assessment-and-fishery-evaluation-safe-documents/current-hms-safe-document/).

3.2.2.4 Overfished Species

There are currently six overfished rockfish stocks (bocaccio south of 40 º10’ N. latitude, canary rockfish, cowcod south of 40º 10’ N. latitude, darkblotched rockfish, Pacific ocean perch, and yelloweye rockfish) and one overfished flatfish stock (petrale sole) managed under rebuilding plans (PFMC 2014a). All species of overfished groundfish are actively managed. They occur as bycatch in the Pacific whiting shorebased and MS sector fisheries. New assessments and rebuilding analyses for these overfished stocks do not indicate any need to modify existing

rebuilding plans since all these analyses indicate progress towards rebuilding is on track and, in most cases, ahead of schedule.

3.2.2.5 Midwater Trawl Whiting Fishery Non-Target Species

Midwater trawling for Pacific whiting primarily occurs on dense aggregations during daylight hours and results in a small percentage of non-whiting catch. The whiting catcher vessels catch a wide variety of non-target species (

Table 3-4). Although the data is from the shorebased fishery most of the vessels also operate in the MS fishery and fish in similar areas. Yellowtail rockfish, spiny dogfish, widow rockfish, and jack mackerel dominate the bycatch (

Table 3-4,

Table 3-5, and

Table 3-6). Overfished species that are incidentally caught include Pacific Ocean perch and darkblotched rockfish.

Table 3-4. Species and species groups caught in the shorebased whiting fishery from 2007 through 2013 (Source: 2007-2012 from the 2012 multiyear data product (Bellman, et al. 2013); 2013 groundfish data from the 2013 groundfish mortality report provided by the WCGOP; 2013 data for nongroundfish data is from fish tickets).

TARGET SPECIES	*Minor slope Rockfish (Rf) N.*[a/]	Pacific Cod	**Endangered Species**	**Other Nongroundfish**
Pacific Hake	Aurora Rf	Sablefish (N)	Eulachon	American Shad
NON-TARGET SPECIES	Bank Rf	Sablefish (S)	*(also salmon)*	Bivalves Unid
Groundfish IFQ Species	Blackgill Rf	Shortspine Thornyhead (N)	**Prohibited Species**	Black Skate
Overfished Groundfish	Blackspotted Rf	Starry flounder	Dungeness Crab	Brown Cat Shark
Bocaccio Rf (S) [b/]	Redbanded Rf	Widow Rf	Chum Salmon	California Mussel
Canary Rf	Rougheye Rf	Yellowtail Rf (N)	Chinook Salmon	Echinoderm Unid
Cowcod Rf (S)	Sharpchin Rf	**Groundfish Landing Limit Species**	Coho Salmon	Fish Unid
Darkblotched Rf	Shortraker Rf	Black Rf (N)	Pink Salmon	Hagfish Unid
Pacific Ocean Perch (N)	Slope Rf Unid	Black Rf (S)	Sockeye Salmon	Jellyfish Unid
Petrale Sole	Splitnose Rf	Nearshore Rf Unid	Salmon Unid	Mackerel Unid
Yelloweye Rf	Yellowmouth Rf	Quillback Rf	Pacific Halibut b/	Mixed Species
Non-Overfished Groundfish	Other flatfish	Spiny Dogfish Shark	**CPS**	Mola Mola (Sunfish)
Arrowtooth flounder	Flatfish Unid	**Groundfish Non-Landing Limit**	Market Squid	Octopus Unid
Chilipepper Rf (S)	Flathead Sole	Longnose skate	Northern Anchovy	Other Nongroundfish
Dover sole	Pacific Sanddab	Mixed thornyheads	Pacific Mackerel	Pacific Herring
English sole	Rex Sole	Other groundfish	Pacific Sardine	Pacific Pomfret
Lingcod (N)	Rock Sole	Big Skate	Jack Mackerel	Pink Shrimp
Lingcod (S)	Sand Sole	Grenadier Unid	**HMS**	Prowfish
Longspine Thornyhead (N)	Sanddab Unid	Groundfish Unid	Albacore Tuna	Sea Cucumber Unid
Minor shelf Rf (N)		Skate Unid	Bonito (Shortfin Mako) Shark	Shark Unid
Bocaccio Rf		Shortbelly Rf	Blue Shark	Shrimp Unid
Chilipepper Rf		Soupfin Shark	Common Thresher Shark	Smelt Unid
Greenblotched Rf		Spotted Ratfish		Squid Unid
Greenspotted Rf				Walleye Pollock
Greenstriped Rf				White Sturgeon
Redstripe Rf				Wolf-eel
Rosethorn Rf				
Shelf Rf Unid				
Silvergray Rf				
Stripetail Rf				

a/ N = North of 40°10' N. lat.
b/ S=South of 40°10' N. lat

Table 3-5. Whiting mothership sector catch and discard 2014.

Note: Bold text indicates overfished species. Observed total catch weight (retained + discard) (mt), discard weight (mt) and percent discarded from observed vessels in the mothership sector of the at-sea mother shop sector. Groundfish and non-groundfish species are presented alphabetically. Double dashes (--) represent zeros or no value; zeroes represent values rounded to 0. Source: NMFS West Coast Groundfish, Shorebased catch share program (http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm#obs)

At-Sea Mothership Sector		**Total catch (mt)**	**Discard (mt)**	**Total % discarded**
Groundfish species				
Arrowtooth Flounder	*Atheresthes stomias*	1.93	0.17	9%
Aurora Rockfish	*Sebastes aurora*	0.00	0.00	100%
Bank Rockfish	*Sebastes rufus*	0.00	0.00	79%
Big Skate	*Raja binoculata*	0.25	0.25	100%
Blackgill Rockfish	*Sebastes melanostomus*	0.00	0.00	100%
Black Rockfish	*Sebastes melanops*	--	--	--
Blue Rockfish	*Sebastes mystinus*	--	--	--
BOCACCIO ROCKFISH	*Sebastes paucispinus*	0.07	0.06	87%
Canary Rockfish	*Sebastes pinniger*	0.35	0.15	42%
Chilipepper Rockfish	*Sebastes goodei*	--	--	--
DARKBLOTCHED ROCKFISH	*Sebastes crameri*	7.21	2.44	34%
Dover Sole	*Microstomus pacificus*	0.05	0.00	8%
Dusky Rockfish	*Sebastes variabilis*	--	--	--
English Sole	*Pleuronectes vetulus*	--	--	--
Flatfish Unid	*Pleuronectiformes*	0.00	0.00	0%
Flathead Sole	*Hippoglossoides elassodon*	--	--	--
Greenstriped Rockfish	*Sebastes elongates*	--	--	--
Grenadier Unid	*Macrouridae*	0.37	0.32	87%
Harlequin Rockfish	*Sebastes variegatus*	0.00	0.00	100%
Kelp Greenling	*Hexagrammos decagrammus*	--	--	--
Lingcod	*Ophiodon elongatus*	0.85	0.35	41%
Longnose Skate	*Raja rhina*	0.40	0.40	100%
Longspine Thornyhead	*Sebastolobus altivelis*	0.00	0.00	35%
Pacific Cod	*Gadus macrocephalus*	--	--	--
Pacific Electric Ray	*Rajidae*	--	--	--
Pacific Hake	*Merluccius productus*	62038.29	244.62	0%
PACIFIC OCEAN PERCH	*Sebastes alutus*	3.60	1.91	53%
Pacific Sanddab	*Citharichthys sordidus*	--	--	--
Petrale Sole	*Eopsetta jordani*	--	--	--
Quillback Rockfish	*Sebastes maliger*	--	--	--
Redbanded Rockfish	*Sebastes babcocki*	0.00	0.00	100%
Redstripe Rockfish	*Sebastes proriger*	0.04	0.03	72%

At-Sea Mothership Sector		Total catch (mt)	Discard (mt)	Total % discarded
Rex Sole	*Errex zachirus*	0.59	0.05	8%
Rockfish Unid	*Scorpaenidae*	--	--	--
Rosethorn Rockfish	*Sebastes helvomaculatus*	--	--	--
Rougheye Rockfish	*Sebastes aleutianus*	1.48	0.90	60%
Roundfish Unid	*Pleuronectiformes*	--	--	--
Sablefish	*Anoplopoma fimbria*	0.90	0.18	20%
Sand Sole	*Psettichthys melanostictus*	--	--	--
Sharpchin Rockfish	*Sebastes zacentrus*	0.00	0.00	33%
Shortbelly Rockfish	*Sebastes jordani*	0.00	0.00	28%
Shortraker Rockfish	*Sebastes borealis*	0.01	0.01	100%
Shortraker/Rougheye Rockfish	*Scorpaenidae*	--	--	--
Shortspine/Longspine Thornyhead	*Sebastolobus*	--	--	--
Shortspine Thornyhead	*Sebastolobus alascanus*	1.63	1.06	65%
Silvergray Rockfish	*Sebastes brevispinus*	0.07	0.01	13%
Skate Unid	*Rajidae*	--	--	--
Soupfin Shark	*Galeorhinus galeus*	--	--	--
Speckled Rockfish	*Sebastes ovalis*	--	--	--
Spiny Dogfish Shark	*Squalus acanthias*	21.53	15.45	72%
Splitnose Rockfish	*Sebastes diploproa*	6.17	3.44	56%
Spotted Ratfish	*Hydrolagus colliei*	0.00	0.00	100%
Squarespot Rockfish	*Sebastes hopkinsi*	--	--	--
Stripetail Rockfish	*Sebastes saxicola*	0.00	0.00	100%
Tiger Rockfish	*Sebastes nigrocinctus*	--	--	--
Widow Rockfish	*Sebastes entomelas*	39.63	13.72	35%
YELLOWEYE ROCKFISH	*Sebastes ruberrimus*	--	--	--
Yellowmouth Rockfish	*Sebastes reedi*	0.00	0.00	0%
Yellowtail Rockfish	*Sebastes flavidus*	41.94	23.66	56%
American Shad	*Alosa sapidissima*	18.12	4.00	22%
Argentine Unid	N/A	--	--	--
Barracudina Unid	N/A	0.00	0.00	80%
Bigscale Unid	N/A	0.00	0.00	100%
Bird Unid	N/A	--	--	--
Blacksmelt Unid	*Osmeridae*	0.00	0.00	100%
Blue Shark	*Prionace glauca*	0.49	0.49	100%
Brown Cat Shark	*Apristurus brunneus*	10.10	6.97	69%
California Halibut	*Paralichthys californicus*	--	--	--

At-Sea Mothership Sector		Total catch (mt)	Discard (mt)	Total % discarded
Common Thresher Shark	*Alopias vulpinus*	0.93	0.93	100%
Cutlassfish Unid	N/A	0.01	0.01	76%
Daggertooths	N/A	0.00	0.00	0%
Deepsea Smelt Unid	*Osmeridae*	0.06	0.02	42%
Dog (Chum) Salmon	*Oncorhynchus keta*	0.02	0.02	100%
Dragonfish Unid	N/A	0.02	0.01	75%
Dreamer Unid	N/A	--	--	--
Duckbill Barracudina	N/A	0.00	0.00	92%
Dungeness Crab	*Cancer magister*	--	--	--
Eelpout Unid	N/A	0.00	0.00	11%
Eulachon	*Thaleichthys pacificus*	0.00	0.00	46%
Fish Unid	N/A	0.02	0.01	56%
Fish Waste	N/A	0.16	0.15	95%
Green Sturgeon	*Acipenser medirostris*	--	--	--
Hatchetfish Unid	N/A	--	--	--
Humboldt (Jumbo) Squid	*Teuthoidea*	0.16	0.16	100%
Invertebrate Unid	N/A	0.00	0.00	100%
Isopod	N/A	0.00	0.00	100%
Jack Mackerel	*Trachurus symmetricus*	19.77	8.81	45%
Jellyfish Unid	*Scyphozoa*	0.18	0.18	100%
King (Chinook) Salmon	*Oncorhynchus tshawytscha*	6.48	6.41	99%
King of the Salmon	N/A	4.18	1.52	36%
Lamprey Unid	N/A	0.01	0.01	62%
Lancetfishes	N/A	0.03	0.02	70%
Lanternfish Unid	N/A	0.02	0.01	39%
Longnose Lancetfish	N/A	--	--	--
Loosejaw Unid	N/A	0.01	0.00	81%
Manefishes	N/A	0.01	0.00	12%
Medusafish	N/A	0.62	0.27	44%
Mixed Species	N/A	0.07	0.07	100%
Mola Mola (Sunfish)	*Mola mola*	0.13	0.08	60%
Myctophidae	N/A	--	--	--
Northern Anchovy	*Engraulis mordax*	--	--	--
Octopus Unid	*Octopoda*	0.02	0.01	52%
Opah	N/A	0.06	0.00	0%
Oreos	N/A	0.00	0.00	81%
Pacific Halibut	*Hippoglossus stenolepis*	0.33	0.33	100%
Pacific Herring	*Clupea pallasii*	0.10	0.04	40%

At-Sea Mothership Sector		Total catch (mt)	Discard (mt)	Total % discarded
Pacific Lamprey	N/A	0.00	0.00	43%
Pacific Mackerel	*Scomber japonicus*	0.47	0.06	13%
Pacific Pomfret	*Brama japonica*	0.71	0.31	43%
Pacific Sardine	*Sardinops sagax*	0.07	0.01	17%
Pacific Saury	*Cololabis saira*	0.00	0.00	100%
Pacific Sharpnose Shark	*Elasmobranchii*	--	--	--
Pacific Sleeper Shark	*Elasmobranchii*	0.33	0.32	98%
Paperbone Unid	N/A	0.00	0.00	100%
Pearleyes Unid	N/A	0.00	0.00	83%
Pelagic Octopus Unid	*Octopoda*	--	--	--
Pink (Humpback) Salmon	*Oncorhynchus gorbuscha*	--	--	--
Pomfret Unid	N/A	--	--	--
Prickleback Unid	N/A	--	--	--
Prowfish	*Zaprora silenus*	--	--	--
Ragfish	N/A	4.91	2.82	57%
Rainbow Smelt	*Osmeridae*	--	--	--
Ribbonfish Unid	N/A	0.25	0.00	0%
Ronquil Unid	N/A	--	--	--
Rough Pomfret	N/A	0.06	0.01	18%
Salmon Shark	*Elasmobranchii*	1.91	1.91	100%
Salmon Unid	*Oncorhynchus*	--	--	--
Sandpaper Skate	*Bathyraja kincaidii*	--	--	--
Sea Anemone Unid	N/A	0.00	0.00	100%
Sea Devil Unid	N/A	0.00	0.00	100%
Sea Pen-Sea Whip Unid	N/A	--	--	--
Sea Squirts Unid	N/A	0.04	0.03	66%
Shark Unid	*Elasmobranchii*	0.00	0.00	100%
Shrimp Unid	N/A	0.00	0.00	65%
Silver (Coho) Salmon	*Oncorhynchus kisutch*	0.18	0.18	100%
Sixgill Shark	*Elasmobranchii*	--	--	--
Skate Egg Case Unid	N/A	0.00	0.00	92%
Slender Barracudina	N/A	--	--	--
Slender Sole	*Lyopsetta exilis*	0.00	0.00	7%
Smelt/Herring Unid	*Osmeridae*	--	--	--

Table 3-6. Shoreside sector observed catch and discard, 2013.

Note: Observed total catch weight (retained + discard) (mt) and at-sea discard weight (mt) from vessels in the shoreside hake IFQ fishery. Shoreside sector functions as a full-retention fishery, so only at-sea discards are observed by WCGOP; additional discards occur on land. Groundfish and non-groundfish species are presented alphabetically. All IFQ vessels carry an observer on every fishing trip. Double dashes (--) represent zeros or no value; zeroes represent values rounded to 0. (http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm#obs)

Shoreside Sector		**Total catch (mt)**	**At-Sea Discard (mt)**
Groundfish species			
Arrowtooth Flounder	*Atheresthes stomias*	6.32	0.05
Aurora Rockfish	*Sebastes aurora*	0.20	0.00
Bank Rockfish	*Sebastes rufus*	--	--
Big Skate	*Raja binoculata*	--	--
Blackgill Rockfish	*Sebastes melanostomus*	0.06	0.00
Black Rockfish	*Sebastes melanops*	--	--
BOCACCIO ROCKFISH	*Sebastes paucispinus*	0.46	0.00
Canary Rockfish	*Sebastes pinniger*	2.57	0.03
Chilipepper Rockfish	*Sebastes goodei*	0.05	0.00
DARKBLOTCHED ROCKFISH	*Sebastes crameri*	8.45	0.00
Dover Sole	*Microstomus pacificus*	0.12	0.00
English Sole	*Pleuronectes vetulus*	0.00	0.00
Flatfish Unid	*Pleuronectiformes*	0.00	0.00
Flathead Sole	*Hippoglossoides elassodon*	0.00	0.00
Greenspotted Rockfish	*Sebastes chlorostictus*	--	--
Greenstriped Rockfish	*Sebastes elongates*	0.11	0.00
Grenadier Unid	*Macrouridae*	--	--
Groundfish Unid	N/A	0.22	0.00
Lingcod	*Ophiodon elongatus*	9.11	0.06
Longnose Skate	*Raja rhina*	0.30	0.02
Longspine Thornyhead	*Sebastolobus altivelis*	0.03	0.00
Pacific Cod	*Gadus macrocephalus*	0.18	0.00
Pacific Hake	*Merluccius productus*	98418.99	493.77
PACIFIC OCEAN PERCH	*Sebastes alutus*	10.17	0.00
Pacific Sanddab	*Citharichthys sordidus*	0.77	0.00
Petrale Sole	*Eopsetta jordani*	0.03	0.00
Redbanded Rockfish	*Sebastes babcocki*	0.05	0.00
Redstripe Rockfish	*Sebastes proriger*	0.35	0.02
Rex Sole	*Errex zachirus*	0.31	0.00
Rockfish Unid	*Sebastes*	--	--
Rock Sole	*Pleuronectes bilineatus*	--	--

Shoreside Sector		Total catch (mt)	At-Sea Discard (mt)
Rosethorn Rockfish	*Sebastes helvomaculatus*	0.01	0.00
Rougheye Rockfish	*Sebastes aleutianus*	3.48	0.00
Sablefish	*Anoplopoma fimbria*	5.23	0.00
Sanddab Unid	*Citharichthys*	0.00	0.00
Sharpchin Rockfish	*Sebastes zacentrus*	0.70	0.01
Shelf Rockfish Unid	*Scorpaenidae*	0.01	0.00
Shortbelly Rockfish	*Sebastes jordani*	0.01	0.00
Shortraker Rockfish	*Sebastes borealis*	0.66	0.00
Shortraker/Rougheye Rockfish	*Sebastes borealis/aleutianus*	--	--
Shortspine/Longspine Thornyhead	*Sebastolobus*	--	--
Shortspine Thornyhead	*Sebastolobus alascanus*	2.19	0.00
Silvergray Rockfish	*Sebastes brevispinus*	0.33	0.00
Skate Unid	*Rajidae*	0.51	0.00
Slope Rockfish Unid	*Scorpaenidae*	0.06	0.00
Soupfin Shark	*Galeorhinus galeus*	0.31	0.12
Spiny Dogfish Shark	*Squalus acanthias*	69.55	0.12
Splitnose Rockfish	*Sebastes diploproa*	30.93	0.01
Spotted Ratfish	*Hydrolagus colliei*	0.01	0.00
Stripetail Rockfish	*Sebastes saxicola*	0.02	0.00
Widow Rockfish	*Sebastes entomelas*	304.31	4.19
YELLOWEYE ROCKFISH	*Sebastes ruberrimus*	0.00	0.00
Yellowmouth Rockfish	*Sebastes reedi*	0.00	0.00
Yellowtail Rockfish	*Sebastes flavidus*	309.47	0.00
American Shad	*Alosa sapidissima*	50.88	0.00
Anemone Unid	*Actiniaria*	--	--
Black Skate	*Bathyraja trachura*	--	--
Blue Shark	*Prionace glauca*	0.23	0.09
Bonito (Shortfin Mako) Shark	*Isurus oxyrinchus*	--	--
Brittle/Basket Star Unid	*Ophiuroidea*	--	--
Brown Cat Shark	*Apristurus brunneus*	1.49	0.09
Common Thresher Shark	*Alopias vulpinus*	1.20	0.84
Dog (Chum) Salmon	*Oncorhynchus keta*	0.03	0.00
Dungeness Crab	*Cancer magister*	0.03	0.00
Echinoderm Unid	*Echinoidea*	0.00	0.00
Eulachon	*Thaleichthys pacificus*	--	--
Hagfish Unid	*Myxinidae*	--	--
Herring Unid	*Clupeidae*	0.14	0.14

Shoreside Sector		Total catch (mt)	At-Sea Discard (mt)
Humboldt (Jumbo) Squid	*Dosidicus gigas*	0.01	0.01
Invertebrate Unid	N/A	0.01	0.01
Jack Mackerel	*Trachurus symmetricus*	290.56	0.82
Jellyfish Unid	*Scyphozoa*	0.03	0.03
Kelp Rocks Wood Mud	N/A	0.34	0.30
King (Chinook) Salmon	*Oncorhynchus tshawytscha*	17.76	0.18
Longnose Lancetfish	*Alepisaurus ferox*	--	--
Mackerel Unid	*Scombridae*	35.90	0.00
Market Squid	*Doryteuthis opalescens*	0.01	0.00
Mixed Species	N/A	12.08	0.23
Mola Mola (Sunfish)	*Mola mola*	0.19	0.19
Non-Eulachon Smelt Unid	*Osmeridae*	0.00	0.00
Non-Humboldt Squid Unid	*Teuthida*	0.55	0.55
Northern Anchovy	*Engraulis mordax*	--	--
Octopus Unid	*Octopoda*	0.01	0.00
Other Nongroundfish	N/A	0.15	0.00
Pacific Halibut	*Hippoglossus stenolepis*	1.36	0.11
Pacific Herring	*Clupea pallasii*	12.29	0.00
Pacific Mackerel	*Scomber japonicus*	22.90	0.09
Pacific Pomfret	*Brama japonica*	--	--
Pacific Sardine	*Sardinops sagax*	0.57	0.00
Pelagic Thresher Shark	*Alopias pelagicus*	0.41	0.41
Pink (Humpback) Salmon	*Oncorhynchus gorbuscha*	--	--
Prowfish	*Zaprora silenus*	--	--
Red (Sockeye) Salmon	*Oncorhynchus nerka*	0.00	0.00
Red Urchin	*Stronglyocentrotus franciscanus*	0.00	0.00
Salmon Unid	*Oncohyhnchus*	0.09	0.09
Sea Pens	*Pennatulacea*	--	--
Sea Star Unid	*Asteroidea*	--	--
Sea Whips	*Pennatulacea*	--	--
Shark Unid	*Elasmobranchii*	5.22	2.89

3.2.2.6 Fixed Gear Non-Target Species

The fixed gear fishery uses longline and pot. The fishery has more participation using pots than longlines, therefore the data may be aggregated to protect confidentiality of the data. Discard of all IFQ species and non-IFQ species (non-target species) are currently estimated by the on-board

observers (Table 3-7). Categories for groundfish and non-groundfish species are presented alphabetically; rebuilding species are capitalized. All IFQ vessels carry an observer on every fishing trip. Double dashes (--) represent zeros or no value; zeroes represent values rounded to 0; blank cells represent unobserved years or data reported in other location.

Table 3-7. IFQ Pot fishery catch and discard, 2014.

IFQ Non-Hake Shoreside Fishery Pot Gear		**2014 Total catch (mt)**	**Discard (mt)**	**Total % discarded**
Groundfish species				
Abyssal Grenadier	*Coryphaenoides armatus*	--	--	--
Arrowtooth Flounder	*Atheresthes stomias*	0.13	0.11	84%
Aurora Rockfish	*Sebastes aurora*	0.04	0.00	9%
Bank Rockfish	*Sebastes rufus*	0.00	0.00	0%
Big Skate	*Raja binoculata*	--	--	--
Blackgill Rockfish	*Sebastes melanostomus*	3.48	0.10	3%
BOCACCIO ROCKFISH	*Sebastes paucispinus*	0.00	0.00	100%
Bronzespotted Rockfish	*Sebastes gilli*	--	--	--
California Grenadier	*Nezumia stelgidolepis*	--	--	--
Canary Rockfish	*Sebastes pinniger*	0.00	0.00	0%
Chilipepper Rockfish	*Sebastes goodei*	--	--	--
DARKBLOTCHED ROCKFISH	*Sebastes crameri*	0.02	0.00	3%
Dover Sole	*Microstomus pacificus*	0.70	0.16	0.22
English Sole	*Pleuronectes vetulus*	0.00	0.00	0%
Flatfish Unid	*Pleuronectiformes*	--	--	--
Flathead Sole	*Hippoglossoides elassodon*	--	--	--
Greenspotted Rockfish	*Sebastes chlorostictus*	--	--	--
Greenstriped Rockfish	*Sebastes elongates*	0.00	0.00	0%
Grenadier Unid	*Macrouridae*	0.57	0.27	0.48
Lingcod	*Ophiodon elongatus*	1.54	0.11	7%
Longnose Skate	*Raja rhina*	0.01	0.01	56%
Longspine Thornyhead	*Sebastolobus altivelis*	0.05	0.02	43%
Mixed Species	*N/A*	--	--	--
Pacific Cod	*Gadus macrocephalus*	--	--	--
Pacific Flatnose	*Antimora microlepis*	0.06	0.06	100%
Pacific Grenadier	*Coryphaenoides acrolepis*	5.05	4.75	94%
Pacific Hake	*Merluccius productus*	0.09	0.09	100%
PACIFIC OCEAN PERCH	*Sebastes alutus*	0.00	0.00	0%
Petrale Sole	*Eopsetta jordani*	0.02	0.00	14%
Redbanded Rockfish	*Sebastes babcocki*	0.05	0.00	7%
Redstripe Rockfish	*Sebastes proriger*	--	--	--
Rex Sole	*Errex zachirus*	--	--	--
Rockfish Unid	*Sebastes*	--	--	--

IFQ Non-Hake Shoreside Fishery Pot Gear		2014 Total catch (mt)	Discard (mt)	Total % discarded
Rosethorn Rockfish	*Sebastes helvomaculatus*	0.00	0.00	0.23
Rougheye Rockfish	*Sebastes aleutianus*	0.09	0.00	5%
Sablefish	*Anoplopoma fimbria*	688.25	10.16	1%
Sharpchin Rockfish	*Sebastes zacentrus*	0.00	0.00	0%
Shelf Rockfish Unid	*Scorpaenidae*	0.00	0.00	0%
Shortraker Rockfish	*Sebastes borealis*	0.00	0.00	0%
Shortraker/Rougheye Rockfish	*Sebastes borealis/aleutianus*	0.00	0.00	1.00
Shortspine/Longspine Thornyhead	*Sebastolobus*	--	--	--
Shortspine Thornyhead	*Sebastolobus alascanus*	1.95	0.46	0.24
Skate Unid	*Rajidae*	0.00	0.00	0%
Slope Rockfish Unid	*Scorpaenidae*	0.01	0.00	0%
Smooth Grenadier	*Nezumia liolepis*	--	--	--
Spiny Dogfish Shark	*Squalus acanthias*	0.04	0.04	100%
Splitnose Rockfish	*Sebastes diploproa*	0.00	0.00	0%
Spotted Ratfish	*Hydrolagus colliei*	0.00	0.00	100%
Vermilion Rockfish	*Sebastes miniatus*	--	--	--
YELLOWEYE ROCKFISH	*Sebastes ruberrimus*	--	--	--
Yellowmouth Rockfish	*Sebastes reedi*	--	--	--
Non-groundfish species				
Amiphpod Unid	*Amphipoda*	--	--	--
Anemone Unid	*Actiniaria*	0.06	0.06	100%
Angulatus Tanner Crab	*Chionoecetes angulatus*	0.06	0.06	100%
Bairdi Tanner Crab	*Chionoecetes bairdi*	0.00	0.00	100%
Bamboo Corals	*Calaxonia*	0.00	0.00	100%
Barnacles Unid	*Cirripedia*	--	--	--
Bay Pipefish	*Syngnathus leptorynchus*	0.00	0.00	100%
Black Coral	*Antipatharia*	0.00	0.00	100%
Blackdragon Unid	*Idiacanthidae*	--	--	--
Black Skate	*Bathyraja trachura*	0.00	0.00	100%
Blob Sculpin	*Psychrolutes phrictus*	--	--	--
Blue Shark	*Prionace glauca*	0.02	0.02	100%
Brittle/Basket Star Unid	*Ophiuroidea*	0.00	0.00	100%
Brown Box Crab	*Lopholithodes foraminatus*	0.00	0.00	100%
Brown Cat Shark	*Apristurus brunneus*	0.00	0.00	100%
California King Crab	*Paralithodes californiensis*	0.00	0.00	100%
California Slickhead	*Alepocephalus tenebrosus*	0.00	0.00	100%
Cat Shark Unid	*Scyliorhinidae*	--	--	--
Corals Unid	*Anthozoa*	0.00	0.00	100%

IFQ Non-Hake Shoreside Fishery Pot Gear		2014 Total catch (mt)	Discard (mt)	Total % discarded
Crab Unid	*Decapoda*	1.16	1.16	100%
Crinoids Unid	*Crinoidea*	0.00	0.00	100%
Decorator/Spider Crab Unid	*Majidae*	0.02	0.02	100%
Deepsea Sole	*Embassichthys bathybius*	0.01	0.01	100%
Deep-sea Spider Crab	*Paralomis manningi*	--	--	--
Dragonfish Unid	*Melanostomiidae*	--	--	--
Dungeness Crab	*Cancer magister*	0.38	0.38	100%
Eelpout Unid	*Zoarcidae*	0.00	0.00	100%
Egg Case Unid	*N/A*	0.00	0.00	100%
Filetail Cat Shark	*Parmaturus xaniurus*	0.43	0.43	100%
Flat-legged Spider Crab	*Paralomis verrilli*	0.04	0.04	100%
Garbage/Trash	*N/A*	--	--	--
Giant Grenadier	*Albatrossia pectoralis*	1.17	1.17	100%
Giant Wrymouth	*Cryptacanthodes giganteus*	--	--	--
Hagfish Unid	*Myxinidae*	0.00	0.00	100%
Hair Crab	*Paralomis multispina*	1.17	1.17	100%
Hermit Crab Unid	*Paguridae*	--	--	--
Horny Gorgonians	*Holaxonia*	0.00	0.00	100%
Hydrocoral	*Hydroida*	0.00	0.00	100%
Invertebrate Unid	*N/A*	0.09	0.09	100%
Irregular Echinoids	*Echinoidea*	--	--	--
Isopod Unid	*Isopoda*	--	--	--
Jellyfish Unid	*Scyphozoa*	0.01	0.01	100%
Kelp Rocks Wood Mud	*N/A*	0.01	0.01	100%
King Crab Unid	*Lithode*	--	--	--
Laternfish Unid	*Myctophidae*	0.00	0.00	100%
Long-armed Spider Crab	*Macroregonia macrochiera*	--	--	--
Longfin Dragonfish	*Tactostoma macropus*	--	--	--
Longnose Cat Shark	*Apristurus kampae*	--	--	--
Loosejaw Unid	*Malacosteidae*	--	--	--
Mixed Species	*N/A*	0.01	0.01	100%
Mollusk Unid	*Mollusca*	--	--	--
Monkeyface Prickleback	*Cebidichthys violaceus*	--	--	--
Nudibranch Unid	*Nudibranchia*	--	--	--
Octopus Unid	*Octopoda*	0.05	0.04	90%
Other Nongroundfish	*N/A*	--	--	--
Pacific Hagfish	*Eptatretus stouti*	0.00	0.00	100%
Pacific Halibut	*Hippoglossus stenolepis*	0.32	0.32	100%
Pacific Saury	*Cololabis saira*	--	--	--
Pacific Sleeper Shark	*Somniosus pacificus*	1.15	1.15	100%

IFQ Non-Hake Shoreside Fishery Pot Gear		2014 Total catch (mt)	Discard (mt)	Total % discarded
Pacific Viperfish	*Chauliodus macouni*	--	--	--
Pelagic Thresher Shark	*Alopias pelagicus*	--	--	--
Ragfish	*Icosteus aenigmaticus*	--	--	--
Ribbonfish Unid	*Trachipteridae*	--	--	--
Ronquil Unid	*Bathymasteridae*	0.00	0.00	100%
Sandpaper Skate	*Bathyraja kincaidii*	--	--	--
Scarlet King Crab	*Lithodes couesi*	0.05	0.05	100%
Sea Cucumber Unid	*Holothuroidea*	0.00	0.00	100%
Sea Fans	*Calaxonia*	0.00	0.00	100%
Sea Pansies	*Pennatulacea*	--	--	--
Sea Pens	*Pennatulacea*	0.00	0.00	100%
Sea Snail Unid	*Gastropoda*	0.14	0.14	100%
Sea Squirts Unid	*Tunicata*	0.00	0.00	100%
Sea Star Unid	*Asteroidea*	0.08	0.08	100%
Sea Whips	*Pennatulacea*	0.00	0.00	100%
Sen Pen/Pansies Unid	*Pennatulacea*	--	--	--
Shark Unid	*Elasmobranchii*	0.01	0.01	100%
Sheep Crab	*Loxorhynchus grandis*	--	--	--
Shrimp Unid	*N/A*	0.00	0.00	100%
Sixgill Shark	*Hexanchus griseus*	--	--	--
Slender Sole	*Lyopsetta exilis*	--	--	--
Snailfish Unid	*Liparis*	0.02	0.02	100%
Snipe Eel Unid	*Nemichthyidae*	--	--	--
Soft Coral	*Alcyonacea*	0.00	0.00	100%
Spiky King Crab	*Neolithodes diomedeae*	0.03	0.03	100%
Spiny King Crab	*Paralithodes rathbuni*	0.00	0.00	100%
Spiny Lithode Crab	*Acantholithodes hispidus*	--	--	--
Spiny Lobster Unid	*Palinura*	--	--	--
Sponge Unid	*Porifera*	0.01	0.01	100%
Spongy Gorgonians	*Scleraxonia*	0.00	0.00	100%
Squat Lobster Unid	*Galatheidae*	0.00	0.00	100%
Squid Unid	*Teuthoidea*	--	--	--
Stony Coral	*Scleractinia*	--	--	--
Tanner Crab Unid	*Chionoecetes*	0.31	0.31	100%
Tanneri Tanner Crab	*Chionoecetes tanneri*	4.21	4.21	100%
Threadfin Slickhead	*Talismania bifurcata*	--	--	--
Tubeshoulder Unid	*Searsiidae*	--	--	--
Tunicata	*Tunicata*	0.00	0.00	100%
Twoline Eelpout	*Bothrocara brunneum*	--	--	--
Urchin Unid	*Echinoidea*	0.71	0.71	100%
Viperfish Unid	*Chauliodontidae*	0.00	0.00	100%

IFQ Non-Hake Shoreside Fishery Pot Gear		2014 Total catch (mt)	Discard (mt)	Total % discarded
Worm Unid	*Annelida*	0.00	0.00	100%

Table 3-8. IFQ hook-and-line (i.e. longline) catch and discard, 2014.

IFQ Non-Hake Shoreside Fishery Hook-and-Line Gear		2014 Total catch (mt)	Discard (mt)	Total % discarded
Groundfish species				
Arrowtooth Flounder	*Atheresthes stomias*	1.94	1.93	100%
Aurora Rockfish	*Sebastes aurora*	0.00	0.00	0%
Bank Rockfish	*Sebastes rufus*	0.01	0.00	0%
Big Skate	*Raja binoculata*	0.13	0.06	49%
Blackgill Rockfish	*Sebastes melanostomus*	0.04	0.00	0%
BOCACCIO ROCKFISH	*Sebastes paucispinus*	--	--	--
California Skate	*Raja inornata*	--	--	--
Canary Rockfish	*Sebastes pinniger*	0.00	0.00	0%
DARKBLOTCHED ROCKFISH	*Sebastes crameri*	0.03	0.00	3%
Deepsea Skate	*Bathyraja abyssicola*	0.01	0.01	100%
Dover Sole	*Microstomus pacificus*	0.10	0.01	6%
English Sole	*Pleuronectes vetulus*	--	--	--
Flatfish Unid	*Pleuronectiformes*	--	--	--
Greenspotted Rockfish	*Sebastes chlorostictus*	0.00	0.00	0%
Greenstriped Rockfish	*Sebastes elongates*	0.00	0.00	51%
Grenadier Unid	*Macrouridae*	0.46	0.00	0%
Lingcod	*Ophiodon elongatus*	0.29	0.02	7%
Longnose Skate	*Raja rhina*	3.06	0.49	16%
Longspine Thornyhead	*Sebastolobus altivelis*	0.43	0.31	72%
Mixed Species	N/A	--	--	--
Pacific Cod	*Gadus macrocephalus*	0.01	0.00	0%
Pacific Flatnose	*Antimora microlepis*	0.01	0.01	100%
Pacific Grenadier	*Coryphaenoides acrolepis*	0.66	0.23	35%
Pacific Hake	*Merluccius productus*	0.06	0.06	100%
PACIFIC OCEAN PERCH	*Sebastes alutus*	0.05	0.00	3%
Petrale Sole	*Eopsetta jordani*	0.10	0.01	6%
Popeye Grenadier	*Coryphaenoides cinereus*	--	--	--
Redbanded Rockfish	*Sebastes babcocki*	1.06	0.00	0%
Redstripe Rockfish	*Sebastes proriger*	--	--	--

IFQ Non-Hake Shoreside Fishery Hook-and-Line Gear		2014		
		Total catch (mt)	Discard (mt)	Total % discarded
Rockfish Unid	*Sebastes*	--	--	--
Rock Sole	*Pleuronectes bilineatus*	--	--	--
Rosethorn Rockfish	*Sebastes helvomaculatus*	0.01	0.00	8%
Rougheye Rockfish	*Sebastes aleutianus*	2.09	0.08	4%
Sablefish	*Anoplopoma fimbria*	77.33	2.51	3%
Sand Sole	*Psettichthys melanostictus*	--	--	--
Sharpchin Rockfish	*Sebastes zacentrus*	0.00	0.00	0%
Shelf Rockfish Unid	*Scorpaenidae*	0.00	0.00	0%
Shortraker Rockfish	*Sebastes borealis*	0.28	0.01	4%
Shortraker/Rougheye Rockfish	*Sebastes borealis/aleutianus*	0.01	0.01	100%
Shortspine/Longspine Thornyhead	*Sebastolobus*	--	--	--
Shortspine Thornyhead	*Sebastolobus alascanus*	4.52	0.11	2%
Silvergray Rockfish	*Sebastes brevispinus*	0.00	0.00	0%
Skate Unid	*Rajidae*	0.13	0.00	0%
Slope Rockfish Unid	*Scorpaenidae*	--	--	--
Soupfin Shark	*Galeorhinus galeus*	--	--	--
Spiny Dogfish Shark	*Squalus acanthias*	29.62	29.62	100%
Splitnose Rockfish	*Sebastes diploproa*	0.01	0.00	0%
Spotted Ratfish	*Hydrolagus colliei*	0.04	0.04	100%
Tiger Rockfish	*Sebastes nigrocinctus*	--	--	--
Widow Rockfish	*Sebastes entomelas*	--	--	--
YELLOWEYE ROCKFISH	*Sebastes ruberrimus*	0.01	0.00	0%
Yellowmouth Rockfish	*Sebastes reedi*	--	--	--
Yellowtail Rockfish	*Sebastes flavidus*	0.01	0.01	56%
Non-groundfish species				
Aleutian Skate	*Bathyraja aleutica*	0.03	0.03	100%
Anemone Unid	*Actiniaria*	0.00	0.00	100%
Bamboo Corals	*Calaxonia*	0.00	0.00	100%
Black Hagfish	*Eptatretus deani*	0.00	0.00	100%
Black Skate	*Bathyraja trachura*	0.11	0.11	100%
Blue Shark	*Prionace glauca*	2.93	2.93	100%
Brittle/Basket Star Unid	*Ophiuroidea*	0.00	0.00	100%
Brown Box Crab	*Lopholithodes foraminatus*	--	--	--
Brown Cat Shark	*Apristurus brunneus*	0.03	0.03	100%

IFQ Non-Hake Shoreside Fishery Hook-and-Line Gear		2014		
		Total catch (mt)	Discard (mt)	Total % discarded
California Slickhead	*Alepocephalus tenebrosus*	0.00	0.00	100%
Cat Shark Unid	*Scyliorhinidae*	0.56	0.56	100%
Crab Unid	*Decapoda*	--	--	--
Decorator/Spider Crab Unid	*Majidae*	--	--	--
Deepsea Sole	*Embassichthys bathybius*	--	--	--
Dungeness Crab	*Cancer magister*	--	--	--
Filetail Cat Shark	*Parmaturus xaniurus*	0.24	0.24	100%
Giant Grenadier	*Albatrossia pectoralis*	0.45	0.45	100%
Giant Wrymouth	*Cryptacanthodes giganteus*	0.01	0.01	100%
Hagfish Unid	*Myxinidae*	0.00	0.00	100%
Hair Crab	*Paralomis multispina*	--	--	--
Hydrocoral	*Hydroida*	--	--	--
Invertebrate Unid	N/A	--	--	--
Kelp Rocks Wood Mud	N/A	0.05	0.05	100%
Longnose Cat Shark	*Apristurus kampae*	0.00	0.00	100%
Mixed Species	N/A	--	--	--
Non-Humboldt Squid Unid	*Teuthida*	--	--	--
Octopus Unid	*Octopoda*	--	--	--
Pacific Hagfish	*Eptatretus stouti*	--	--	--
Pacific Halibut	*Hippoglossus stenolepis*	3.43	3.43	100%
Pacific Mackerel	*Scomber japonicus*	--	--	--
Pacific Pomfret	*Brama japonica*	--	--	--
Pacific Sleeper Shark	*Somniosus pacificus*	0.23	0.23	100%
Pelagic Thresher Shark	*Alopias pelagicus*	--	--	--
Sandpaper Skate	*Bathyraja kincaidii*	0.04	0.04	100%
Sculpin Unid	*Cottidae*	--	--	--
Sea Cucumber Unid	*Holothuroidea*	0.00	0.00	100%
Sea Fans	*Calaxonia*	--	--	--
Sea Pens	*Pennatulacea*	0.01	0.01	100%
Sea Snail Unid	*Gastropoda*	--	--	--
Sea Squirts Unid	*Tunicata*	0.00	0.00	100%
Sea Star Unid	*Asteroidea*	0.01	0.01	100%
Sea Whips	*Pennatulacea*	0.00	0.00	100%
Sea Whips/Fans	*Holaxonia*	--	--	--
Shark Unid	*Elasmobranchii*	--	--	--
Silver (Coho) Salmon	*Oncorhynchus kisutch*	0.06	0.06	100%

IFQ Non-Hake Shoreside Fishery Hook-and-Line Gear		2014		
		Total catch (mt)	Discard (mt)	Total % discarded
Sixgill Shark	*Hexanchus griseus*	--	--	--
Slickhead Unid	*Alepocephalidae*	--	--	--
Soft Coral	*Alcyonacea*	--	--	--
Sponge Unid	*Porifera*	--	--	--
Spongy Gorgonians	*Scleraxonia*	--	--	--
Squid Unid	*Teuthoidea*	--	--	--
Stony Coral	*Scleractinia*	--	--	--
Sturgeon Poacher	*Podothecus acipenserinus*	--	--	--
Tanner Crab Unid	*Chionoecetes*	0.00	0.00	100%
Tanneri Tanner Crab	*Chionoecetes tanneri*	0.01	0.01	100%
Tunicata	*Tunicata*	--	--	--
Urchin Unid	*Echinoidea*	--	--	--
Wrymouth Unid	*Cryptacanthodidae*	0.01	0.01	100%

3.2.3 **ESA-Listed and Protected Species**

Protected resources (i.e., salmon, marine mammals, seabirds, and turtles) are those species or stocks that are regulated by one or more of the following laws, Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and the Migratory Bird Treaty Act (MBTA) and Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186). For more information on these laws, please refer to the Council's 2014 Fishery SAFE (PFMC 2014). Three types of protected species are known to be affected by groundfish fisheries: ESA-listed salmon, marine mammals, and seabirds. Therefore, this section describes these species and historical takes in groundfish fisheries in the most detail. Although sea turtles have been sighted off the west coast, no takes of these species have been documented and will not be described here.

Table 3-9. ESA-listed species that may be found in the area of operation for groundfish fisheries.

ESA Species	
Green sturgeon *(Acipenser medirostris)*	Southern Resident killer whales *(Orcinus orca)*
Eulachon *(Thaleichthys pacificus)*	Guadalupe fur seals *(Arctocephalus townsendi)*
Humpback whales (*Megaptera novaeangliae*)	Green sea turtles *(Chelonia mydas)*
Steller sea lions *(Eumetopiasjubatus)*	Olive ridley sea turtles *(Lepidochelys olivacea)*
Leatherback sea turtles (*Dermochelys coriacea*)	Loggerhead sea turtles (Carretta carretta)
Sei whales *(Balaenoptera borealis)*	Short-tailed albatross *(Phoebastria albatnfs)*
North Pacific Right whales *(Eubalaenajaponica)*	Marbled murrelet *(Brachyramphus marmoratus)*
Blue whales *(Balaenoptera musculus)*	Southern sea otter *(Enhydra lutris nereis)*
Fin whales *(Balaenoptera physalus)*	California least tern (*Sterna antil/arum browni*)
Sperm whales *(Physter macrocephalus)*	

3.2.3.1 ESA-Listed Species

The ESA provides for the conservation of species that are endangered or threatened, and the conservation of the ecosystems on which they depend. Section 7(a)(2) of the ESA requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "may affect" an ESA-listed species, that agency is required to consult formally with NMFS (for marine species or their designated critical habitat) or the U.S. Fish and Wildlife Service (USFWS; for terrestrial and freshwater species or their designated critical habitat). Federal agencies are exempt from this formal consultation requirement if they have concluded that an action "may affect, but is not likely to adversely affect" ESA-listed species or their designated critical habitat, and NMFS or USFWS concur with that conclusion (see ESA Section 7 Implementing Regulations; 50 CFR 402).

The ESA also prohibits the taking of endangered species except under limited circumstances. Western Pacific regional fisheries are operated in accordance with ESA consultations that consider the potential interactions of fisheries with listed species, as well as the impacts of interactions on the survival and recovery of listed species and protection of critical habitat.

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

(1) the amount or extent of the incidental take is exceeded;
(2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in an opinion;
(3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the opinion; or
(4) a new species is listed or critical habitat designated that may be affected by the action.

If the amount or extent of incidental take identified in the ITS that is enclosed in a BiOp is exceeded, NMFS SFD should immediately request initiation of formal consultation.

3.2.3.2 ESA Opinions and Thresholds for the Pacific Coast Groundfish Fishery

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

On December 7, 2012, NMFS issued a Biological Opinion (Opinion) under the Endangered Species Act (ESA) on the continuing operation of the Pacific Coast groundfish fishery. NMFS

concluded that the fishery is not likely to jeopardize the continued existence of green sturgeon *(Acipenser medirostris),* eulachon *(Thaleichthyspacificus),* humpback whales *(Megaptera novaeangliae),* Steller sea lions *(Eumetopiasjubatus),* and leatherback sea turtles *(Dermochelys coriacea).* We also conclude that the proposed action is not likely to destroy or adversely modify designated critical habitat of green sturgeon or leatherback sea turtles. Furthermore, NMFS concluded that the proposed action may affect, but is not likely to adversely affect the following species and designated critical habitat:

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

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

The most recent Biological Opinion covering the incidental take of ESA-listed salmon in groundfish fisheries was published in 2006 (NMFS 2006c). That document includes a detailed history of section 7 consultations on the groundfish fishery. Also, see section 0 for more detail on incidental take information.

On January 22, 2013 the NMFS West Coast Region's Sustainable Fisheries Division requested reinitiation of the current salmon biological opinion for the groundfish fisheries. The request resulted from the evolution of the trawl fishery under the trawl rationalization framework and improving conditions for species such as widow rockfish that are expected to change the characteristics of the fishery. In addition, WCGOP data reports contained new estimates of Chinook and coho salmon catch in the nearshore FG fisheries (open access and limited entry fisheries), limited entry sablefish fishery, and open access California Halibut fishery. The update was expected to be completed prior to implementation of the 2015-2016 harvest specifications and management measures.

In October 2014 prior to completion of the update, the Pacific whiting fisheries in aggregate exceeded the 11,000 Chinook threshold that reinitiates the consultation. Given the changes in the fishery identified in the January 22, 2013 reinitiation request, NMFS determined that the reinitiation should address all fishing under the Pacific Coast Groundfish FMP, including the Pacific whiting and non-whiting fisheries and all gears.

In 2014, the midwater trawl fishery exceed the threshold of 11,000 chinook salmon, therefore; in 2015 the NMFS reinitiated the Section 7 consultation for the Pacific groundfish trawl fishery.

NMFS will continue to monitor and collect data to analyze take levels for all protected species. Table 3-10 provides a summary of the most recent effects determinations in biological opinions made by NMFS and the USFWS.

Table 3-10. Current effects determinations made by NMFS and USFWS.

Key: NLAA=Not Likely to Adversely Affect, LAA=Likely to Adversely Affect

Species	Agency	Determination	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Sei whales *(Balaenoptera borealis),*	NMFS	NLAA	No	No	No
North Pacific Right whales *(Eubalaenajaponica),*	NMFS	NLAA	No	No	No
Blue whales *(Balaenoptera musculus),*	NMFS	NLAA	No	No	No
Fin whales *(Balaenoptera physalus),*	NMFS	NLAA	No	No	No
Sperm whales *(Physter macrocephalus),*	NMFS	NLAA	No	No	No
Southern Resident killer whales *(Orcinus orca),*	NMFS	NLAA	No	No	No
Guadalupe fur seals *(Arctocephalus townsendi),*	NMFS	NLAA	No	No	No
Green sea turtles *(Chelonia mydas),*	NMFS	NLAA	No	No	No
Olive ridley sea turtles *(Lepidochelys olivacea),*	NMFS	NLAA	No	No	No

Species	Agency	Determination	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Loggerhead sea turtles *(Carretta carretta)*	NMFS	NLAA	No	No	No
Critical habitat of Southern Resident killer whales	NMFS	NLAA	No	No	No
Critical habitat of Steller sea lions	NMFS	NLAA	No	No	No
marbled murrelet *(Brachyramphus marmoratus),*	USFWS	NLAA	No	No	No
California least tern (*Sterna antil/arum browni),*	USFWS	NLAA	No	No	No
southern sea otter *(Enhydra lutris nereis),*	USFWS	NLAA	No	No	No
bull trout *(Salvelinus conjluentus)*	USFWS	NLAA	No	No	No
short-tailed albatross *(Phoebastria albatnfs),*	USFWS	LAA	Yes	No	No
Green Sturgeon, *(Acipenser medirostris)* and their critical habitat	NMFS	LAA	Yes	No	No
Eulachon, *(Thaleichthys vaci/icus)*	NMFS	LAA	Yes	No	No
Humpback whales, *(Megaptera novaeangliae)*	NMFS	LAA	Yes	No	N/A
Steller sea lions, *(Eumetopias jubatus)*	NMFS	LAA	Yes	No	No
Leatherback sea turtles, *(Dermochelys coriacea)* and their critical habitat	NMFS	LAA	Yes	No	No

3.2.3.3 Species Covered by the 2012 NMFS Biological Opinion

Section 1.2 in the most recent biological opinion (NMFS 2012a) describes the past ESA Section 7 consultations on the continued operation of the Pacific Coast groundfish fishery.[5] Among

[5] NMFS PRD also consulted on the operation of the fishery for 2012 only (PFMC and NMFS 2011). That biological opinion found effects consistent with those described in the current biological opinion.

other sources, this biological opinion used a biological assessment completed in mid-2012 by NMFS NWR SFD (NMFS 2012b) and a risk assessment drafted by the NMFS NWFSC in early 2012 (NWFSC 2012).

Based on this information, and previous interactions observed in the Pacific Coast groundfish fishery, NMFS PRD determined that the fishery is likely to adversely affect the following listed species and critical habitat:

- Eulachon (*Thaleichthys pacificus*)
- Green sturgeon (*Acipenser medirostris*) and their critical habitat
- Humpback whales (*Megaptera novaeangliae*)
- Steller sea lions (*Eumetopias jubatus*)[6]
- Leatherback sea turtles (*Dermochelys coriacea*) and their critical habitat

The following ESA-listed species occur in the fishery management area but NMFS SFD determined that the fishery is not likely to adversely affect them or their critical habitat:

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

Section 2.2 in the 2012 biological opinion describes the status of species and critical habitat subject to the consultation. Section 2.11 describes the rationale for reaching a "not likely to adversely affect" determination for the species listed above.

Section 2.1 in the current biological opinion describes the methods used to determine the effects of the Pacific Coast groundfish fishery with respect to two standards found in the ESA: whether the fishery is likely to "jeopardize the continued existence of a listed species" or result in "destruction or adverse modification" of critical habitat. "To jeopardize…" is defined in regulations as "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Destruction or adverse modification of critical habitat was evaluated based on provisions in the

[6] The eastern DPS of Stellar sea lions (the population segment occurring in the action area) was removed from the list of threatened species under the ESA on November 4, 2013 (78 FR 66140). Therefore, Federal agencies will no longer need to consult with NMFS under Section 7 of the ESA regarding actions that may affect the eastern DPS of Stellar sea lions. Protections under the MMPA would continue, however.

ESA as interpreted by the agency.[7] These methods were applied to eulachon, green sturgeon (and critical habitat), humpback whales, Stellar sea lions, and leatherback sea turtles (and critical habitat), the species and critical habitat where preliminary findings suggested that the proposed action is likely to have an adverse effect.

Based on the analysis, NMFS PRD documented the effects of continued operation of the Pacific Coast groundfish fishery on species and habitat. These finding are summarized in the following sections.

Eulachon – Southern DPS (Threatened)

Eulachon are found in the north eastern Pacific Ocean from northern California to southwest Alaska and into the southeastern Bering Sea. The eulachon southern DPS is defined from the Mad River in northern California, north to the Skeena River in British Columbia. Eulachon are an anadromous fish. Adults migrate from the ocean to freshwater creeks and rivers where they spawn from late winter through early summer. The offspring hatch and migrate back to the ocean to forage until maturity. Once juvenile eulachon enter the ocean, they move from shallow nearshore areas to deeper areas over the continental shelf. There is little information available about eulachon movements in nearshore marine areas and the open ocean.

Because catches are not concentrated in a particular area or population components, the fishery is not expected to "have a measureable effect on the species' structure or diversity." The action affects species abundance and potentially population productivity. Productivity is a concern, because of the substantial decline in spawner abundance over the last 20 years. The cumulative effect, as characterized in the biological opinion, of climate change and modification of freshwater habitat contribute to this decline. Based on conservative assumptions about species abundance, the fishery is expected to "take 0.0052 percent of the estimated eulachon population and overall [account for] less than 0.1 percent of the total bycatch from U.S. fisheries." In conclusion "The level of take expected for the proposed action is therefore so small that we do not anticipate it would have any notably deleterious effect on the species, nor would it add materially to the ongoing effects already occurring in the action area."

NMFS recently considered whether the 2012 opinion should be reconsidered for eulachon in light of new information from the 2011 fishery and the proposed chafing gear modifications and determined that information about the eulachon bycatch in 2011 and chafing gear regulations does not change the extent of effects of the action, or any other basis to require reinitiation of the December 7, 2012 biological opinion. Therefore, the December 7, 2012 biological opinion meets the requirements of section 7(a)(2) of the ESA and implementing regulations at 50 CFR 402 and no further consultation was required.

Green Sturgeon – Southern DPS (Threatened)

The North American green sturgeon southern DPS is defined as coastal and Central Valley populations, south of the Eel River in California. Green sturgeon critical habitat is designated from 0 to 60 fm (74 FR 52300).

[7] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

The biological opinion's assessment focuses on the Southern DPS of green sturgeon. The Pacific Coast groundfish fishery is not likely to further restrict the geographic distribution of green sturgeon along the coast or extent of spawning habitat in freshwater rivers. Southern DPS green sturgeon are at moderate to high risk of extinction because of the low estimated abundance of adults, and historically fisheries have been the primary source of mortality. Based on available data, fisheries other than the federally-managed groundfish fishery are estimated to incidentally capture 1,219 to 1,512 Southern DPS green sturgeon (adults and subadults) per year. This represents 20 to 69 percent of the total subadult and adult population, depending on the estimate of abundance used (2,188-6,250 subadults and adults, combined). It is estimated that fisheries for which no data are available account for the annual removal of an additional 1 to 4 percent of the population. Based on population models, these fisheries (excluding the Federal groundfish fishery) may be affecting the continued survival and recovery of Southern DPS green sturgeon. Green sturgeon take in the Pacific Coast groundfish fishery, when considered within the context of these sources of mortality and other cumulative effects, results in a comparatively small increase in the mortality imposed on the subadult and adult population. The majority of the green sturgeon caught in the groundfish fishery are expected to be released alive. In most years mortality due to the groundfish fishery would be low (0.03 to 0.09 percent of the total subadult and adult population). In the worst case (not expected to occur more than 2 years within a period of 9 years), mortalities would account for 0.1 to 0.3 percent of the total subadult and adult population. In summary, the lack of substantial impacts on the Southern DPS green sturgeon based on the low expected sublethal and lethal impacts of the fishery supports the conclusion that the proposed fishing will not appreciably reduce the likelihood of survival and recovery of the species.

With respect to critical habitat for green sturgeon, prey resources within the action area may be affected by non-point source and point source discharges, oil spills, dredged material disposal activities, renewable ocean energy installations, low oxygen "dead zones," bottom-trawl fishing activities, and climate change. These activities and factors may also affect water quality and migratory corridors for green sturgeon. Although use of bottom-trawl gear may disturb benthic habitats and remove prey resources, existing gear restrictions provide a measure of protection for green sturgeon critical habitat. In addition, the expected effects of the proposed fishing on the prey resources are likely to be low given the opportunistic feeding behavior of green sturgeon and the likely dynamic nature of benthic prey. The low expected impacts to green sturgeon prey resources supports the conclusion that the Pacific Coast groundfish fishery is not likely to reduce the value of designated critical habitat for the conservation of Southern DPS green sturgeon.

Humpback Whale (Endangered)

Humpback whales are found in all oceans of the world. For management under the MMPA, stocks of humpback whales are defined based on feeding areas, with the whales feeding off California, Oregon, and Washington currently considered one stock. The most recent population estimate of humpback whales in the North Pacific Ocean is 21,808 (CV=0.04). The most recent estimated abundance of the CA/OR/WA feeding stock is 2,043 whales (CV=0.10), with a minimum population estimate of 1,878 whales. The maximum expected rate of annual increase for the species as a whole ranges from an estimated 7.3 to 8.6 percent, with a maximum plausible rate of 11.8 percent annually. North Pacific populations as a whole grew by an estimated 6.8

percent annually over the period from 1966 to 2006. The annual growth rate for the CA/OR/WA feeding stock is estimated at 7.5 percent. The Pacific Coast groundfish fishery affects the CA/OR/WA feeding stock, within the context of effects to the globally-listed species. Occurrence of the CA/OR/WA feeding stock overlaps the most with the spatial extent of the groundfish FG fishery. There is uncertainty about the number of past entanglements attributed to FG fishing, but based on precautionary assumptions NMFS PRD estimated that an average of 0.89 humpback whales may be injured or killed by the Pacific Coast groundfish fishery, annually.

The MMPA identifies the concept of potential biological removal (PBR) in assessing the effects of mortality on marine mammal stocks (see further discussion below). Based on the portion of the stock occurring in the west coast EEZ at any given time, PBR within the action area is estimated at 11.3 whales. On average, NMFS PRD estimated that 7.19 human-caused serious injuries or mortalities of CA/OR/WA humpback whales are likely to occur annually. This annual average is below the current PBR. Based on past annual variability, the average estimate likely will be exceeded in some years, up to a maximum of 16.25 injuries or mortalities in a single year. However, on average human-caused humpback injuries and mortalities will be below PBR allowing the stock to grow toward its optimum sustainable population level.

NMFS PRD also evaluated effects with respect to the potential change in the rate of population increase. It concluded that the population growth rate will decrease by approximately 0.04 percent due to groundfish fishing and by approximately 0.37 percent from all human sources, including groundfish fishing. Based on food-web modeling, trophic effects of the Pacific Coast groundfish fishery will likely be minor and in fact may positively affect the abundance of krill (prey of humpback whales) through removal of predators.

Because of uncertainty in the estimates of fishery-caused serious injury/mortality two other methods for estimating the maximum mortality rate potentially imposed by all west coast fisheries were examined (NWFSC 2012). These methods result in estimates of 61 and 88 whales killed annually. The biological opinion discusses reasons to conclude these estimates are implausibly high.

NMFS PRD concluded that impacts of the Pacific Coast groundfish fishery, when combined with other human sources of serious injury/mortality, are not likely to substantially reduce the population abundance or the growth trend of the stock. The lack of substantial impacts on the CA/OR/WA humpback whale stock combined with the increasing population trend for this listed entity supports the conclusion that the proposed fishing will not reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution.

The incidental take statement (ITS) for humpback whales in the current biological opinion was conditional on the issuance of a permit to authorize the incidental, but not intentional, taking of individuals pursuant to MMPA section 101(a)(5)(E). This permit was issued on September 4, 2013 (78 FR 54553) based on a Negligible Impact Determination (NID) as required by the MMPA. Therefore, the ITS for CA/OR/WA humpback whale stock is now valid.

Pursuant to the MMPA the WA/OR/CA sablefish pot fishery is listed as a Category II fishery, because of interaction with humpback whales. (See Section 0 for an explanation of these MMPA fishery categorizations.)

Steller Sea Lions (Delisted)

The eastern DPS of Steller sea lions is a single population that ranges from southeast Alaska to southern California, including inland waters of Washington State and British Columbia. The total population estimate is a range between 58,334 and 72,223 sea lions, with a minimum population estimate of 52,847 sea lions. The population has increased at a rate of approximately 3.1 percent in recent decades. Methods, as described above for humpback whales, were used to assess the effects of the Pacific Coast groundfish fishery on the eastern DPS of Steller sea lions.

NMFS PRD estimated that on average 13.88 Steller sea lions would be seriously injured or killed incidental to groundfish fishing, annually. When added together, NMFS PRD estimated a total of 60.55 sea lions seriously injured or killed annually from fisheries bycatch, including fishing in the Pacific Coast groundfish fishery. When combined with the estimate from Allen and Angliss (Allen and Angliss 2012) for other sources of injury or mortality of 15.2, the total is 75.75 sea lions per year. The PBR for this DPS is 2,378 sea lions. The estimated number of all human-caused serious injuries and mortalities anticipated to occur in future years from all sources, including the proposed fishing, is approximately 3.19 percent of the PBR. Based on food-web modeling, NMFS PRD also concluded that trophic effects of the Pacific Coast groundfish fishery will be minor. The serious injury/mortality estimate results in a decrease in the population growth rate of about 0.03 percent due to groundfish fishing and by approximately 0.14 percent from all human sources including the groundfish fishery.

Based on the evaluation, NMFS PRD concluded that impacts of groundfish fishing, in addition to other human sources, are not likely to substantially reduce the population abundance or trend. The lack of substantial impacts on the eastern DPS combined with the increasing population trend for this listed entity supports the conclusion that the groundfish fishery will not reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution.

Subsequent to conclusion of this consultation NMFS removed the eastern DPS of Stellar sea lions from the list of threatened and endangered species under the authority of the ESA. This delisting became effective December 4, 2013 (78 FR 66140). Section 0 discusses past and present impacts of the groundfish fishery on non-ESA listed marine mammals. However, since the 2012 NMFS biological opinion contains information relevant to evaluating impacts, the eastern DPS of Stellar sea lions is discussed here.

Leatherback Sea Turtles (Endangered)

Leatherback sea turtles face a variety of threats depending on the region in which they occur; they are widely distributed across the oceans of the world. Identified threats in the marine environment include direct harvest, debris entanglement and ingestion, fisheries bycatch, and boat collisions, among other threats. In the Pacific Ocean, nesting aggregations occur in the eastern Pacific (primarily in Mexico and Costa Rica) and in the western Pacific (primarily Indonesia, the Solomon Islands, and Papua New Guinea). Leatherbacks that occur within the

ESA action area are most likely to originate from nesting aggregations of the western Pacific. The abundance of leatherback sea turtles is currently unknown; however, the most recent global estimate for nesting females is 34,500 turtles. The trend for the western Pacific subpopulation has been declining over the past four decades; however, estimates of breeding females slightly increased from 2000 to 2007 (2,700 to 4,500 turtles in 2007 compared to 1,775 to 1,900 turtles in 2000), although this is likely due to additional nesting sites that were not previously factored into the estimate (Dutton, *et al.* 2007). Given recent monitoring over the last few years, however, the trend continues to decline (C. Fahy, pers. comm., NOAA Fisheries SWR, July 18, 2012, as cited in NMFS 2012a). NMFS PRD concluded that 0.38 turtles would be killed annually due to groundfish fishing and a total of 5.82 turtles killed due to all activities occurring in the ESA action area. Given that the anticipated mortality attributed to the proposed fishing is less than one turtle per year on average and no more than one turtle in a single year, the groundfish fishery is likely to result in a very small increase to the level of mortality already authorized for the species both inside and outside of the action area.

In addition to the direct and indirect effects to the species, the proposed fishing is likely to result in some bycatch of jellyfish, which will reduce prey availability in critical habitat. However, based on the general predicted pattern of food-web modeling, it is unlikely that the conservation value of critical habitat will be substantially impacted by food-web interactions caused by the groundfish fishery.

NMFS PRD concluded that groundfish fishing contributes a very small additional impact to those of other human sources. It also concluded that the conservation value of critical habitat will not be substantially impacted. In conclusion, effects of the groundfish fishery, when combined with effects of other human sources in the action area, are not anticipated to result in an appreciable change to the population abundance or trend. A lack of an appreciable change in population abundance or trend supports the conclusion that the Pacific Coast groundfish fishery will not appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution. Likewise, a lack of substantial impact on the conservation value of critical habitat supports the conclusion that the proposed fishing will not adversely modify critical habitat.

Incidental Take Statement

The current biological opinion contains an incidental take statement, or ITS. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. The ITS is a formal statement of the estimated take of a listed species within a defined time period and is connected to provisions in the ESA that allow takes incidental to an otherwise lawful agency action, if the action is performed in compliance with the terms and conditions of this incidental take statement. Based on analysis in the biological opinion, take at or below this level has been determined not to cause "jeopardy." Actual takes that exceed the level identified in the ITS are a basis for reinitiating the section 7 consultation, which entails a new analysis of "jeopardy" or adverse habitat modification and new terms and conditions for the continuation of the proposed action. The ITS in the current biological opinion is summarized below.

- Incidental take of **southern DPS eulachon** occurs as a result of bycatch and handling in the fisheries, or mortalities resulting from encounter with fishing gear, as a consequence of

fishing activity. Take of eulachon in the proposed action is expected to not exceed 1,004 fish per year. This take is expected to occur in the limited groundfish bottom trawl (shorebased IFQ) and at-sea hake (Pacific whiting) fisheries.

- Under the proposed action, incidental take of **Southern DPS green sturgeon** because of bycatch and handling in the fishery is not expected to exceed 28 fish per year; however, incidental take could be higher in some years. Therefore, this take statement allows for incidental take of up to 86 Southern DPS green sturgeon per year in no more than 2 years within a period of 9 consecutive years.
- Incidental take of **humpback whales** occurs as a result of entanglement with fishing gear, as a consequence of fishing activity. This take is expected to occur in the sablefish pot/trap fishery. The incidental take limit for humpback whales is a 5-year average of 1 humpback whale injury or mortality per year, and up to 3 humpback whale injuries or mortalities in any single year.
- Incidental take of **Steller sea lions** occurs as a result of entanglement with fishing gear as a consequence of fishing activity. This take is expected to occur in limited entry trawl (shorebased IFQ) and at-sea hake (Pacific whiting) fisheries. The incidental take limit for Steller sea lions is a 5-year average of 14 Steller sea lion injuries or mortalities per year, and up to 45 Steller sea lion injuries or mortalities in a single year.
- Incidental take of **leatherback sea turtles** occurs as a result of entanglement with fishing gear as a consequence of fishing activity. This take is expected to occur in the sablefish pot/trap fishery. The incidental take limit for leatherback sea turtles is a 5-year average of 0.38 leatherback sea turtle injury or mortality per year, and up to 1 leatherback sea turtle injury or mortality in a single year.

Reasonable and Prudent Measures, Terms and Conditions

Terms and conditions implement reasonable and prudent measures (50 CFR 402.14), both of which are described in the current ITS. These must be carried out for the exemption to the general ESA prohibition of take resulting from the consultation to apply. The current ITS enumerates reasonable and prudent measures and associated terms and conditions that are summarized below:

- NMFS establishes a Pacific Coast Groundfish and Endangered Species Workgroup (PCGW) in cooperation with the USFWS and the Council. The PCGW will meet at least biennially to develop recommendations on methods for monitoring take and additional mitigation measures as needed. The PCGW has been organized as a Council committee and held its first meeting in November 2013.
- NMFS will analyze available data to detect changes in fishing effort by gear type as a consequence of implementation of the Shorebased catch share program and biennially report results. The PCGW will provide recommendations on the design of the analysis.
- The WCGOP will provide summaries of observed takes of the species considered in the biological opinion, and NMFS will report fleet-wide estimates of total take biennially. WCGOP will immediately report takes of leatherback sea turtles as well as any opportunistically observed whale or sea turtle entanglements.
- As appropriate, the NWFSC will update the risk assessment (NWFSC 2012).

Marine Mammals not Listed under the Endangered Species Act

The MMPA requires all commercial fisheries to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in the fishery:

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

Annually, NMFS Office of Protected Resources publishes an updated List of Fisheries with these categorizations. NMFS published the final 2014 List of Fisheries on March 14, 2014 (79 FR 14418). The WA/OR/CA sablefish pot is a Category II fishery; all other groundfish fisheries are Category III.

As discussed above, potential biological removal, PBR, is used to assess the effects of human-caused incidental mortality under the MMPA. PBR represents the maximum level of human-caused mortality a stock can sustain and still have a high likelihood of achieving its optimum sustainable population level. PBR is calculated as N_{min}* 0.5 R_{max} * F, where N_{min} is the minimum current population size, R_{max} is the maximum annual rate of increase for the species or stock, and F is a recovery factor that ranges from 0.1 to 1 depending on the conservation status of the stock (Barlow, *et al.* 1995). PBR is reported in stock assessment reports and the most recent estimates of PBR can be found in Carretta et al. (2013).[8]

Table 3-11 shows non-ESA listed marine mammal stocks with observed interactions in groundfish fisheries. Stock definitions, PBR estimates, and estimates of human-caused and fishery-caused serious injury / mortality are taken from Caretta, et al. (2013). (The fishery component is a subset of all human-caused serious injury / mortality.) Stock assessment reports include a breakdown of serious injury / mortality by fishery based on observer information. As noted in the table footnote, where no estimate for groundfish fisheries is reported, but there is an estimate based on stranded animals, that is reported under the groundfish fishery column. Note that in most cases the stock assessment report data are presented as minimum estimates. The table also includes observed interactions and estimates of annual average interactions using WCGOP and A-SHOP (At-Sea Hake Observer Program) data reported in Jannot, et al. (2011).[9] Overall take could only be estimated from observed interactions for three species; California sea lion, harbor seal, and northern elephant seal. This information is used to assess past effects of groundfish fisheries.

Table **3-12** is similar in format but reports remaining non-ESA listed species occurring in the fishery management area but with no observed interactions in the Pacific Coast groundfish fishery. Since there are no observer interactions, the groundfish fishery column shows estimates

[8] Marine mammal stock assessment reports are available at http://www.nmfs.noaa.gov/pRBSars/region.htm.
[9] Jannot et al. (2011) report estimated takes by year. These values are averaged in Table 3-11 to derive the annual estimate.

based on strandings, if reported. These observations could not be attributed to any particular fishery.

Estimates of total human-caused serious injury/mortality are below the PBR for all these stocks. Minimum estimates of fishery-caused serious injury/mortality is less than 1 percent of the PBR for most of the stocks. The California sea lion stock, the Monterey harbor porpoise stock, the Washington inland waters harbor porpoise stock, Pacific white-sided dolphin stock, and both common dolphin stocks have fractions between 1 percent and 10 percent of PBR. The average annual mortality estimate for California sea lion derived from Jannot, *et al.* (2011) is greater than the estimate from all fisheries from the stock assessment report but is still a small fraction of the large PBR for this stock. These data suggest that mortality of non-ESA listed marine mammal stocks occurring in the fishery management area caused by the operation of the Pacific Coast groundfish fishery will not prevent these stocks from reaching their optimum sustainable population level.

Observed takes reported in Jannot *et al.* (2011) break down by fishery sector/gear type as follows:

- California sea lion: Shoreside groundfish trawl, California halibut trawl, non-nearshore FG sablefish, nearshore FG, at-sea Pacific whiting fishery sectors
- Harbor seal: California halibut trawl, non-nearshore FG sablefish, nearshore FG, at-sea Pacific whiting fishery sectors
- Northern elephant seal: Shoreside groundfish trawl, California halibut trawl, non-nearshore FG sablefish, at-sea Pacific whiting fishery sectors
- Harbor porpoise: California halibut trawl
- Dall's porpoise: at-sea Pacific whiting fishery sectors
- Pacific white-sided dolphin: Shoreside groundfish trawl
- Risso's dolphin: Shoreside groundfish trawl
- Common bottlenose dolphin: Non-nearshore FG

Animals may interact with the gear or the vessel in a variety of ways. Interactions and takes are a function of gear type and co-occurrence of fisheries and species. Anderson, et al. (Andersen, *et al.* 2008) present criteria for classifying marine mammal fishery interactions with respect to serious injury. These criteria are with respect to hook-and-line gear (or entanglement in lines associated with gear without hooks, such as pot/trap gear). Marine mammals may be hooked externally, in the mouth region, or ingest the hook. They can also become entangled in the gear. In trawl fisheries the animal is more likely to be caught by the gear and become injured or drown. Large cetaceans are less likely to incur serious injury from hooks but gear entanglement can lead to serious injury in a variety of ways.

Large cetaceans have not been observed directly interacting with the gear in groundfish trawl fisheries. However, a 1997 paper (Fertl and Leatherwood 1997), reviewed global data and found that interactions do occur. These interactions are result of overlap between areas of high prey density for cetaceans and productive fishing areas. Furthermore, cetaceans may be attracted to trawls if fishing operations enhance prey opportunity or because of discards. Most of the interactions documented in this paper are between fishing vessels and various species of

dolphins, like those listed above. Minke, humpback, and fin whales are the large cetacean species documented in this paper. Cetaceans are more often caught in midwater gear compared to bottom trawl, because this gear type more often targets pelagic species of interest to cetaceans, are towed at high speeds, and are large.

Saez, et al. (2013) report results of a fishery-large cetacean co-occurrence model for the west coast EEZ. The large cetaceans evaluated are blue whales, fin whales, gray whales, humpback whales, and sperm whales. Gray whales are not listed under the ESA. The gray whale migration is generally very near to shore, crossing through a variety of anthropogenic threats, including fixed-gear fisheries. Sablefish longline and trap occur farther offshore than migrating gray whales and subsequently pose generally lower entanglement risk. However they are considered high risk fisheries considering all whale species, especially in central and northern California.

Table 3-11. Non-ESA listed marine mammal stocks occurring in the fishery management area with observed interactions by the West Coast Groundfish Observer Program and At-sea Pacific Whiting Observer Program, 2002-2009. Source:

Species	Stock Area	PBR	Annual Mortality + Serious Injury	Fishery Annual Mortality + Serious Injury	2012 SAR Estimate of Groundfish Fishery Mortality + Serious Injury	WCGOP Total Observed 200-09	WCGOP Average Annual Fishery Estimate, 2002-09	WCGOP Average Annual Fishery Estimate, 2002-09 - Upper CI
California sea lion	U.S.	9,200	≥431	≥337	34.6	98	43.125	102.125
Harbor seal	California	1,600	31	18				
Harbor seal	Oregon/Washington Coast	unk	≥3.8	≥1.8	6.4	10	4.57*	12*
Harbor seal	Washington Inland Waters	unk	≥13.0	>3.8				
Northern Elephant Seal	California breeding	4,382	≥10.4	≥8.8	0.8	16	2.29*	3.86*
Harbor porpoise	Morro Bay	15	0	0	0			
Harbor porpoise	Monterey Bay	10	≥1.0	≥1.0	≥1.0†			
Harbor porpoise	San Francisco – Russian River	67	0	0	0	1		
Harbor porpoise	Northern CA/Southern OR	577	≥4	≥4	≥0.8†			
Harbor porpoise	Northern Oregon/Washington Coast	114	≥1.4	≥1.4	≥1.4†			
Harbor porpoise	Washington Inland Waters	63	≥2.2	≥2.6	0			
Pacific white-sided dolphin	California/Oregon/Washington	193	15.1	10.5	2.1	1		
Dall's porpoise	California/Oregon/Washington	257	≥0.4	≥0.4	0.2	1		
Risso's dolphin	California/Oregon/Washington	39	1.6	1.6	≥0.2†	1		
Common Bottlenose dolphin	California Coastal	2.4	0.2	0.2	≥0.2†	1		
Common Bottlenose dolphin	California/Oregon/Washington Offshore	5.5	≥0.4	≥0.4	≥0.2†			

*7 years of data only.
†Estimate from strandings assigned to unidentified/unknown fisheries.

Table 3-12. Non-ESA listed marine mammals occurring in the fishery management area with no observed interactions in groundfish fisheries. Source:

Species	Stock Area	PBR	Annual Mortality + Serious Injury	Fishery Annual Mortality + Serious Injury	2012 SAR Estimate of Groundfish Fishery Mortality + Serious Injury
Common dolphin, short-beaked	California/Oregon/Washington	3,440	64	64	≥0.0†
Common dolphin, long-beaked	California	610	13.8	13	≥2.6†
Northern right whale dolphin	California/Oregon/Washington	48	4.8	3.6	0.0
Gray whale	Eastern North Pacific	558	128	3	--

†Estimate from strandings assigned to unidentified/unknown fisheries.

3.2.3.4 Salmonids (including ESA-listed stocks)

Salmon are anadromous, spending part of their life in fresh water streams and rivers from Central California to Alaska and part of their life in marine waters. During their marine phase they occur along the U.S. and Canada seaward into the north central Pacific Ocean, including Canadian territorial waters and the high seas. Critical portions of these ranges include the freshwater spawning grounds and migration routes.

Salmon caught in the groundfish fisheries include stocks that are listed under the ESA. There are 31 West Coast salmon and Steelhead Evolutionarily Significant Units (ESUs) or distinct population segments (DPSs) in the action area. The concept of ESUs and DPSs are used by NMFS in applying the ESA to salmon and steelhead. Of the ESA-listed species, Chinook are most likely to be encountered as bycatch. The Chinook ESUs that NMFS has concluded to be affected by the groundfish fisheries are: Snake River fall Chinook, Upper Willamette River Chinook, Lower Columbia River Chinook, Puget Sound Chinook, Sacramento River winter-run Chinook, California coastal Chinook, and Central Valley spring-run Chinook (NMFS 2006) .

Incidental take of salmonids in the shoreside whiting fishery and midwater non-whiting trawl fisheries are primarily Chinook salmon. Other salmonid species catch is relatively low. The incidental take of salmonids include species listed as endangered, threatened, or as a species of concern under the ESA. Section 7 biological opinions have been prepared for the whole groundfish fishery. The incidental take statement in a 1999 biological opinion identified an expected level of take of 11,000 Chinook salmon per year for the all sectors of the Pacific whiting fishery (mothership, catcher/processor, shoreside, and tribal) and 9,000 Chinook salmon for the bottom trawl fishery. The Section 7 ESA consultation was reinitiated in 2006, because take exceeded these estimates in 2005 for the whiting fishery and two out of three years between 2002 and 2004 for the bottom trawl fishery. NMFS issued a supplemental biological opinion on March 11, 2006 concluding that neither the higher observed bycatch of Chinook in the 2005 whiting fishery nor new data regarding salmon bycatch in the groundfish bottom trawl fishery required a reconsideration of its prior ‘‘no jeopardy’’ conclusion. The supplemental biological opinion also reaffirmed NMFS’s prior determination that implementation of the Groundfish FMP is not likely to jeopardize the continued existence of any of the affected ESUs.[10] Lower Columbia River coho (70 FR 37160, June 28, 2005) and Oregon Coastal coho (73 FR 7816, February 11, 2008) were relisted as threatened under the ESA. NMFS subsequently considered whether the consultation should be reinitiated to evaluate changes in the groundfish fishery following implementation of the Shorebased catch share program and new information available from the WCGOP. Salmon are caught incidentally in both the at-sea and shoreside sectors of the whiting fishery. This bycatch is closely monitored through an at-sea observer program in the MS fishery and during dockside sorting of shore deliveries. A salmon bycatch reduction plan was implemented in this fishery. NMFS issued a Supplemental Biological Opinion on March 11, 2006 concluding that neither

[10] “An ESU, or evolutionarily significant unit, is a Pacific salmon population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species. The ESU policy (56 FR 58612) for Pacific salmon defines the criteria for identifying a Pacific salmon population as a distinct population segment (DPS), which can be listed under the ESA.” Source: http://www.nmfs.noaa.gov/pr/glossary.htm#esu

the higher observed bycatch of Chinook in the 2005 whiting fishery nor new data regarding salmon bycatch in the groundfish bottom trawl fishery required a reconsideration of its prior "no jeopardy" conclusion. NMFS also reaffirmed its prior determination that implementation of the Groundfish FMP is not likely to jeopardize the continued existence of any of the affected ESUs. The 1999 biological opinion concluded that the bycatch of salmonids in the Pacific whiting fishery were almost entirely Chinook salmon, with little or no bycatch of coho, chum, sockeye, and steelhead.

Salmonids Covered by the 2006 Biological Opinion

Salmon caught in the groundfish fisheries are anadromous, spending part of their life in fresh water streams and rivers from Central California to Alaska and part of their life in marine waters. During their marine phase they occur along the U.S. and Canada seaward into the north central Pacific Ocean, including Canadian territorial waters and the high seas. There are 31 West Coast salmon and Steelhead Evolutionarily Significant Units (ESUs) or distinct population segments (DPSs) in the action area. The concept of ESUs and DPSs are used by NMFS for applying the ESA to salmon and steelhead. Of the ESA-listed species, Chinook are most likely to be encountered in the fishery. The Chinook ESUs that NMFS has concluded to be affected by the groundfish fisheries are: Snake River fall Chinook, Upper Willamette River Chinook, Lower Columbia River Chinook, Puget Sound Chinook, Sacramento River winter-run Chinook, California coastal Chinook, and Central Valley spring-run Chinook (NMFS 2006))

Table 3-13. Endangered Species Act Status of West Coast salmon and steelhead (highlighted ESUs are those subject to the 2006 consultation).

Species/	ESU	Status
Salmon		
Sockeye	Snake rive	Endangered
	Ozette Lake	Threatened
Chinook	**Sacramento River Winter-run**	Endangered
	Upper Columbia River Spring-run	Endangered
	Snake River Spring/Summer -run	Threatened
	Snake River Fall-run	Threatened
	Puget Sound	Threatened
	Lower Columbia River	Threatened
	Upper Willamette River	Threatened
	Central Valley Spring-run	Threatened
	California Coastal	Threatened
	Central Valley Fall and Late Fall-run	Species of Concern
Coho	Central California Coast	Endangered
	Southern Oregon/Northern California	Threatened
	Lower Columbia River	Threatened
	Oregon Coast	Threatened
	Puget Sound/Strait of Georgia	Species of Concern
Chum	Hood Canal Summer-run	Threatened
	Columbia River	Threatened
Steelhead	Southern California	Endangered
	Upper Columbia River	Threatened
	Central California Coast	Threatened
	South Central California Coast	Threatened

Species/	ESU	Status
	Snake River Basin	Threatened
	Lower Columbia River	Threatened
	California Central Valley	Threatened
	Upper Willamette River	Threatened
	Middle Columbia River	Threatened
	Northern California	Threatened
	Puget Sound	Threatened
	Oregon Coast	Species of Concern

NMFS first consulted under the ESA on the effects of the fishery on listed salmonids in 1990 and reinitiated consultation several times thereafter. The incidental take statement in a 1999 biological opinion identified an expected level of take of 11,000 Chinook salmon per year for the Pacific whiting fishery and 9,000 Chinook salmon for the bottom trawl fishery. Bycatch of other salmonid species is modest so no specified threshold was established for any other salmonid. Consultation under Section 7 of the ESA was reinitiated in 2006, because take exceeded these estimates in 2005 for the whiting fishery and two out of three years between 2002 and 2004 for the bottom trawl fishery. This resulted in the 2006 supplemental biological opinion evaluating whether additional mitigation measures were needed to prevent the activity from jeopardizing the continued existence of the species (NMFS 2006).

Chinook salmon accounted for 91 percent of all salmonids caught in groundfish fisheries, 2002-2010, and the Pacific whiting fishery sectors caught two-thirds of the total. On an annual basis, there is temporal and spatial variation in the catch of salmon that is associated with the behavior and biology of incidental catch of salmon in the Pacific whiting fishery is shown in

Table 3-14. Most interactions are with Chinook salmon, although other salmon species are also encountered. Bycatch rates tend to be higher closer to shore and earlier in the season. Higher bycatch rate have been observed in the tribal sector, since these vessels fish within the tribal usual and accustomed areas (U/As), and have less flexibility to make spatial adjustments in response to salmon bycatch. The shorebased sector, for cost and operational reasons, also tends to fish closer to shore. However, no such factors adequately account for inter-annual variation in bycatch. Previous work found no "obvious or consistent correlation" between annual Chinook abundance and bycatch (NMFS 2006b). Ocean conditions may play a role, but specific causative factors, at least any that can be used predicatively, cannot be identified.

As noted in the 2006 biological opinion, the Pacific whiting fishery sectors are fully observed, either through onboard observers in the at-sea sectors or dockside monitoring in shoreside sectors, where full retention of catch is required. NMFS and the Council have implemented management measures that restrict fishing in areas or at times where there is high Chinook bycatch. These measures are the result of previous ESA consultations, or were recommended by the Council to reduce overall catch of salmon.

During the 1991 to 2014 period, Chinook bycatch averaged 6,901 fish per year. The ESA consultation on the groundfish fisheries limits the bycatch rate in the whiting sectors to 0.05 Chinook per mt of Pacific whiting, with an associated total annual catch of 11,000 Chinook. The Pacific whiting fishery catch has exceeded 11,000 Chinook in four years (1995, 2000, 2005, and 2014) in the 1991 to 2014 period.

The annual Chinook bycatch rate for the Pacific whiting sectors for 2002 to 2014 are shown in Table 12. Although one or more sectors of the Pacific whiting fishery exceeded the bycatch rate of 0.05 Chinook per mt of Pacific whiting in nine of the thirteen years between 2002 and 2014, the fishery as a whole exceeded 0.05 Chinook per mt of Pacific whiting only in 2014.In most years, the fishery has stayed below both the bycatch rate of 0.05 Chinook per mt of Pacific whiting and the catch of 11,000 fish (

Table 3-14).

Table 3-14. Chinook bycatch rates by Pacific whiting sector, 2002-2014 (rates in excess of 0.05 Chinook/mt whiting shown in bold)(A-SHOP/PacFin).

		Year												
		2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014 a/**
Chinook	Mothership	707	2,078	417	2,207	1,095	585	226	296	457	1,296	2,300	1,979	2,906
	Catcher Processor	970	570	388	1,756	114	736	496	23	257	2,694	1,932	1,758	3,779
	Tribal	1,018	3,439	3,740	3,985	1,940	2,404	697	2,147	678	906	17	1,025	154
	Shorebased a/ b/	1,062	425	4,206	4,018	839	2,462	1,962	378	2,997	3,727	2,333	1,313	7,554
	Whiting Sector Total	3,759	6,512	8,751	11,966	3,988	6,187	3,381	2,844	4,389	8,624	6,586	6,078	14,395
Whiting	Mothership	26,593	26,021	24,102	48,571	55,355	47,809	57,432	24,090	35,714	50,051	38,480	52,472	62,098
	Catcher Processor	36,341	41,214	73,175	78,890	78,864	73,263	108,121	34,800	54,292	71,679	55,263	77,950	103,203
	Tribal	21,793	23,454	28,648	34,357	35,441	30,177	31,907	22,381	18,255	18,234	658	4,906	617
	Shorebased a/ b/	45,276	51,061	89,670	97,381	97,297	73,280	50,423	40,293	62,653	90,354	65,280	96,857	97,965
	Whiting Sector Total	130,003	141,750	215,595	259,199	266,957	224,529	247,883	121,564	170,914	230,318	159,681	232,185	263,883
Chinook/mt Whiting	Mothership	0.027	**0.079**	0.017	0.045	0.020	0.012	0.004	0.012	0.013	0.026	**0.060**	0.038	0.047
	Catcher Processor	0.026	0.014	0.005	0.022	0.001	0.010	0.005	0.001	0.005	0.038	0.035	0.023	0.037
	Tribal	0.047	**0.147**	**0.131**	**0.116**	**0.055**	**0.080**	0.022	**0.096**	0.037	**0.050**	0.026	**0.209**	**0.250**
	Shorebased	0.023	0.008	0.047	0.041	0.009	0.034	0.039	0.009	0.048	0.041	0.036	0.014	**0.077**
	Whiting Sector Total	0.029	0.046	0.041	0.046	0.015	0.028	0.014	0.023	0.026	0.037	0.041	0.026	**0.055**

a/ 2014 estimates are based on preliminary data
b/ includes all midwater trawl north of 40°10 N. lat

Reinitiation of the Salmon Biological Opinion

On January 22, 2013, NMFS requested the reinitiation of the biological opinion for listed salmonids to address changes in the fishery occurring since implementation of the trawl rationalization program and the emerging midwater trawl fishery.

In October of 2014, the Pacific Whiting Fishery exceeded the threshold of 11,000 chinook salmon triggering a reinitiation of the Section 7 consultation. NMFS will being the process to evaluate the fishery's impact on salmon stocks for the West Coast.

3.2.3.5 Seabirds

Species Covered by the 2012 USFWS Biological Opinion

In 2011 a short-tailed albatross was observed killed in operations of a sablefish longline vessel. On July 30, 2012, at the request of NMFS, USFWS initiated a formal section 7 consultation on the effects of continued operation of the Pacific Coast groundfish fishery on the ESA-listed species enumerated above at the beginning of section. In the consultation USFWS concurred with NMFS's conclusion (NMFS 2012b) that operation of the Pacific Coast groundfish fishery is not likely to adversely affect marbled murrelet, California least tern, southern sea otter, bull trout or bull trout critical habitat. Therefore, the Section 7 consultation and biological opinion focused on the effects of the fishery on short-tailed albatross. Prior to the conclusion of the consultation the Council was notified that USFWS would include in the terms and conditions that NMFS establish regulations requiring the use of streamer lines on commercial groundfish longline vessels 55 feet in length or greater. The current biological opinion (USFWS 2012) was published on November 21, 2012. In November 2013, the Council took final action to recommend a regulatory package to implement the streamer line requirement (USFWS 2012).

In the 19th and early 20th centuries the short-tailed albatross population was decimated by hunting for feathers, oil, and fertilizer. By 1949 no breeding pairs were observed and the species was thought to be extinct. Subsequently, breeding colonies were found on two small volcanic islands in the western Pacific.[11] The population has been recovering since the 1950s. A third breeding colony is being established on another volcanic island through translocation of chicks. A breeding pair successfully hatched and reared a chick on Midway Island in 2011 and 2012, suggesting that a breeding colony may eventually establish there as well. With recovery, short-tailed albatross's foraging range has been reestablished and in recent years they have reappeared with more regularity in the west coast EEZ. Short-tailed albatross prefer foraging area over the continental shelf where food resources are more abundant. Population growth and habitat preference has increased its vulnerability to the Pacific Coast fisheries and other anthropogenic effects in the action area.

The USFWS's recovery plan for short-tailed albatross (USFWS 2012) lists the following criteria for delisting the species:

- The total breeding population of short-tailed albatross reaches a minimum of 1,000 pairs; (population totaling 4,000 or more birds); AND
- The 3-year running average growth rate of the population as a whole is ≥6% for ≥7 years; AND
- At least 250 breeding pairs exist on two island groups other than Torishima [one of the two original breeding colony sites], each exhibiting ≥6% growth for ≥7 years; AND
- A minimum of 75 pairs occur on a site or sites other than Torishima and the Senkaku [the two original breeding colony sites]

[11] Both breeding sites, Torishima Island and the Senkaku Islands, are under the jurisdiction of Japan, although China and Taiwan dispute the claim to the Senkaku Islands. Eighty to eighty-five percent of the breeding population is estimated to breed on Torishima Island.

As of the 2011-12 breeding season, the population is estimated at 3,441 birds and 851 breeding pairs. The population growth rate is estimated at about 6.5 percent. Injury and mortality occurs primarily in longline fisheries. Birds dive on baited hooks as they are deployed during fishing operations. They may become hooked, pulled underwater, and drown or otherwise be injured or killed when interacting with the gear in this fashion.

In the biological opinion, USFWS describes the risk assessment methodology used in the NMFS biological assessment to estimate annual mortality of short-tailed albatross due to the operation of the Pacific Coast groundfish fishery. In the risk assessment, the occurrence of black-footed albatross, a closely related species, was used as a surrogate to evaluate injury and mortality, because short-tailed albatross interactions are too rare to derive meaningful statistics. Essentially, the risk assessment scales WCGOP estimates of black-footed albatross mortality in the fishery based on the relative size of the two species' populations. Adjustment factors are included in the equation to account for unobserved mortality ("dropoff") and differences in the distribution of the two species relative to the action area considered in the biological opinion.[12] The resulting groundfish FG (longline) mortality estimate is 0.8 birds per year. The risk assessment includes a sensitivity analysis based on uncertainty in the WCGOP mortality estimates and alternative dropoff rates. This produced a range of annual mortality rates between 0.3 (0 percent dropoff rate, lower 90 percent confidence interval on WCGOP estimate) and 1.9 (45 percent dropoff rate, upper confidence interval on WCGOP estimate). Although unquantified in the sensitivity analysis, it is noted that these estimates could be biased by uncertainty about actual exposure of short-tailed albatross to the groundfish fishery (i.e., occurrence in the action area considered in the biological opinion) and unknown differences in black-footed and short-tailed albatross behavior that could affect vulnerability to the gear. The biological opinion concludes that the estimated mortality of ~1 short-tailed albatross per year will not appreciably affect the population growth rate.

The incidental take allowed is one short-tailed albatross per year due to continued operation of the Pacific Coast groundfish fishery (including both FG and trawl). The take limit will be calculated based on an average of no more than two birds in any two-year period to accommodate inter-annual variation. The extent of future take will be assessed using documented takes of short-tailed albatross and estimates of interactions with the surrogate species (black-footed albatross) based on observer reports.

Terms and conditions in the ITS include NMFS implementing regulations to require the use of streamer lines on commercial longline vessels in the Pacific Coast groundfish fishery and establishing the Pacific Coast Groundfish and Endangered Species Workgroup also mandated by the NMFS biological opinion described above. As noted above, the development of a regulatory package occurred in the Council process. At its November 2013 meeting the Council adopted a preferred alternative from a range evaluated in a draft EA (USFWS). The preferred alternative requires streamer lines be deployed during setting operations on commercial FG vessels 55 feet

[12] A complete description of the methodology can be found on pages 24-28 of the biological opinion (USFWS).

or greater in length with a safety exception in the event of rough weather, which would be triggered by a National Weather Service forecast of a gale wind warning.[13]

The California current system supports a diverse array of seabird species. Species found on the Pacific Coast include resident species and transitory species (migrating or foraging). All the California Current system seabirds are highly mobile and require an abundant food source to support their high metabolic rates. A total of 10 species or species groups of seabird interactions with the groundfish fishery were documented during 2002-2009 (Table 3.2.5). The at-sea whiting fishery interactions were with blackfooted albatross (0-3 per year), common murre (0-3 per year), northern fulmar (0 to about 50 per year), sooty shearwater (0-8 per year), unspecified tubenose species (0-6 per year) and unspecified alcid species (0-3 per year).

A 2012 biological opinion (FWS Reference Number 01EOFW00-2012-F-0086) concluded that continued operations of the Pacific Coast Groundfish Fisheries, as described in a Biological Assessment (BA) prepared by NMFS, would not jeopardize the continued existence of short-tailed albatross. The U.S. Fish and Wildlife Service also concurred with the BA statements that the proposed action is not likely to adversely affect marbled murrelet, and California least tern. The BA estimated that 0.8 short-tailed albatross would be harmed per year due to the continued operations of the Pacific Coast Groundfish Fisheries. However, the level of take was not expected to reduce appreciably the likelihood of survival or significantly affect recovery of the species. The short-tailed albatross population is expanding, and is in the process of recovering from extremely low numbers. The expansion of the population will likely result in more conflict with the Pacific Coast Groundfish Fisheries.

Data specific to the shorebased fishery using midwater trawl gear to target Pacific whiting and non-whiting are not available. Therefore, observed take in the at-sea Pacific whiting fishery are presented as a proxy for potential interaction with midwater trawl while recognizing that the at-sea Pacific whiting fishery often fish in deeper waters than the shorebased IFQ fishery.

Table 3-15. Seabird Species observed in the Pacific Whiting At-sea Fisheries, 2002-2009.

Species	Distribution *	ESA	Observed Take in At-sea whiting fishery
Black-footed albatross (*Phoebastria nigripes*)	Open ocean along the entire Pacific Coast on North America. Rarely seen near shore.	Not listed	Pacific whiting fishery takes include 3 in 2003, 2 in 2005, 2 in 2006, 1 in2008
Common murre (*Uria aalge*)	Open seas and gulfs. All coasts in the Northern hemisphere with cold currents or upwelling. In the Pacific they range from Arctic Alaska and the Aleutian Islands to central California.	Not listed	Occurrence in variety of fisheries- at-sea whiting take was 3 in 2004, and 2 in 2005
Northern fulmar (*Fulmarus glacialis*)	Open ocean. In winter it is found along the Pacific Coast, occasionally to Baja California.	Not listed	Most taken in at-sea whiting
Sooty shearwater (*Puffinus griseus*) (estimate includes Shearwater, unidentified)	Open ocean throughout the Pacific Ocean, but go shoreward during foul weather. Large numbers migrate or summer from the West Coast to Alaska.	Not listed	At-sea whiting (8 in 2004, and 2 in 2005)

[13] Section 1.2 in NMFS (2013c) describes the elements of streamer lines. They are deployed above the groundline as it is laid out from the vessel and creates "a moving fence around the sinking groundline reducing or eliminating bird interactions."

Unspecified tubenose species	NA	NA	At-sea whiting
Unspecified alcid species	NA	NA	At-sea whiting

Seabirds not listed under the Endangered Species Act

Section 3.1.4.5 in the 2013-14 Groundfish Harvest Specifications FEIS includes an overview of the occurrence and abundance of seabirds in the fishery management area. This information is reproduced here.

The California current system supports a diverse array of seabird species. Species found off the west coast include resident species and transitory species (migrating or foraging). All the California Current system seabirds are highly mobile and require an abundant food source to support their high metabolic rates (Ainley, *et al.* 2005). The abundance of most seabird species on the West Coast is influenced by similar physical and biological factors, such as oceanic productivity and prey availability (Ainley, *et al.* 2005; Tyler, *et al.* 1993). Specifically, the seasonal and latitudinal distribution of seabirds is defined by the intensity of coastal upwelling, which delivers nutrient-rich water and supports higher prey biomass in surface waters accessible to seabirds (Tyler, *et al.* 1993). On the west coast, upwelling is most intense south of Cape Blanco, Oregon (42° 50' N. latitude) (Bakun, *et al.* 1974; Barth, *et al.* 2000).

Three distinct oceanic seasons have traditionally been defined for the U.S. west coast: the Upwelling, Oceanic, and Davidson Current seasons. The distribution of seabirds varies by season. During the upwelling season in the late spring and summer, northerly winds transport surface waters southward and away from the coast. Commonly-observed visiting species in summer include the sooty shearwater (*Puffinus griseus*), Northern fulmar (*Fulmarus glacialis*), and black-footed albatross (*Phoebastria nigripes*) (Tyler, *et al.* 1993). In the fall (Oceanic season), northerly winds and upwelling intensity decrease, and sea surface temperature reaches its annual maximum. Several species that nest farther south in Mexico and southern California move northward, including the brown pelican (*Pelecanus occidentalis*) and storm-petrels. As winter approaches, these species again return south and breeders from boreal nesting colonies become more abundant, particularly off of California (Tyler, *et al.* 1993). The winter months along the west coast are characterized by warmer water delivered by the Davidson current and reduced levels of primary production (Davidson Current season). Seabird abundance during this time is generally low (Tyler, *et al.* 1993).

Table 3-16 summarizes information in Jannot, et al. (2011) on non-ESA listed seabird interactions in groundfish fisheries. The breakdown of interactions by fishery / gear type is as follows:

- Black-footed albatross (*Phoebastria nigripes*): Non-nearshore FG fishery and at-sea whiting fishery
- Brandt's cormorant (*Phalacrocorax penicillatus*): Trawl and FG fisheries
- Brown pelican *(Pelecanus occidentalis*): Non-nearshore FG fishery
- Common murre (*Uria aalge*): Shoreside trawl, FG fisheries, and at-sea whiting fishery
- Leach's storm petrel (*Oceanodroma leucorhoa*): shoreside trawl
- Northern fulmar (*Fulmarus glacialis*): Shoreside trawl and non-nearshore FG

- Sooty shearwater (*Puffinus griseus*): Non-nearshore FG and at-sea whiting
- Western gull (*Larus occidentalis)*: Non-nearshore FG

Table 3-16. Non-ESA listed seabird species observed by the West Coast Groundfish Observer Program and At-sea Pacific Whiting Observer Program, 2002-2009, WCGOP annual fishery mortality estimate, and IUCN Red List status. Source:

Species	Shoreside Trawl	CA Halibut Trawl	Fixed Gear	At-Sea Hake	WCGOP Average Annual Fishery Estimate, 2002-09	WCGOP Average Annual Fishery Estimate, 2002-09 - Upper CI	Actual no. years when observations made, 2002-2009	IUCN Red List Status	IUCN Red List Populatoin Trend
Black-footed albatross	0	0	123	8	43.8	93.5	8	Vulnerable	Increasing
Brown pelican	0	0	1	0			8	Least Concern	Increasing
Brandt's cormorant		7	4	0	4	10.8	5	Least Concern	Decreasing
Common murre	1	37	3	5	3.4	5.6	5	Least Concern	Increasing
Leach's storm petrel	8				0.3	1.2	6	Least Concern	Stable
Northern fulmar	1		2	108	15.7	16.1	7	Least Concern	Increasing
Sooty shearwater			20	10	1.7	1.7	6	Near Threatened	Decreasing
Western gull			7		6.3	18.5	4	Least Concern	Increasing
Unspecified/unidentified			3	15			6-8	N/A	N/A

3.2.4 Prohibited Species

Prohibited species are those species and species groups which must be returned to the sea as soon as is practicable with a minimum of injury when caught and brought aboard, except when their retention is authorized by other applicable law. Prohibited species catch by vessels targeting Pacific whiting in the shorebased and MS fishery from 2002 to 2014 are shown in Table 3-17. Other groundfish fishery bycatch is provided for comparison.

3.2.4.1 Salmon

Salmon are considered prohibited species, however; some of the bycatch is considered protected species (ESA-listed salmon). Therefore all biological information for each species of salmon that is caught is summarized in Section 3.2.3.4. Bycatch in the whiting fishery can vary year to year (Table 3-17). In the fixed gear fishery, bycatch is rather low from year to year and mainly taken in the longline fishery (See non-trawl gear category in Table 3-17).

Table 3-17. Salmon mortality (number of fish) by species and fishing sector in Pacific Coast Groundfish Fisheries, 2002-2014.

Fishery	Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 a/
At-Sea whiting	Chinook	1,679	2,648	805	3,963	1,209	1,321	722	319	714	3,990	4,232	3,737	6,685
	Coho	146	3	1	86	28	227	21	12	0	5	17	6	108
	Chum	24	11	52	20	88	170	60	41	10	46	53	26	4
	Pink	0	17	0	48	0	34	0	2	0	12	22	37	0
	Sockeye	0	0	0	0	0	0	2	0	2	0	0	0	0
Shorebased whiting	Chinook	1,062	425	4,206	4,018	839	2,462	1,962	378	2,997	3,727	2,333	1,313	7,554
	Coho	14	0	8	37	18	141	10	37	16	137	15	33	175
	Chum	72	0	43	6	3	113	8	2	8	42	3	8	4
	Pink	0	0	0	49	0	47	7	26	0	6,113	2	2	0
	Sockeye	0	0	0	0	0	0	0	0	0	2	0	0	1
	Steelhead	0	0	0	0	0	0	0	0	0	0	0	0	2
Tribal whiting c/	Chinook	1,018	3,439	3,740	3,985	1,940	2,404	697	2,147	678	906	17	1,025	154
	Coho	23	193	207	344	3	107	21	57	5	27	0	91	0
	Chum	51	9	11	2	24	8	11	11	1	23	0	1	0
	Pink	0	3,766	0	384	0	513	9	129	0	1,190	0	5	0
	Sockeye	0	0	0	0	0	0	0	0	0	2	0	0	0
Bottom trawl d/	Chinook	14,915	16,460	2221	1,242	175	317	324	299	53	175	304	323	NA
	Coho	25	31	65	5	48	13	0	0	31	20	27	49	NA
	Chum	14	36	4	0	0	0	0	0	0	0	0	0	NA
	Pink	0	0	0	0	0	0	0	2	0	0	2	0	NA
	Sockeye	0	0	0	0	0	0	0	0	0	1	0	0	NA
Non-trawl gear	Chinook	0	41	33	32	20	0	0	22	33	40	66	404	NA
	Coho	0	5	38	6	0	15	42	71	42	64	16	581	NA
	Chum	0	0	0	0	0	0	0	0	0	0	0	0	NA
	Pink	0	0	0	0	0	0	0	0	0	0	0	0	NA
	Sockeye	0	0	0	0	0	0	0	0	0	0	0	0	NA

a/ Preliminary data

b/ Includes approximately 19 Chinook in 2011, 69 Chinook in 2012, and 78 Chinook in 2013 from midwater non-whiting targeting north of 40°10' north latitude.

c/ Tribal non-whiting values were not available

d/ Between 2011 and 2013 includes 1-2 Chinook from vessel targeting Pacific whiting with bottom trawl

Source: Council meeting Agenda Item D.3.a NMFS Report 1, June 2015

3.2.4.2 Pacific Halibut

Pacific halibut (*Hippoglossus stenolepis*) is a bottom-dwelling, right-eyed flatfish species from the family of flounders called Pleuronectidae. A 2013 stock assessment indicated that the Pacific halibut stock has been declining continuously over the last decade, with recruitment strengths being much smaller than those observed in the 1980s and 1990s, and more typical of those seen during the last century (79 FR 05339; March 12, 2014). The 2013 stock assessment notes that decreasing size at age may also contribute to lower biomass (79 FR 05339; March 12, 2014). In response catch limits for area 2A was reduced in 2014 from 2013, due to concerns about the coastwide stock status (79 FR 05339; March 12, 2014).

Pacific Halibut Data Collection in the Shorebased IFQ Fishery
In the Shorebased IFQ program halibut are managed with individual bycatch quotas (IBQ). All vessels must have enough IBQ to cover their incidental catch of legal and sublegal sized Pacific halibut bycatch mortality in the area north of 40°10 N latitude. The WCGOP designed sampling methodologies that help ensure halibut mortality can be estimated, regardless of the limitations imposed by the vessel, catch composition, or catch quantity.

Three pieces of information are necessary to estimate Pacific halibut mortality:

1. A count of individual P. halibut in the haul or sample
2. Actual or visual length measurements (cm)
3. A viability obtained by physical assessment of individual P. halibut using IPHC designed dichotomous keys that relate the physical condition of the fish to a viability code (NWFSC 2013). A unique key is used for each gear type (trawl, longline, pot).

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

Specific mortality rates are applied to the gear based on certain conditions of the halibut (viability assessment) and viability categories are used to assign mortality rates to halibut. Discard mortality was assumed to be 100% for midwater trawl bycatch estimates. Mortality rates for vessels fishing pot gear are based on conservative assumptions of likely survival from pot-induced injuries (Williams and Wilderbuer 1995). Because of the difficulties of collecting halibut viability on hook-and-line vessels, we used a discard mortality rate (DMR) of 16%, which represents an average of DMRs over all years for the Bering Sea/Aleutian region longline fishery (Williams 2008). For pot gear, NMFS relies on discard mortality rates computed for groundfish fisheries off Alaska (Williams 2008). Therefore, an 18% discard mortality rate is

applied to estimates for pot gear, coinciding with the DMR used for the sablefish pot CDQ fishery in Alaska.

Pacific halibut are taken in midwater trawls and with FG, as they co-occur with groundfish stocks. Table 3-18 shows the incidental catch of Pacific halibut by vessels targeting Pacific whiting in the shoreside and MS fishery. The discard mortality rate (DMR) applied in the whiting fishery is 100% since most often the fish are retained and landed dead. If some are dumped at sea the 100% rates is still applied.

Table 3-18. Halibut bycatch (mt) in the midwater trawl shoreside and mothership whiting fisheries, 2011-2014.

Year	Shoreside	MS	DMR
2011	0.03	0.085	100%
2012	0.00	0.99	100%
2013	0.05	0.397	100%
2014	0.11	0.332	100%
Total	**0.19**	**1.804**	100%

Source: NMFS Pacific halibut Bycatch Report 2002-2014, Table 1 and 14.

Table 3-19 provides halibut caught in the longline and pot fisheries. Both fisheries have different handling requirements. For the longline fishery, observers are provided the opportunity to get a visual length estimate and the crew unhooks the fish and releases it directly into the water. For the pot fishery, the halibut are measured on deck, a viability assessment is conducted, and the fish is released.

Table 3-19. Halibut bycatch (mt) in the IFQ fixed gear fishery (pot and longline), 2011-2014.

Year	Pot			Longline		
	Estimated gross discarded	Estimated discard mortality	DMR	Estimated gross discarded	Estimated discard mortality	DMR[1/]
2011	3.34	0.89	16%	6.06	0.97	16.42% – 30.94%
2012	1.89	0.51	16%	4.66	2.34	13.03% - 33.66%
2013	0.98	0.21	16%	3.00	0.48	16.82% – 39.22%
2014	0.32	0.08	16%	3.96	0.63	26.29%

Source: NMFS Pacific halibut Bycatch Report 2002-2014, Table 1 and 14.
Footnote: 1/ discard mortality rates vary from year to year and by area based on viability assessments so a range is provided. In 2014, only a coastwide rate was provided due to confidentiality rules.

Dungeness crab

The Dungeness crab (Cancer magister) is distributed from the Aleutian Islands, Alaska, to Monterey Bay, California. Off the west coast, Dungeness crab is most abundant in nearshore areas from central California to the Washington-Canada border. Dungeness crab is found to a depth of about 180 meters (590 ft). Dungeness crab is taken incidentally and harmed unintentionally by groundfish gears. Although it occurs on mud and gravel, it is most abundant on sand bottoms; frequently it occurs in eelgrass. Routine stock assessments are not conducted on Dungeness crab stocks in the action area, and catch per unit effort (CPUE) is unknown. The states of Washington, Oregon and California examine annual landings to evaluate the condition of the stock.

3.3 Socio-Economic Resources

3.3.1 Description of the Limited Entry Midwater Trawl Fishery for Whiting

The LE midwater trawl whiting fishery consists of three sectors: 1) shorebased, 2) catcher-processor, and 3) mothership with catcher vessels. There are two distinct cooperative programs that target and process whiting at-sea: 1) mothership sector (MS fishery) and 2) catcher-processor sector (CP). The proposed action only applies to midwater trawl catcher vessels that deliver to shoreside processors and to mothership vessels. The proposed action would not apply to CP vessels.

LE trawl catcher vessels use midwater trawl gear to catch pacific whiting and deliver to either shoreside processors under the Shorebased catch share program (shorebased or shoreside whiting fishery) or to large vessels that process the fish at-sea on a mothership (MS fishery; includes Mothership Coop and Non-Coop participants). Midwater vessels that catch whiting typically operate in both the shoreside and MS fisheries. Under the proposed action the midwater catcher vessels would be able to use electronic monitoring rather than an observer to monitor discard activity. For purposes of analysis we will refer to these catcher vessels as the midwater trawl whiting fishery.

Most shoreside whiting trawl vessels operate under a primary season structure where vessels harvest Pacific whiting until the sector allocation is reached, and the fishery is closed. Trawlers fish under a common quota of whiting and bycatch limits. The commercial whiting optimum yield (OY) is allocated to three different nontribal sectors, with the shore-based sector receiving 42 percent of the commercial OY, 34 percent to the catcher-processors, and 24 percent to mothership catcher vessels. Each sector is closed when their whiting allocation is reached or when a bycatch limit is reached.

To allow the Pacific whiting industry to have the opportunity to harvest the full Pacific whiting OY, the nontribal commercial fishery is managed with bycatch limits for certain overfished species. To date, bycatch limits have been established for darkblotched, canary, and widow rockfish. With bycatch limits, the industry has the opportunity to harvest a larger amount of Pacific whiting, if they can do so while keeping the total catch of specific overfished species within adopted bycatch limits.

Regulations provide for the automatic closure of the commercial (nontribal) portion of the Pacific whiting fishery upon attainment of a bycatch limit. Many catcher vessels participating in the mothership sector also participate in the Pacific whiting shoreside fishery. Up to 70 percent of the mothership sector catcher vessels have also participated in the Pacific whiting shoreside fishery.

Vessel operations vary slightly between the MS fishery and the shorebased fishery. Catcher vessels that operate in the mothership sector are larger on average than vessels that operate shoreside. Several catcher vessels in the mothership sector exceed 100 feet in length, but most vessels tend to be between 80 and 100 feet in length. Midwater trawl nets in the shorebased fishery can typically hold between 150,000 to 180,000 lb of fish and vessels will make one to three tows to fill the net. It can take from 1 to four hours to fill the net. In the shorebased fishery, vessels fill a net then dump the unsorted fish into the vessel's hold with refrigerated seawater to preserve the fish quality. Vessels hulls can hold up to 180,000 lb of fish. In the MS fishery, the cod ends hold between about 110,000 - 132,000 lbs. Generally the practice in the MS fishery is to fill the net, tie up the cod end of net, and transfer it to the MS vessel for processing.

Midwater trawl may be used to harvest Pacific whiting only after the opening dates of the whiting primary season, May 15. Under the current regulations, a Pacific whiting IFQ trip is defined as "a trip in which a vessel uses midwater groundfish trawl gear during the dates of the Pacific whiting primary season to target Pacific whiting, and Pacific whiting constitutes 50 percent or more of the catch by weight at landing as reported on the state landing receipt" (50 CFR 660.111).

3.3.1.1 Maximized retention

All catch from trawl IFQ trips is required to be sorted to the specified groundfish species and species groups before it is first weighed after offloading. The only exception is for Pacific whiting taken with midwater trawl gear; IFQ first receivers may use an in-line conveyor or hopper type scale meeting the regulatory requirements for scales at § 660.15(c) to derive an accurate total catch weight prior to sorting. Immediately following weighing of the total catch and prior to processing or transport away from the point of landing, the catch must be sorted to the species groups and all incidental catch (groundfish and non-groundfish species) must be accurately weighed and the weight of incidental catch deducted from the total catch weight to derive the weight of a single predominant species.

In an August 31 2010 proposed rule (75 FR 53380) and a December 15, 2010 Final rule (75 FR 78344) for the catch share program, maximized retention was specifically considered for the Pacific whiting IFQ fishery. Regulations at § 660.140(g) specify the retention requirements for maximized retention vessels participating in the Pacific whiting IFQ fishery. On a maximized retention trip, minor operational amounts of catch may be discarded at sea if the observer has accounted for the discard. The current regulations do not define what is meant by minor

operational amounts[14] of catch. Pacific whiting vessels that sort at sea must discard Pacific halibut, and the discard mortality must be accounted for and deducted from IBQ pounds in the vessel account.

3.3.2 Description of the IFQ Fixed Gear Fishery

Fixed gear (anchored non-trawl gear) includes longline, pot, set net, and stationary hook-and-line gear. Fixed gear must be marked, individually or at each terminal end as appropriate, with a pole, flag, light, and radar reflector attached to each end of the set, and a buoy clearly identifying the owner. In addition, fixed gear shall not be left unattended for more than seven days. Limited entry trawl vessel that use fixed-gear to catch their quotas use pot and hook-and-line gear to target species such as sablefish, nearshore rockfish, and thornyheads. Each year up to 26 vessels switch gears; vessels are limited in the number of times they switch however they are required to make a gear declaration each time to the NMFS.

Limited entry fixed-gear vessels target different species along the coast. Historically, much of the sablefish had been caught off the coast of California. With the implementation of the LE fixed-gear sablefish tier program, however, much of the sablefish catch migrated north out of California and into Washington and Oregon. Inversely, species such as shortspine thornyhead became targeted more heavily off California in the years following the sablefish tier program.

In 2014, 21 vessels fished with pots and 4 vessels fished with longline (NMFS 2015). A typical set or string of pots includes 10 to 14 pots and a vessel may set up to 20 strings in a trip. Vessel's add bait to the pots and let them soak for 24 to 48 hours then begin working through the gear, retrieving and setting pots again. Vessel may travel for a week or more on a trip then return to port to deliver their catch.

3.3.3 Applicable Federal Permits, Licenses, or Authorizations

Limited entry gear means longline, trap (or pot), or groundfish trawl gear used under the authority of a valid limited entry permit affixed with an endorsement for that gear.

Endorsement means an additional specification affixed to the limited entry permit that further restricts fishery participation or further specifies a harvest privilege, and is non-severable from a limited entry permit.

Limited entry permits indivisible. Limited entry permits may not be divided for use by more than one vessel.

[14] Operational discards. Pacific whiting removed from the deck and fishing gear during cleaning may be discarded, provided that the total operational discards must not exceed one basket from any single haul, with the maximum dimensions of the basket being 24 inches by 16 inches by 16 inches. If net cleaning results in a greater amount, all catch in excess of the one basket must be placed into the fish hold. Discarding operational discards of more than one basket of Pacific whiting per haul is prohibited. Discarding any quantity of groundfish species other than Pacific whiting is prohibited (Maximized Retention And Monitoring For Vessels Participating In The 2010 Coastwide Pacific Whiting Shoreside Fishery).

A Pacific Coast groundfish limited entry permit endorsed for trawl gear is required to participate in the shorebased catch share program. The catch share program applies to qualified participants in the Pacific Coast Groundfish limited entry trawl fishery and includes a system of transferable quota shares (QS) for most groundfish species or species groups, individual bycatch quota (IBQ) for Pacific halibut, and trip limits or set-asides for the remaining groundfish species or species groups. A permit is required to establish a vessel account.

Trawl vessels that operate and deliver to motherships in the MS fishery are required to have limited entry permit, a MS/CV-endorsed permit (mothership/catcher vessel). If the vessel participates in a coop then it must also have an MS Coop permit. The MS Coop Program is a general term to describe the limited access program that applies to eligible harvesters and processors in the mothership sector of the Pacific whiting at-sea trawl fishery. Eligible harvesters and processors, including coop and non-coop fishery participants, must meet the requirements set forth in the Pacific Coast groundfish regulations. Each year a vessel registered to an MS/CV-endorsed permit may fish in either the coop or non-coop portion of the MS Coop Program, but not both.

LE trawl vessels must have a fixed gear endorsement to use longline and pots to land fish under the shorebased catch share program. These vessels account system is the same for each vessel and data flow and accounting follow the same process as previously described.

3.3.3.1 Declaration reports

Regulations at 50 CFR § 660.13(d) require the operator of any vessel registered to a limited entry permit to submit a declaration report to NMFS OLE before the vessel leaves port on a trip in which a gear type that is different from the gear type most recently declared for the vessel will be used. The vessel is then only allowed to fish with the gear that has been declared. Vessels using midwater trawl gear in the Shorebased catch share program may only declare one of the following trawl gear types: "Limited entry midwater trawl/Pacific whiting shorebased IFQ" or "Limited entry midwater trawl, Pacific whiting mothership sector (catcher vessel or mothership)". Vessels that use fixed gear must declare "Limited entry groundfish non-trawl, shorebased IFQ."

3.3.4 **At-sea Observation and Delivery Monitoring**

The Northwest Fisheries Science Center (NWFSC) trains, certifies, and equips catch share program observers, ensures data quality, and stores, maintains, and analyzes data collected by observers.

There are currently two Federal observer programs being operated by the NMFS NWFSC in the Pacific coast groundfish fishery: 1) West Coast Groundfish Observer Program (WCGOP) and; 2) compliance observers in the catch share program (compliance observers). Each program is funded through a different mechanism: the WCGOP observers are federally funded and the compliance observers are paid for by the industry through third-party observer providers.

3.3.4.1 West Coast Groundfish Observer Program

The WCGOP is a year-round program that provides observers for all of the commercial groundfish fisheries. All WCGOP sampling protocols and coverage strategies are defined by NMFS. Observer coverage goals for the WCGOP are detailed in a coverage plan (NMFS 2006a). Prior to 2000, Observers initially covered about 10 percent of the west coast LE trawl fleet effort and were selected via a stratified random sample. Trawl fleet coverage increased to about 25 percent after 2000 and was expanded to include the LE fixed-gear and open access vessels. Now, vessels that operate in the catch share program are observed 100%. The observer data, in combination with landings data, is used to track individual quotas and allow managers to monitor the progress of each vessel's account and whiting sector allocations.

WCGOP observers collect scientific data on fishing trips such as areas and depths fished, gear set and retrieval times, individual fish info (including genetic samples, length, weight, and sex), conduct halibut viability assessments (i.e., survivability), and estimate total discard by species, and estimate total bycatch of protected species like marine mammals and seabirds.

3.3.4.2 Catch Shares Observer Program and Compliance Observers

The catch share program requires 100% at-sea observer coverage, as all catch of IFQ species/species groups must be accounted for. IFQ observers conduct the same scientific sampling as the WCGOP and monitor the fishery for compliance with the catch share program (mainly estimating discards at sea), such as how much of each species was discarded.

Similar to the WCGOP, observers are highly trained biologists that work independently aboard vessels to quantify total catch. They estimate bycatch, collect biological samples, and monitor for fishery interactions with marine mammals, sea turtles, and seabirds. The observer data is used to account for any catch share quota discards. Again, the observer data, in combination with landings data, is used to track individual quotas and allow managers to monitor the progress of each vessel's account and whiting sector allocations.

Observers in the whiting and fixed gear fisheries are referred to as compliance observers and are employed by private third-party observer provider companies. Vessels make arrangements with a third-party observer provider to secure an observer for a trip and pay the provider directly. These observers are trained in the same manner as those observers in the WCGOP. The observer providers collect the fees directly from the vessels, recruit qualified individuals, provide insurance and benefits to the observers, deploy the observers, and ensure that the observer data are delivered to NMFS.

3.3.4.3 Delivery Monitoring

Catch that is landed at shoreside facilities (first receiver) are monitored with catch monitors that are employed by a third-party observer providers. A catch monitor is someone who is land-based at first receiver facilities and confirms that total landings are accurately sorted, weighed, and recorded on fish tickets (landing receipts). Each first receiver taking delivery of catch share program species is required to have a certified catch monitor present for the entire duration of the

landing. Catch monitors are certified by NMFS and must meet responsibilities specified in the regulations at 50 CFR Part 660 under section 660.17. Once verified, catch monitors independently report catch data to the Pacific States Marine Fisheries Commission and NOAA Fisheries catch accounting databases. Catch monitors perform more of a compliance role than that of a biologist and are required to report any observations of suspected violations of regulations. An observer in the shorebased catch share program will often fill the role of conducting at-sea observations for discard and biological collection then get off the vessel and fill the role as a shoreside catch monitor to monitor the landing at a shoreside processor.

In the MS fishery a compliance observer is deployed on the catcher vessel to monitor the fisheries for compliance with the catch share program and estimate total discard. Catch that is landed onto motherships are monitored by separate compliance observers that estimate retained catch totals and conduct biological sampling. Discard from MS vessel is estimated by the observer and provided to NFMS to monitor total catch for the MS sector. This activity would remain under the prosed action; an EM system could not be used to monitor discard form a MS vessel.

3.3.5 **Landings, Revenue, and Participation**

Section 3.2 in the 2014-15 Groundfish Harvest Specifications FEIS (as well as EISs for earlier biennial periods) describes commercial fisheries targeting groundfish and characterizes west coast fishing communities with respect to groundfish fisheries. That information is a useful resource upon which the current description is based. The 2014 Groundfish SAFE document contains a series of tables summarizing landings and ex-vessel revenue in groundfish fisheries, landings and revenue by port, and indicators of fishery participation. These data may be summarized here to highlight current fishery trends. In addition, an environmental assessment by NMFS was also incorporated into this document because it contains the most recent information regarding the whiting fishery's economic status and baseline trends in revenue through 2012 (NMFS 2015, Refer to whiting EA). Some information through 2013 is also provided.

Figure 3-6 provides a general overview of catcher vessel costs and participation in 2012.

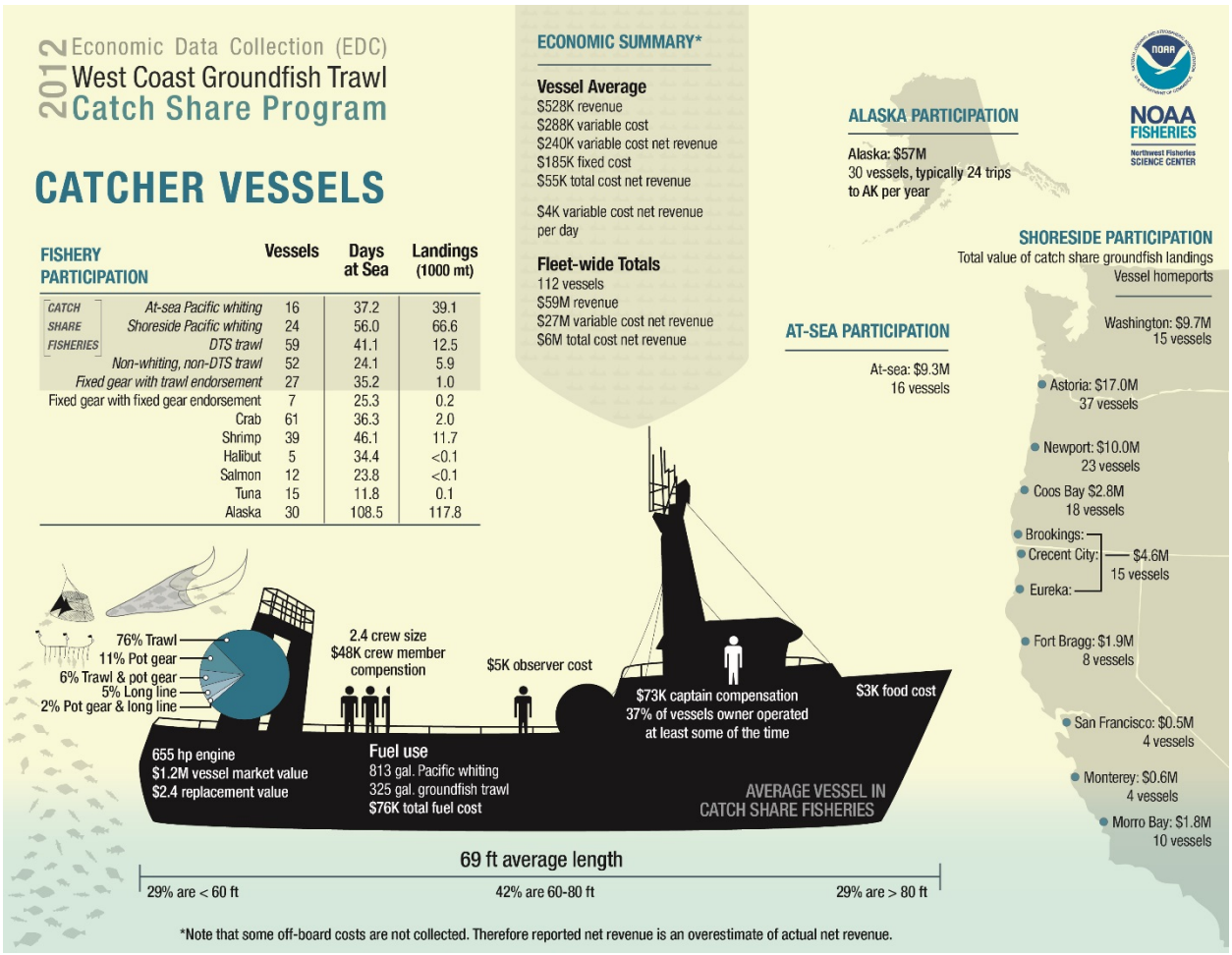


Figure 3-6. General description of groundfish catcher vessels on the west coast, 2012.

Note: At-sea Pacific whiting vessels deliver to mothership processing vessels; shoreside Pacific whiting vessels deliver to shorebased processors. Days at sea is an average number per vessel. Average human observer costs are lower here because vessels received reimbursement from NMFS for a majority of the costs in 2012. Source: NWFSC

Table 3-20. Provides a quick summary for each sector considered for EM use for year 2011 through 2013.

SECTOR	YEAR	Count of Dealers	Count of Vessels	Count of Landings	SUM (Round WT_LBS)	SUM (Revenue)
whiting trawl IFQ	2,011	10	26	1,403	199,900,209	22,412,925
whiting trawl IFQ	2,012	9	24	961	145,646,067	20,820,256
whiting trawl IFQ	2,013	9	24	1,221	214,756,277	26,589,809
nonwhiting trawl IFQ	2,011	34	71	1,206	37,697,424	24,189,412
nonwhiting trawl IFQ	2,012	33	66	1,220	37,870,727	22,447,912
nonwhiting trawl IFQ	2,013	35	68	1,300	41,319,598	24,991,771
nontrawl IFQ	2,011	24	32	380	2,653,441	7,684,227
nontrawl IFQ	2,012	21	29	297	2,143,051	4,984,527
nontrawl IFQ	2,013	17	23	125	1,295,970	2,732,201

3.3.5.1 Revenue Trends in Commercial Groundfish Fishery Sectors

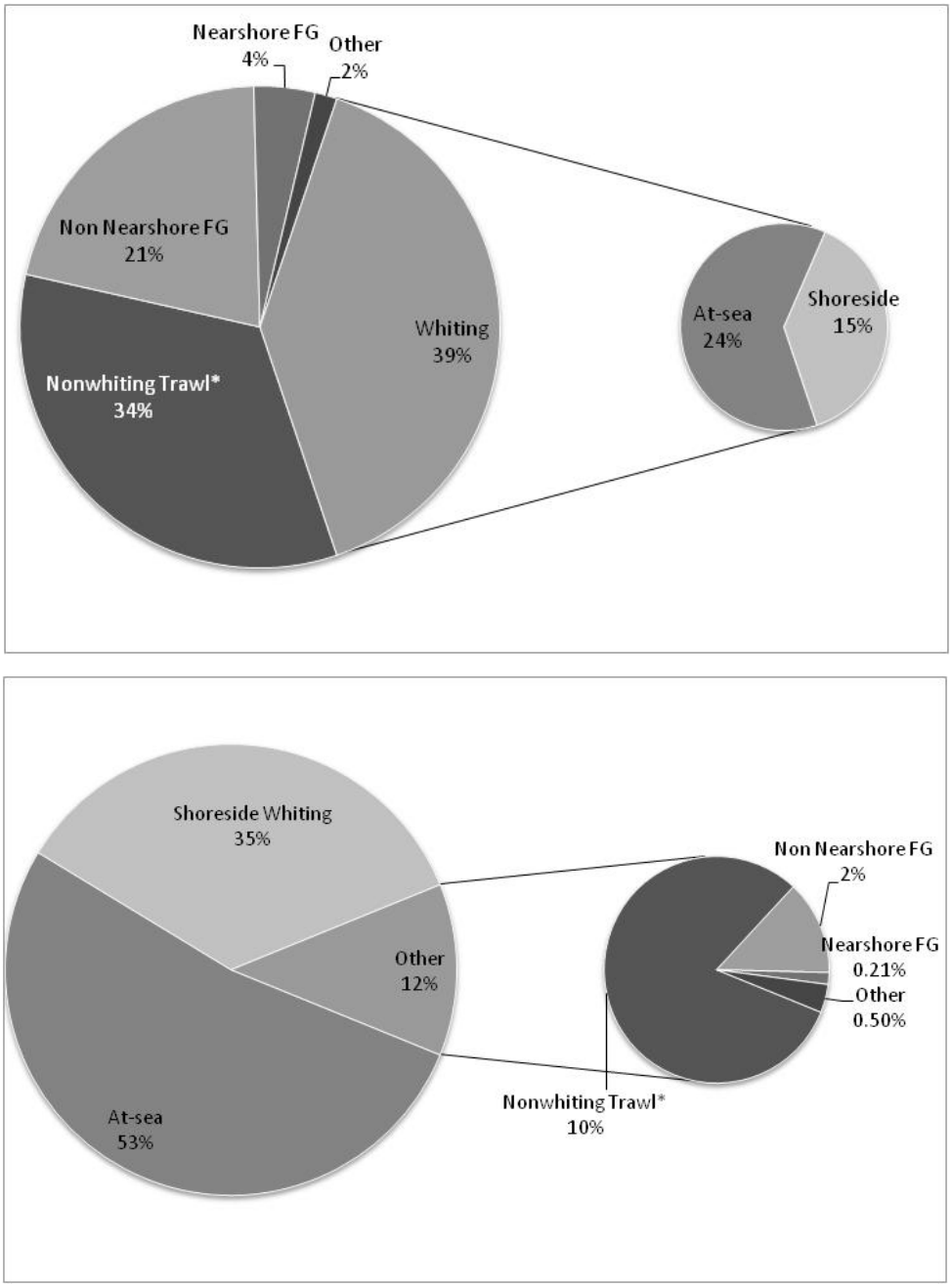
Fishery managers frequently view groundfish fisheries in terms of fishery "sectors."[15] These sectors are defined by the permit status of participating vessels, gear type, target species, and various other historical factors. The Council allocates fishing opportunity (or the amount of fish vessels in a particular sector may harvest) either as part of the biennial process or through rules that have been established in the Groundfish FMP. Fishery sectors may receive a fixed allocation of the ACL for particular management units (stocks, geographic subdivisions of stocks, and stock complexes); in other cases fishery managers may identify a catch amount as a management objective (e.g., a harvest guideline, "HG") or simply as an accounting mechanism to prevent ACLs from being exceeded.

Figure 3-7 shows the share of landings (top panel) and inflation-adjusted ex-vessel revenue (bottom panel) by groundfish fishery sector for the 2003-2012 baseline period. Pacific whiting fisheries dominate in terms of landings, accounting for 88 percent of the total. However, because whiting fetches a low price per pound, those sectors accounted for only 39 percent of inflation-adjusted ex-vessel revenue. Shorebased IFQ accounts for the next largest share of landings and revenue, 10 percent and 34 percent respectively. FG landings fetch a relatively higher price so while those sectors accounted for only a little more than 2 percent of landings, they garnered a quarter of groundfish revenue, primarily in the non-nearshore sector that targets sablefish.[16]

[15] Data presented in this section use sector definitions included in the PacFIN vdrfd table. The coding is based on data available within the database including gear type, species composition of landings, and Federal permit status. Global criteria for these sectors are landings from within the Pacific Council management area landed in west coast ports. Relatively small amounts of groundfish coming from other areas, such as Puget Sound, Canada or Alaska, but landed in a west coast port are thus not included in the landings figures for these sectors.

[16] The dahl_sector column in the PacFIN vdrfd table is used to categorize landings and revenue by groundfish fishery sectors.

Figure 3-7. Share of groundfish landings (top) and inflation adjusted ex-vessel revenue (bottom) by fishery sector, 2003-2012. Source: *2011-2012 non-whiting trawl includes IFQ non-trawl landings.



(PFMC 2014, Tables 12a-b and 14a-b).

Figure 3-8 shows revenue trends for groundfish sectors over the baseline period. Revenues have been more stable for non-whiting sectors compared to whiting.

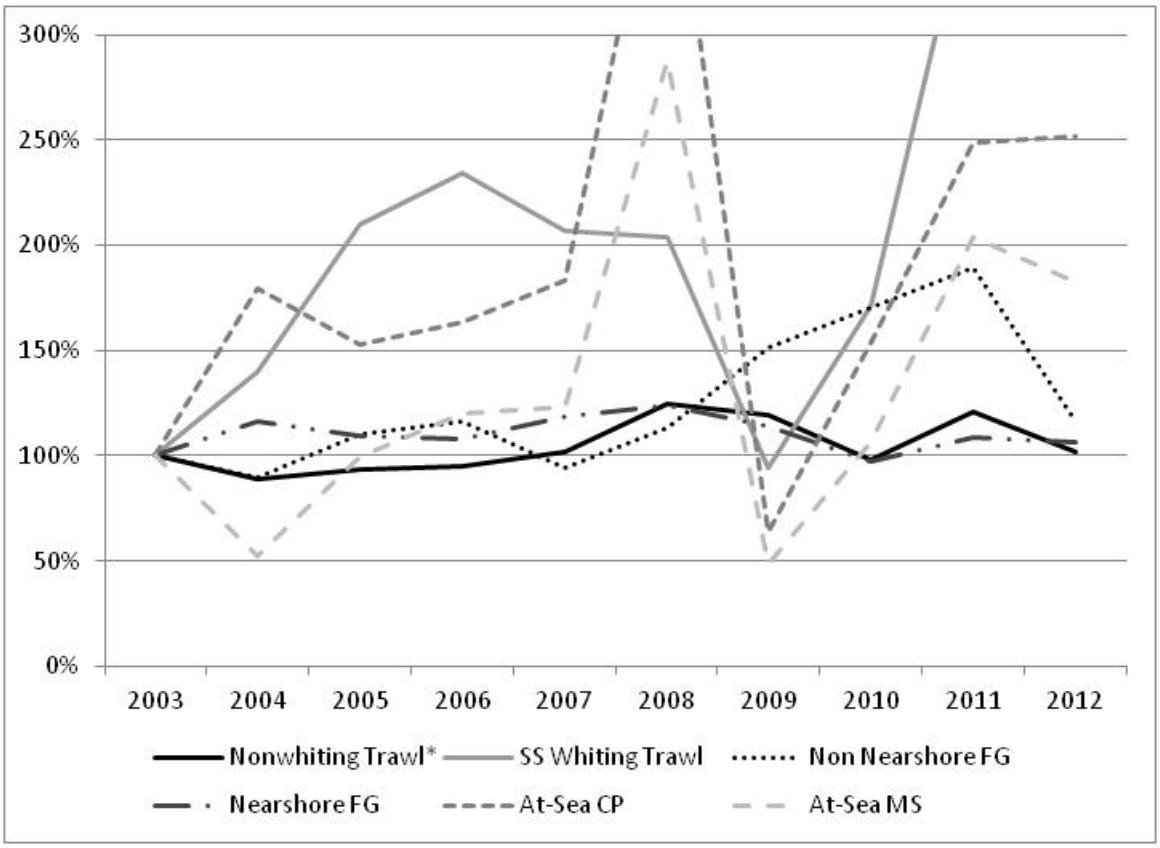


Figure 3-8. Ex-vessel revenue trends (inflation adjusted, 2012, from groundfish only) for groundfish fishery sectors, 2003-2013; 2003=100. *Non-whiting trawl includes non-trawl IFQ in 2011-2012. Value outside figure scale (>300%): 2008 at-sea CP whiting 408%, 2011 shoreside whiting 342%. (Source: PFMC 2014 Tables 12b and 14b).

Long-term historical landings, revenue, and price data (the full PacFIN database time series and a recent a 10-year baseline period of 2003-2012) are used to characterize fisheries and communities.

Table 3-21 shows the share of landings and inflation-adjusted ex-vessel revenue by groundfish fishery sector (IFQ, whiting catcher processor, and whiting mothership) for the 2012 baseline period.

Table 3-21. Exvessel revenue and total pounds landed in 2012 by month and fishery sector. Key IFQ = Individual Fishing Quota, CP = Catcher processor or CP, and Mothership or MS.

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

Source: Cost Recovery Annual Report, NMFS 2014

Figure 3-9 shows the share of revenue among these sectors during the baseline period.

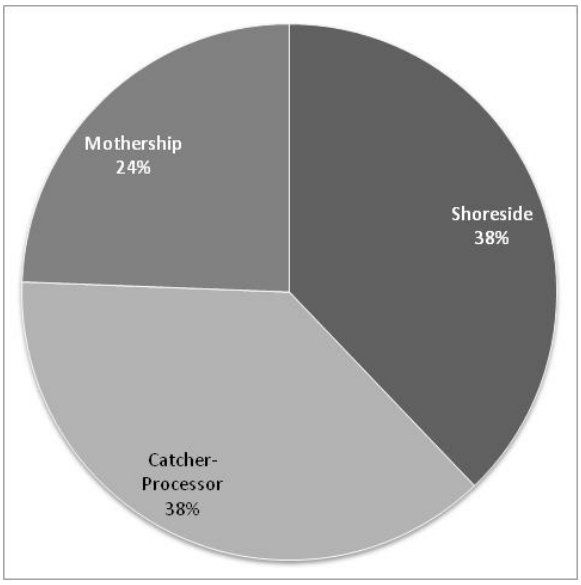


Figure 3-9. Share of inflation-adjusted (2012) ex-vessel revenue for unprocessed Pacific whiting by fishery sector, 2003-2012.

As noted above, whiting catch and revenue can be quite variable from year to year, mainly due to the underlying variation in stock productivity. Figure 3-10 shows the long-term trends for revenue by whiting sector during the baseline period against the left vertical axis and annual catch limits (in metric tons) against the right vertical axis. This depiction shows that variation in catch limits has a major influence on revenue, which has been somewhat mitigated by increasing real prices for whiting. The average inflation-adjusted price per pound for shoreside deliveries was $0.06 in 2009 and $0.14 in 2012, which likely explains why the decline in revenues in 2012

was not as steep as in 2009 even though the catch limit in 2012 was below the average for the baseline period.

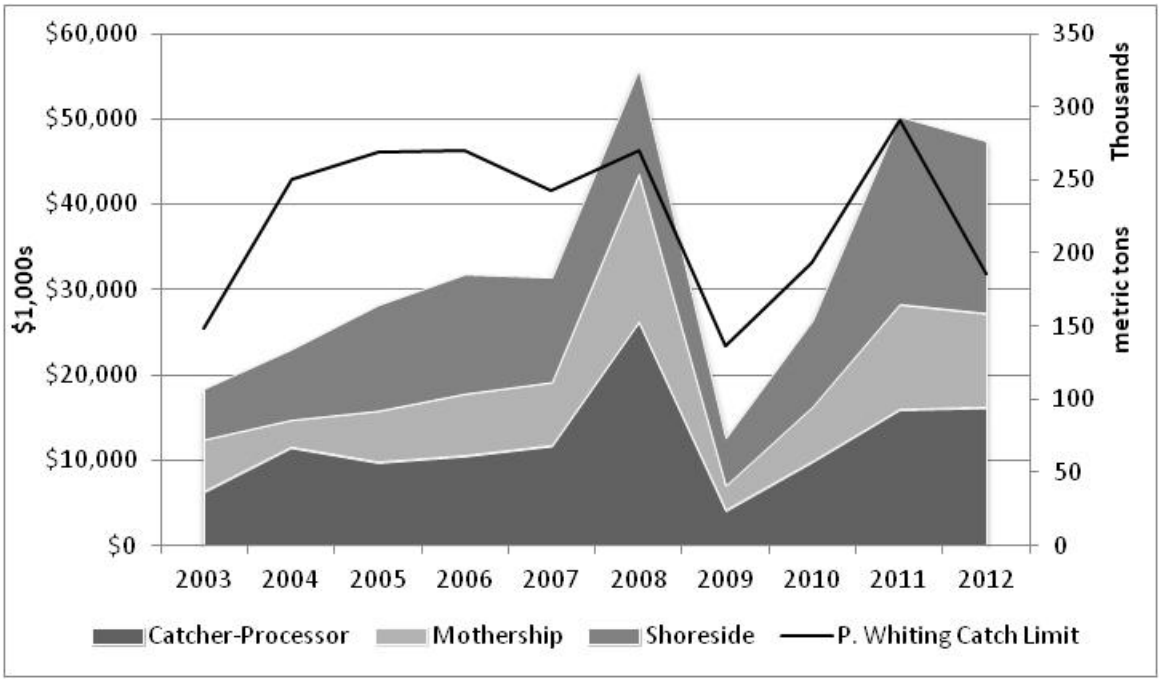


Figure 3-10. Inflation adjusted ex-vessel revenue by sectors ($1,000s, left vertical axis) and catch limits (metric tons 1,000s, right vertical axis) for Pacific whiting, 2003-2012. (Source: PFMC 2014, Table 14b) and various groundfish harvest specifications EISs.

Shorebased trawl catch share program - Midwater Trawl Harvesters

Whiting is a high volume fishery, with a relatively low value per pound. In the past 10 years, the ex-vessel price has ranged from $0.45 per pound in 2004 to $0.13 per pound in 2013 (PacFin). Pacific whiting catch and revenue can be quite variable from year to year, mainly due to the underlying variation in stock productivity. Since implementation of the Shorebased catch share program in 2011, the number of vessels has been reduced from 36 vessels in 2010 to 24 vessels in 2012, while the net revenue of Pacific whiting increased considerably. Figure 3.3.1 compares ex-vessel revenue of Pacific whiting from 2010 (before IFQ) to 2012. Table 3.3.1 shows variable cost and total cost net revenue in the Pacific Whiting Shorebased IFQ fishery for 2009-2011. Since 2009, the net revenues for the fishery have increased substantially. Most Shoreside Pacific whiting vessels also fish in Alaska fisheries or in the Mothership sector of the Pacific whiting fishery.

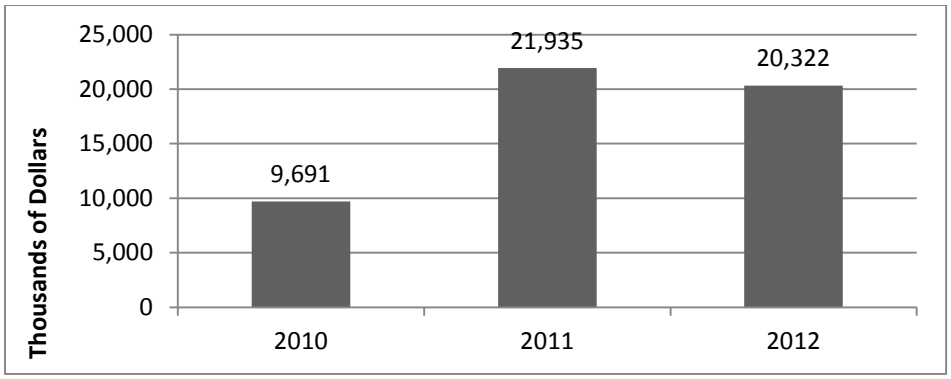


Figure 3-11. Shorebased Pacific Whiting Ex-vessel Revenue by Year, all Ports, 2010-2012 (Pacfin 10/27/14 query)

Table 3-22. Vessels Targeting Pacific Whiting in the Shorebased Fishery variable cost and total cost net revenue.

	2009		2010		2011	
	Mean	N	Mean	N	Mean	N
Revenue	$188,057	35	$262,367	36	$821,419	26
(Variable costs)	($102,182)	35	($148,483)	36	($366,928)	26
Variable cost net revenue	**$85,875**	**35**	**$113,884**	**36**	**$454,491**	**26**
(Fixed costs)	($117,459)	35	($101,674)	36	($308,807)	26
Total cost net revenue	**-$31,585**	**35**	**$12,211**	**36**	**$145,685**	**26**

Note: Average total revenue, variable costs, variable cost net revenue, fixed cost, and total cost net revenue (N= number of vessels with non-zero, non-NA responses). Fixed costs include capitalization expenditures, capital expenses, and other fixed costs. (Steiner et al. 2014)

Annual counts of participating catcher vessels in the shorebased IFQ whiting fishery and MS fishery.

Year	Whiting	Mothership
2011	26	NA
2012	25	16
2013	24	18
2014	25	25

3.3.5.2 Costs in Commercial Groundfish Fisheries

Figure 3-12 presents estimates of the breakdown in costs for different segments of the groundfish trawl fishery provided by the Economic Data Collection (EDC) program, which was enacted to monitor the economic effects of the 2011 transition of the West Coast groundfish trawl fishery to a catch share (IFQs, co-ops) program.

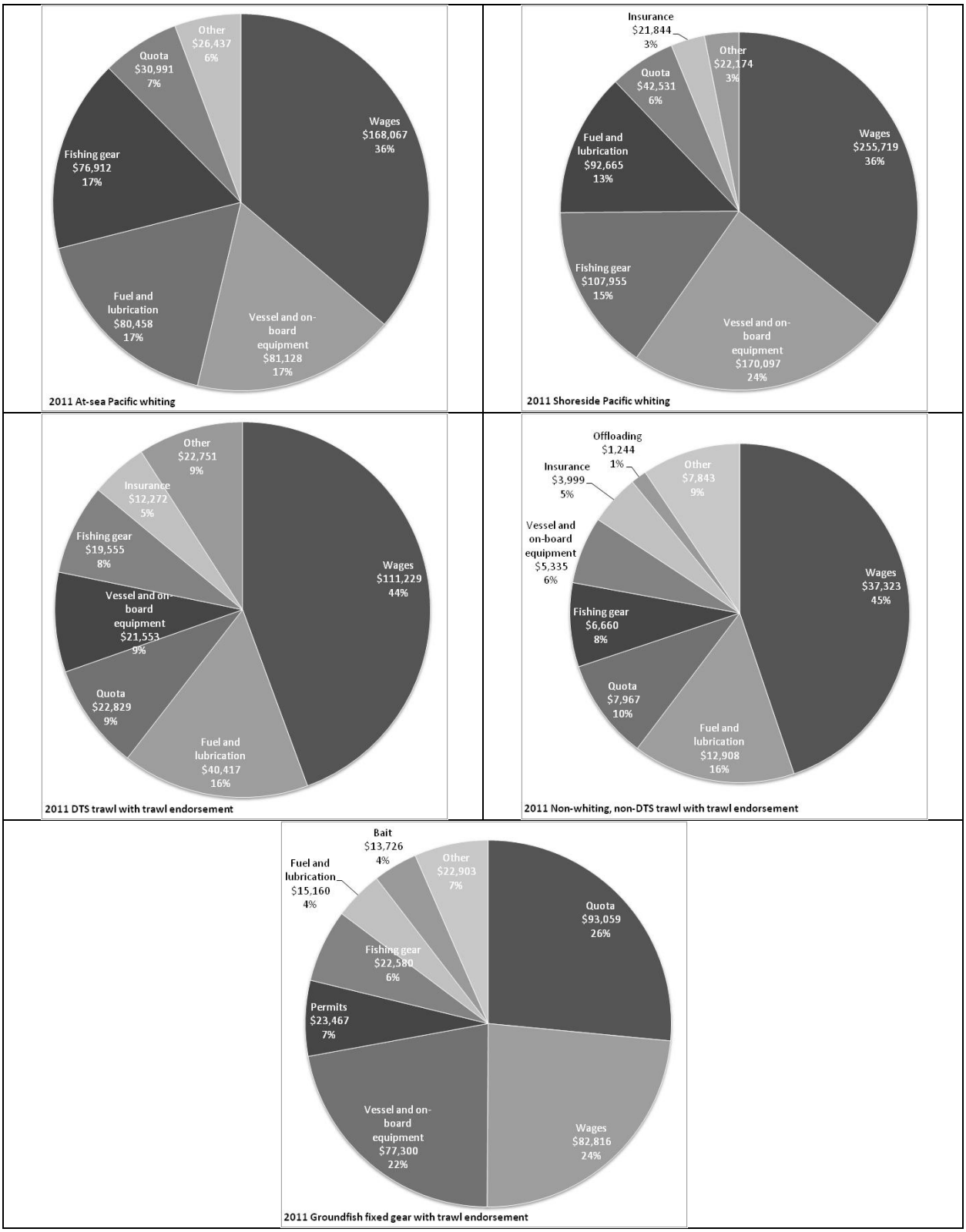


Figure 3-12. Estimated costs in different segments of the trawl fishery.

3.3.5.3 Buyers and Processors

Table 3-23 shows sector distribution of first receivers based on the processor ID field in the PacFIN database. (Note that a single firm may own several entities with different IDs so these numbers may overstate the number of independent firms engaged in processing groundfish. A comparison to counts based on processor names stored in the database showed a negligible difference.) A first receiver may be an entity that both buys and processes fish or a buyer or transportation company serving as a middleman between purchasing locations and processing facilities. The count of first receivers (based on ID) has declined by about 20 percent both for those accepting groundfish and those accepting any species. From a sector perspective the largest declines have been the counts of first receivers accepting trawl-caught groundfish from the shoreside sectors. This may represent consolidation within the buyer/processor sector.

Table 3-23. Count of first receivers (based on processor ID) that accepted groundfish, by major groundfish fishery sector, 2003-2012. (Source: vdrfd 8/29/13.)

Groundfish Fishery Sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Shorebased IFQ Trawl (Whiting)	12	10	10	14	14	15	17	20	9	9
Non-whiting Trawl	65	57	52	49	49	47	45	36	26	25
Shorebased IFQ Non-trawl									20	19
Non-nearshore FG	202	211	183	198	205	187	201	178	179	203
Nearshore FG	133	153	142	140	131	132	145	124	120	121

Figure 3-13 provides a snapshot of average participation and revenue in 2012 for first receivers and shorebased processors. This information is collected as a requirement of the catch share program and provided by NMFS.

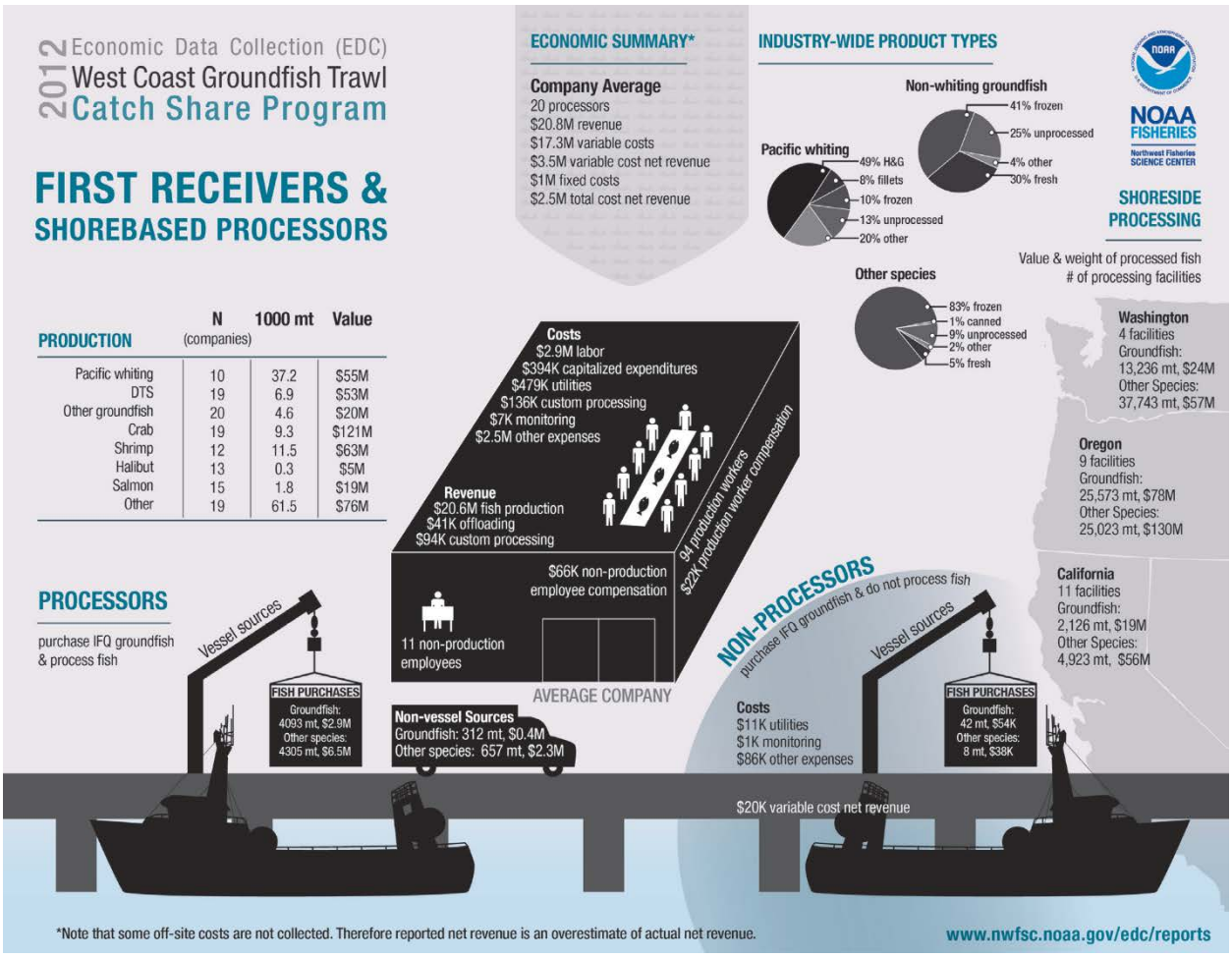


Figure 3-13. Economic Data Collection program summary for first receivers and shorebased processors.
Source: NMFS West Coast Region Trawl Catch Share Program website http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/trawl_program/analytical%20docs/final_economic_data_collection_insert.pdf

In 2012, there were twenty processors and six non-processor companies that received IFQ groundfish. The first receivers and shorebased processors generated $72 million in West Coast income and 1,460 jobs from purchases of fish caught in the trawl catch share program. Processors and non-processors received about 44% of all fish caught commercially on the West Coast in 2012, which was 33% of the total dollar value of all fish purchased. Processors employed the most production workers in the month of August, with an average of 124 production workers per company. The fewest production workers were employed in March, with an average of 65 per company. Processors on average had 11 non-production employees per company. Average variable cost net revenue (revenue minus variable costs) was $3.5 million in 2011 and 2012, which was an increase from $3.17 million in 2009.

3.3.5.4 Fishing Communities

As in the 2013-14 Groundfish Harvest Specifications EIS, fishing communities are described below in terms of landings by IOPAC port group. (See Table 9 in NOAA Technical Memorandum NMFS-NWFSC-111 for ports included in these port groups. The IOPAC Input-Output Model for Pacific Coast Fisheries is used to evaluate personal income impacts of proposed management measures.)

The 18 port groups used in IOPAC are:
Washington State:

1. Puget Sound
2. North Washington Coast
3. South and Central Washington Coast

Oregon:

4. Astoria (and other Columbia River ports in Oregon)
5. Tillamook
6. Newport
7. Coos Bay
8. Brookings

California:

9. Crescent City (North Coast)
10. Eureka (North Coast)
11. Fort Bragg (North Coast)
12. Bodega Bay (North-Central Coast)
13. San Francisco (North-Central Coast)
14. Monterey (South-Central Coast)
15. Morro Bay (South-Central Coast)
16. Santa Barbara (South Coast)
17. Los Angeles (South Coast)
18. San Diego (South Coast)

Fisher characteristics of each state are shown in Figure 3-14.

Dependence and Engagement in Groundfish Fisheries

Within the Council process, economic analyses often separate fishing communities by geography or by sector (e.g., commercial or recreational, treaty or non-treaty, fishing or processing, trawl or FG, purse seine or longline, etc). Regional economic models are employed to assess the amount of economic activity, in terms of sales, income, and employment that is generated by the business operations of economic entities within a particular geographic region. The input-output model is one type of economic impact model that tracks the flow of dollars within a regional economy. With respect to ecosystem-based management, an input-output model can help to evaluate, predict, and assess goals and policies in an inter-connected system of sectors or industries comprising a regional economy. In this sense, it is akin to an ecological food web that characterizes predator-prey interactions within an ecosystem.

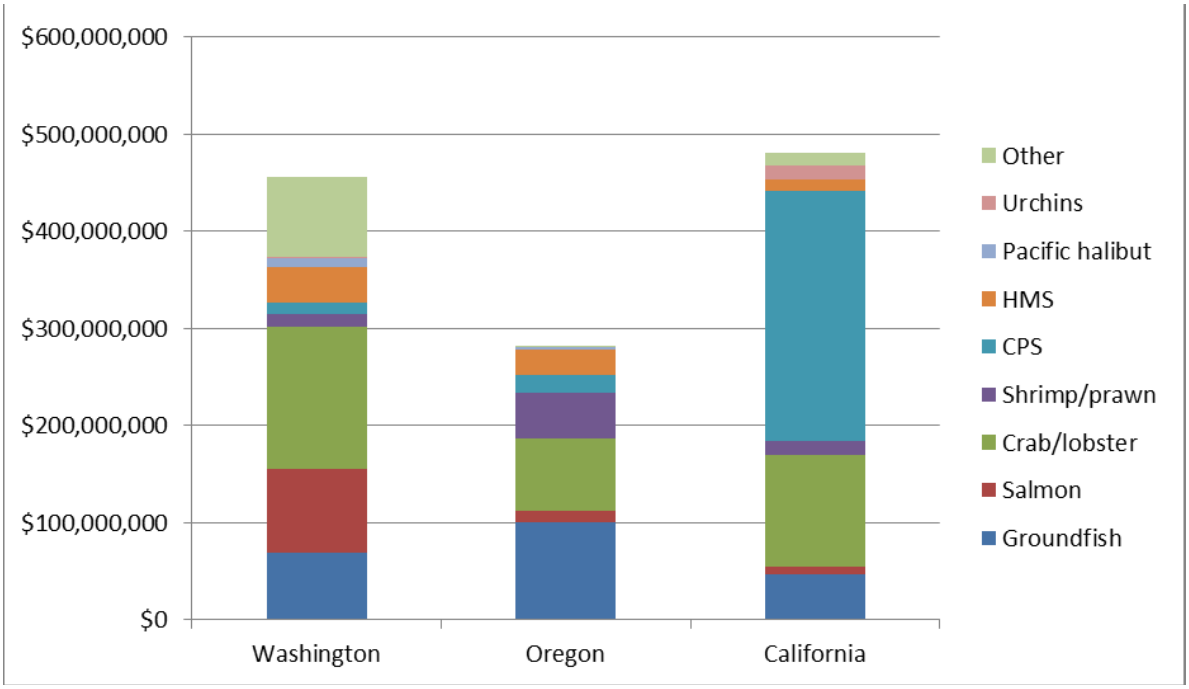


Figure 3-14. State fishery income by species, 2011.

To understand the socioeconomic effects of fishery management actions, the Council uses the Fishery Economic Assessment Model (FEAM), a production-oriented input-output model to estimate the contribution of West Coast commercial fishery sectors to the total income of the coastal communities of Washington, Oregon, and California (Seung and Waters 2005). The FEAM allows for geographic resolution from the state level down to port area within each state. It distinguishes fishery sectors within each geographic area by their corresponding FMP, and where appropriate, disaggregates harvests within a sector according to vessel or gear type and the condition in which they were landed (e.g. alive or dead).

The FEAM[17] provides estimates of the income impacts stemming from the dollar value added to landings of West Coast commercial species as they make their way from the ocean, to the ex-vessel level, and through to the ex-processor level of the fishery. It does this by deriving input-output multipliers, which are used to convert the revenues at each stage of the production process into either: (1) direct income – ex-vessel income generated in the region of interest by the harvesting sector of the fishing industry from landings by species, by port, and by gear; (2) indirect income - income generated in the region of interest by all industries, due to the iteration of industries purchasing from industries in response to landings of a particular species at the ex-vessel level; (3) induced income - the expenditures from new household income within the region of interest, generated by the direct and indirect income effects of landings of a particular species.

[17] The Fishery Economic Assessment Model (FEAM) was developed by Dr. Hans Radtke and Dr. William Jensen to estimate local, state and regional marginal and average income impacts for West Coast fishery landings. The FEAM model is based on the U.S. Forest Service IMPLAN model enhanced with fishing sector coefficients specific to West Coast fisheries. In its current configuration the FEAM was calibrated using coefficients from the IMPLAN's 1998 input-output database, and PacFIN landings extractions for Year 2000.

Here, the FEAM was used to estimate the total income impact from each state's 2011 landings of species targeted by the major commercial fisheries occurring within the CCE (Figure 3-15 and Figure 3-16).

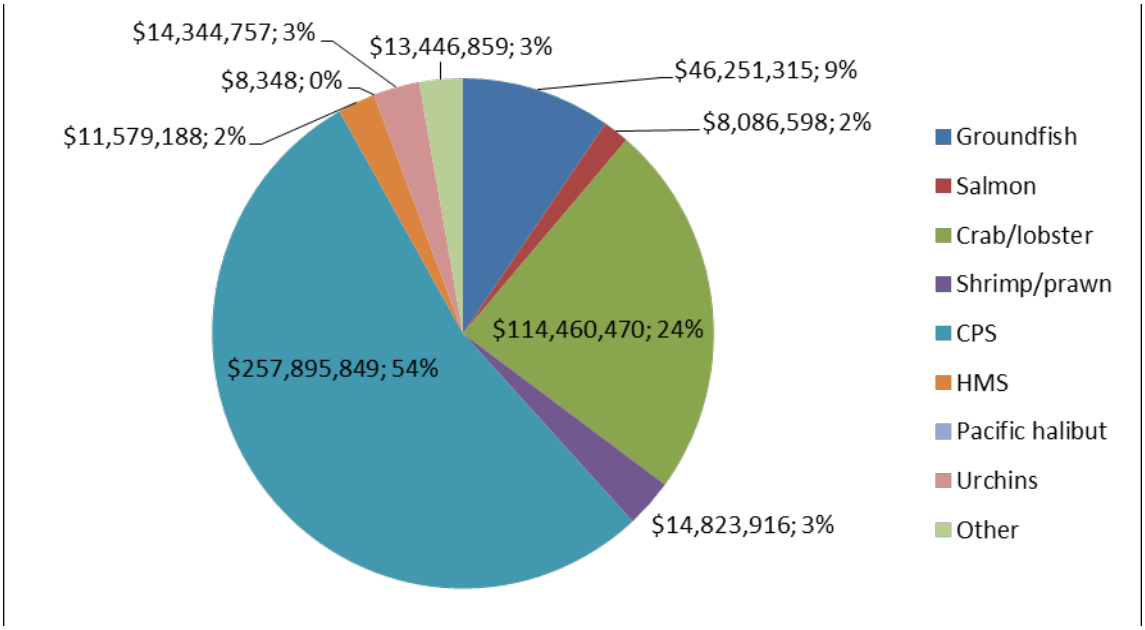


Figure 3-15. Fisheries income information for California by species, 2011.

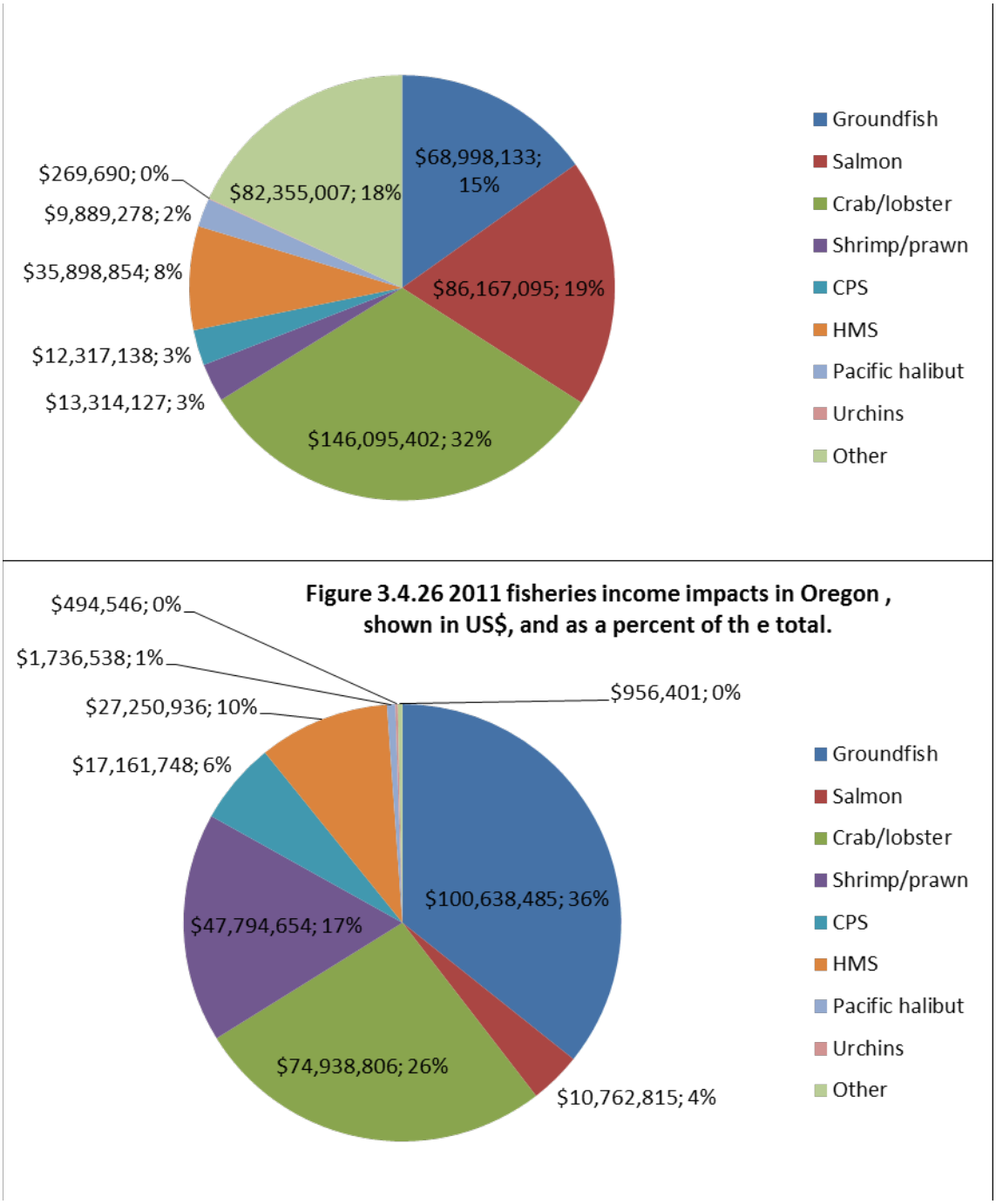


Figure 3-16. Fisheries income information by species, 2011, for Washington (top panel) and Oregon (bottom panel).

Table 23 in the 2014 Groundfish SAFE document (PFMC 2014) presents values for community engagement and dependence on commercial groundfish fisheries. Engagement is defined as groundfish ex-vessel revenue in the port as a percent of coastwide groundfish ex-vessel revenue for the 2003-2012 baseline period. Similarly, dependence is defined as groundfish ex-vessel revenue in the port as percent of total ex-vessel revenue in port during the baseline period. (For these calculations revenues are inflation-adjusted to 2012 dollar values.)

In terms of engagement in commercial fisheries (share of coastwide revenue) South and Central Washington, Astoria, and Newport top the list. In addition, these port areas are where whiting is landed and processes. In contrast, ports with high dependence values are much more geographically dispersed with Morro Bay at the top of the rankings followed by Puget Sound and the North Washington Coast. These ports tend to be mid-ranking in terms of engagement. Southern California ports (Santa Barbara, Los Angeles, and San Diego) are neither highly engaged nor dependent on commercial groundfish fisheries.

Table 3-24 shows that revenue from whiting trawl and the nearshore sector are relatively concentrated in the top-ranked ports at 94 percent and 70 percent respectively (but note that for nearshore the top two ports alone account for 58 percent of coastwide sector revenue).

Table 3-24. Top-ranked ports by groundfish fishery sector, based on inflation adjusted ex-vessel revenue 2003-2012. Percent share of coastwide sector revenue for the entire baseline period shown in parenthesis and total share accounted for by the three top-ranked ports in each category shown in the bottom row. Source: vdrfd 8/27/13 based on method used for data in the 2014 Groundfish SAFE Table 20.

	Whiting Trawl	Non-whiting Trawl*	Non-Nearshore	Nearshore
1	Newport (33%)	Astoria (28%)	Newport (15%)	Morro Bay (31%)
2	So. & Cent. WA Coast (31%)	Coos Bay (13%)	So. & Cent. WA Coast (11%)	Brookings (27%)
3	Astoria (30%)	Newport (12%)	Puget Sound (9%)	Crescent City (12%)
Total share:	94%	53%	35%	70%

*Includes non-trawl IFQ sector in 2011-2012.

3.3.5 Communities with Shorebased Pacific Whiting Processing

The ex-vessel value of Pacific whiting in the shorebased fishery has roughly doubled in value since implementation of the Shorebased catch share program increasing from $9,691,000 in 2010 to $26,539,000 in 2013 (Table 3-25). In 2010 there were seven port comunities that received Pacific whiting taken with midwater trawl. By 2012, only four port community were receieving Pacific whiting taken with midwater trawl. The three most southern comminities (Crescent City, Eureka, and Coos Bay/Charlston) have not received landings since 2011.

Table 3-25. Pacific whiting midwater trawl Landings and Ex-vessel Value for all Ports 2010-2013 (Pacfin 10/28/2014 query)

Year	Landings (mt)	Revenue (1000s of dollars)
2010	62,319	9,691
2011	91,060	21,935
2012	65,628	20,322
2013	97,886	26,539

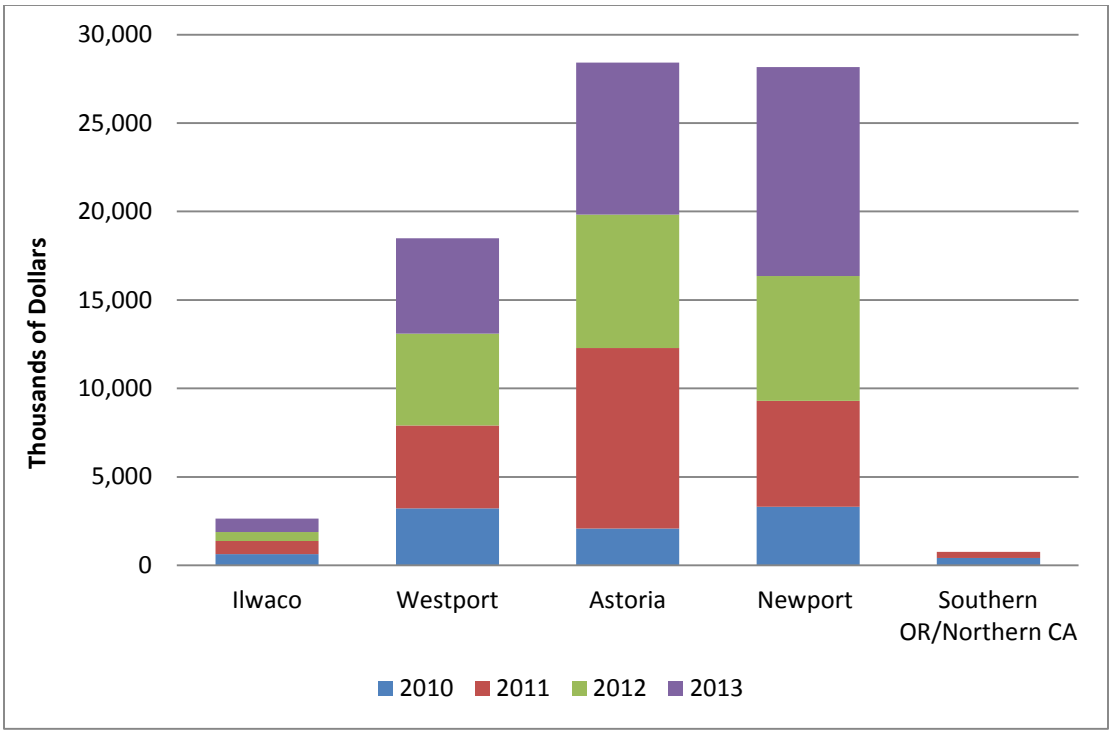


Figure 3-17. Pacific Whiting Ex-vessel Value by Community 2010-2013 (Pacfin 10/28/2014)

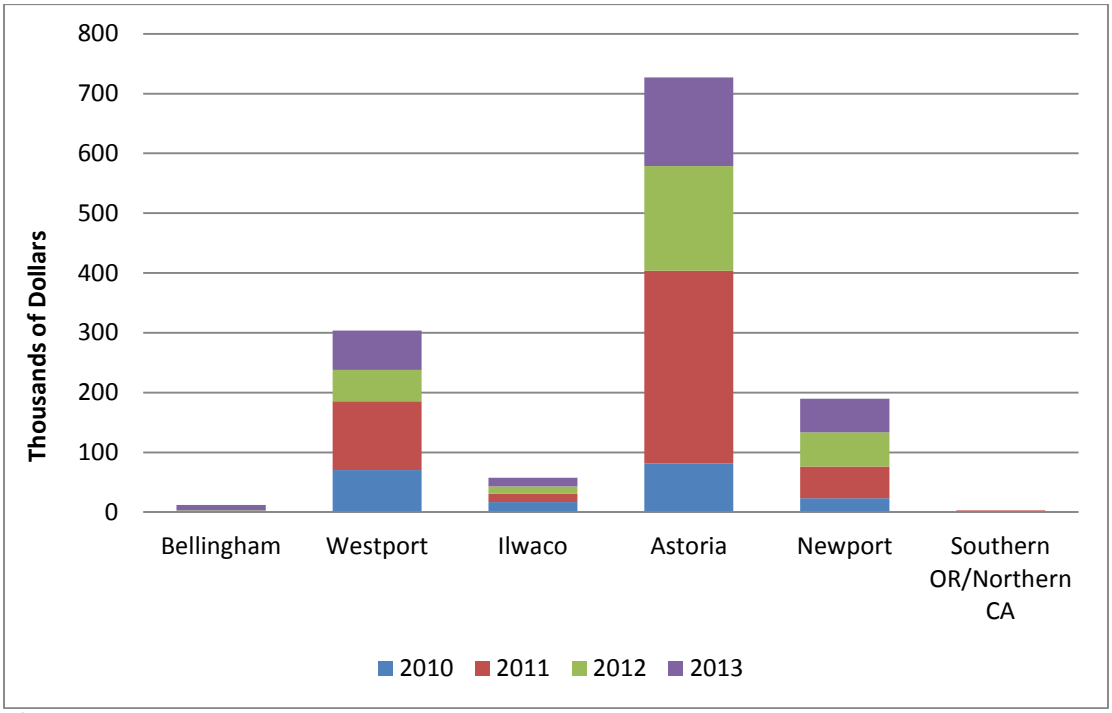


Figure 3-18. Yellowtail and Widow Rockfish Ex-vessel Value by Community, Includes Landing from Pacific Whiting and non-whiting Midwater Trawling. (Pacfin 10/28/2014)

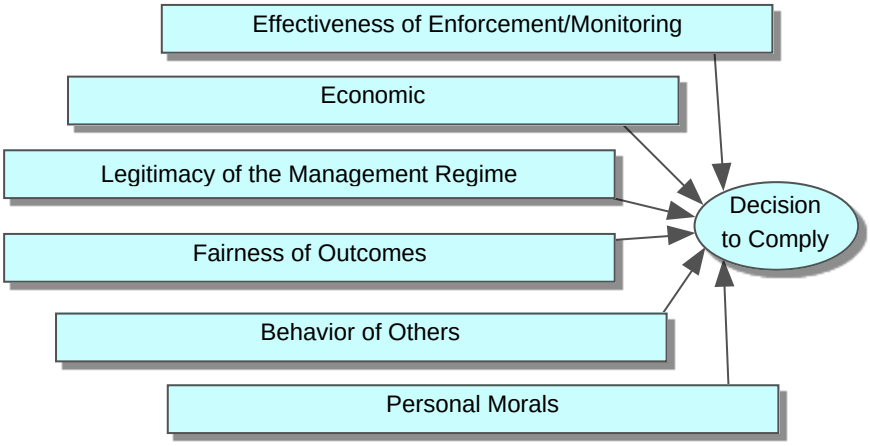
Relative to the overall value of all commercial fishing (Table 3-26), the importance of Pacific whiting revenue, and yellowtail/Widow Rockfish revenue varies by community. From 2010 to 2013 Pacific whiting landings were more important relative to the contribution to all commercial fishing revenue in the ports of Astoria (16 percent) and Newport (17 percent). During this same period, Pacific whiting

was less important relative to the contribution to all commercial fishing revenue in the ports in southern Oregon and California, Ilwaco (3 percent), and Westport (8 percent).

Table 3-26. Value of all Commercial Fish by Community, 2012 and 2013 Millions of Dollars (NMFS 2014b)

Port	2010	2011	2012	2013	Sum
Westport, WA	39	61	59	65	224
Ilwaco, WA	18	24	22	30	94
Astoria, OR	31	44	39	50	164
Newport, OR	31	44	37	55	167
Coos Bay/Charleston, OR	24	36	27	34	121
Eureka, CA	NA	9	25	25	--
Crescent City , CA	NA	9	28	34	--

3.3.6 Six Factors Influencing Compliance and Effect of Compliance on Quota Transfers



As the Council considers how the current system is performing and the risk of any changes to the program, it is important to consider the issue of compliance. This discussion focuses on six types of factors identified by Randall (2004) as affecting compliance, only one of which (effectiveness of enforcement/monitoring) may be directly affected by the change to EM. Two other factors (economic and behavior of others) may be indirectly through effectiveness of enforcement/monitoring.[18]

Enforcement/Monitoring. The expected cost of getting caught is also a function of the effectiveness of the enforcement and monitoring system. There are three main influences on the effectiveness of enforcement: the effectiveness of the particular enforcement agency (agencies have different reputations), the type (whether it is at-sea or shoreside), and frequency of inspections/contacts. For EM, the enforcement agency effectiveness might also include the expected effectiveness of video cameras and the entity doing the video review (e.g. the agency or a contractor); and frequency would be the sampling rates used to verify logbooks under Alternative 1b (or verify compliance with discard prohibitions under Alternative 1a). The enforcement penalty associated with a conviction might be considered part of the enforcement system, but here we have included it as an economic factors.

Economic. There are three main factors influencing the fishermen's assessment of the economic situation with respect to compliance: the potential additional profit, the expected cost of getting caught, and economic stress (utility of additional income). The benefits from noncompliance relative to the size of penalty for cheating and the fisherman's degree of risk aversion determine

[18] The discussion provided here loosely follows Randall's model.

the economic yield. As with all of the factors, the economic factor alone does not determine the outcome but is only one potential influence. For example, Randall reports that in a New England system in which there was an extensive culture of violations there was still a core of fishermen who maintained integrity with the regulations.

The action alternatives will modify the effectiveness of the enforcement and monitoring system in an uncertain manner. There are reasons to believe that there are ways that cheating can occur when an observer is on board and there may be ways that cheating can occur when monitoring is carried out with cameras.

Legitimacy of the Management Regime. There will tend to be more compliance when management regimes are considered legitimate. Legitimacy is positively influenced when stakeholder input is seen to have an influence on outcomes, when stakeholders are fairly represented in the process, when the scientific information on which management is based is viewed as being credible and when external influences (court and political interventions) are at low levels. Fairness of procedure influences the view of legitimacy of the management regimes.

Fairness of Outcomes. Fairness of outcomes of the management regime related to the equity and practicality of the management regulations.

Behavior of Others. As with most people, fishermen may be influenced toward violations when they observe others violating the regulations. Under such circumstances, when there are significant ongoing violation patterns, there may be less likelihood that any one person may be caught and with morality erosion the patterns become a behavioral norm. Alternatively, when there is good compliance already in the fishery, behavioral norms may encourage more fishers toward compliance.

From a narrower view, compliance is a function of frequency of contact rates and the penalty for getting caught (Becker, 1968). Low frequencies require high penalties to achieve compliance. Kuperan and Sutinan (1998) reviewed literature indicating that in fisheries, contact rates are generally below one percent and the penalties are not severe enough to lead to compliance solely on the basis of an economic calculation. Yet they note that compliance rates are believed to be in the 50 to 90 percent range and attribute this to fishermen's tendancy to "do the right thing" out of a "sense of moral obligation" p. 312.

Personal Norms. "Fishermen often choose to comply with the rules regardless of the tangible incentives [for noncompliance]" (Randall, 2004). Personal norms, while influenceable to some degree by current behavior of others, are also established much earlier in a person's life experience and are influenceable up to a limits (which vary by individual).

While enforcement and monitoring is the only factor that directly affects compliance, it has indirect influence with respect to economics (the probability of incurring financial penalties) and collective behavior, the latter of which influences the expression of personal norms.

Individual accountability is one of the main emphases of the trawl rationalization program. However, there are also collective dynamics which occurs through systems which link the fishermen together. Two of primary systems which provide that connection are the conditions of the fish stocks and prices in the market, and in particular, the prices for quota. With regard to quota prices, to the extent that those

who are not compliant with the program achieve an advantage over others, the quota will be more valuable to them and they will be willing to pay more, bidding the price up in the market and bringing more quota into the hands of those who are not compliant.

CHAPTER 4 **ENVIRONMENTAL CONSEQUENCES**

This chapter evaluates the impacts of the alternatives on the various environmental resources. For each resource component, the analysis identifies the potential impacts of each alternative. If significant impacts are likely to occur, preparation of an EIS is required. Although an EIS should evaluate economic and socioeconomic impacts that are interrelated with natural and physical environmental effects, economic and social impacts by themselves are not sufficient to require the preparation of an EIS (see 40 CFR 1508.14).

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

The impact analysis focuses on three areas:
1) Impacts on the Physical
2) Impacts on the Biological
3) Impacts on the Socio-Economic

A general impact statement is provided in each section and then the alternatives are analyzed. The analysis focuses on the potential impact on the physical, biological and socio-economic environment for each alternative and options compared to the no action alternative.

Sections 4.1 through 4.3 of this document discuss the direct and indirect impacts on the physical, biological, and socio-economic environment that are likely to occur under each of the proposed alternatives, including the No Action alternative. Section 4.4 presents the cumulative effects of the environment from the proposed alternatives.

In general, landing more fish that are undesirable by the fish processors (under maximized retention) may have an impact on processing plants financially through additional handling and trucking of fish. Additional costs to dispose of fish may be passed on to fishermen or born by the processing facility. It’s

possible that fish meal may be utilized in other ways to help off-set the cost of trucking and handling the surplus of fish that are generally unmarketable.

Impacts to essential fish habitat (EFH) or marine habitats are not expected to change as a result of the proposed actions since fishing practices and areas fished are not expected to change significantly. Fishing practices (number of hooks, pots, trips, set/hauls) are not expected to significantly change under all options using EM. Fish handling on deck may take more time under all retention options to accurately identify and estimate species weights before they are discarded.

4.1 Impacts on the Physical Resources

The physical environment is described as the marine environment in the area of operation of the fisheries described in this document and includes California Current Ecosystem, the Essential Fish Habitat (EFH), and Habitats of Particular Concern (HAPC).

4.1.1 Impacts to California Current Ecosystem

4.1.1.1 Impacts of the No Action Alternative and Alternatives 1a, 1b, 2a, and 2b

Under the No Action Alternative and the action Alternatives 1a, 1b, 2a, and 2b, fishing would continue as described Section 3.2.4 of the FEIS for 2015-2016 Harvest Specifications. Under the No Action Alternative fishing operations (area fished, effort, gear used, and number of trips or hauls) are not expected to change noticeably; therefore, impacts to the physical environment are not expected to change under the No Action Alternative or Alternatives 1a, 1b, 2a, and 2b.

4.1.2 Impacts to EFH and HAPC

4.1.2.1 Midwater Trawl Whiting Fishery

No Action
Impacts under the No Action alternative would be the same as analyzed in previous NEPA documents, EFH Amendment 19 (PFMC 2006) and the Amendment 24 2015-16 Harvest Specification EIS (PFMC 2015). This information is summarized in section 3.1.3 of this document. No changes are expected to fishing behavior regarding area fished or gear used. The fishery is not likely to change the method in which the gear would be used and it is not likely to come in contact with the sea floor.

Alternatives 1a and 1b
Under alternatives 1a and 1b impacts to EFH and HAPC would be the same as No Action. The proposed action largely focuses on monitoring discard activity. Alternatives 1a and 1b would implement an EM program that is a framework for an alternate way to conduct at-sea monitoring of discard on catcher vessels and submit the data for total catch accounting of the two sectors (shoreside and mothership).

Impacts to the physical environment including essential fish habitat (EFH), and other marine habitats and are not expected to change as a result of the action alternatives since fishing operations (area fished, effort, gear used, and number of trips or hauls) are not expected to change noticeably. Impacts would be similar to the No Action Alternative.

Generally fishermen try to avoid high bycatch areas or schools of fish that are not whiting. Both action alternatives would preserve the incentives for this behavior, so a change in fishing behavior is not

expected under the EM program. Increases in gear loss or contact with the ocean floor is not expected to change under the proposed action; therefore, this action is not likely to result in changes to the physical environment beyond the considerations discussed in the 2015-2106 Harvest Specification EIS. The EIS examined current fishing practices of the west coast groundfish fisheries under the Council's fishery management plan, associated impacts to changes in harvest specifications for years 2015 and 2016, and discussed potential changes to EFH designations.

4.1.2.2 Fixed Gear

No Action

Impacts under the No Action alternative would be the same as analyzed in previous NEPA documents, EFH Amendment 19 (PMFC 2006) and the 2014 Harvest Specification EIS (PFMC 2014). This information is summarized in section 3.1.3 of this document. No changes are expected to fishing behavior regarding area fished or gear used. The fishery is not likely to change the method in which the gear would be used and it is not likely to come in contact with the sea floor. Although effort in the fixed gear fishery has increased over time since the FEIS was developed, sensitivity indices and impact recovery rates are not expected to be different than the previous estimates.

Alternatives 2a and 2b

Under alternatives 2a and 2b impacts to EFH and HAPC would be the same as No Action.
Impacts to the physical environment including essential fish habitat (EFH), and other marine habitats and are not expected to change as a result of the action alternatives since fishing operations (area fished, effort, gear used, and number of trips or hauls) are not expected to change noticeably.

4.2 Impacts on the Biological Resources

Effects on the biological environment primarily include potential changes in species total mortality levels resulting from implementation of the alternatives. Implementation of an alternative that changes fish retention and discard requirements could have a direct biological effect; however, the fisheries would continue to operate under current ACLs and IFQ limits. Accounting for IFQ, overfished, prohibited, and protected species are analyzed under each alternative.

Indirect effects from fishery management actions include changes in fishing practices that affect the biological environment, but are further away in time or location than those occurring as a direct impact. Indirect biological impacts could result if catch data were inaccurate or delayed such that fishery specifications (bycatch limits, species allocations, OYs, and biological opinion thresholds) could not be adequately monitored. If a fishery specification were exceeded, the magnitude of the impact would depend of the status of the stock (healthy, precautionary zone, or overfished), the proportion of allowable fishing mortality represented by fishery specification that was exceeded, and the stock's sensitivity to changes in fishing mortality. If other groundfish fisheries outside the catch share program could not be effectively managed to stay within the same fishery specification, cumulative indirect impacts could result.

Impact topics analyzed for each fishery and corresponding alternatives are divided into the following sections:

- 4.2.1 Impact to Target Species (based on retention requirements and IFQ accounting accuracy)
- 4.2.2 Impacts to Non-Target Species

- 4.2.3 Impacts ESA-Listed Species and Protected Species
- 4.2.4 Impacts to Prohibited Species

The analyses focuses on a few key impact mechanisms (Table 4-2):

- Total mortality accounting for IFQ species
- Change in precision and accuracy in accounting at Annual Catch Limit (ACL) and IFQ levels
- Change to individual accountability
- Accounting of overfished and rebuilding species
- Accounting of prohibited and protected species
- Risk of missing discarded fish
- Risk of exceeding an ACL
- Risk of affecting data used for stock assessments

4.2.1 **Impact to Target Species**

Each fishery is examined for impacts to fish resources. The main impact is whether EM will capture the information needed to monitor IFQ species and include this information into the total mortality estimate. The main concern for accurately estimating total discard of IFQ species is whether the vessel is allowed to discard and how accurate that estimate is using EM vs. a fisherman's estimate in a logbook.

4.2.1.1 Whiting Fishery and IFQ Fixed Gear - No Action Alternative (Status Quo)

Under No Action for both fisheries, the fisheries would continue as status quo. There would be no changes to fishery monitoring and accounting. Vessel's would still be required to have a limited entry permit with a QS permit and must have quota pounds in their account to continue fishing under the IFQ Program. Under the No Action Alternative, participants in the catch share program must continue using human observers on 100% of all IFQ trips to estimate discard and maintain individual accountability. Observers would continue to estimate catch and discard at sea to provide full accounting of all IFQ catch and submit this information to PSMFC, and NMFS would debit IFQ QS accounts. Catch monitors would still be required to monitor offloading and verify catch accounting by observers. Fishermen would still be allowed to discard minor operational discards under the current groundfish regulations. Fishermen would continue to use existing procedures regarding logbook reporting requirements for permit holders/vessel operators, to submit this information along with economic data, and be required to use VMS.

Total mortality is not expected to change under No Action for either fishery. Total mortality under the current catch share program has not resulted in exceeding current ACLs or IFQ limits. Only three IFQ species (petrale sole, Pacific whiting, and sablefish) had fishing mortality estimates that were between 80 to 100% of the ACL goals whereas all other IFQ species were harvested at less than 50% of their ACL goal (Figure 4-1). It's likely that mortality levels in the IFQ fishery will remain at this level under the No Action. Mortality levels would likely remain similar to current estimates in NMFS 2013 Estimated Discard and Catch of Groundfish Species in the MS and shorebased sectors and levels would be commensurate with any increases or decreases in available ACLs or IFQs (See Table 3-5 and Table 3-6). Yellowtail rockfish, spiny dogfish, widow rockfish, and jack mackerel dominate the bycatch. Overfished species catch include pacific ocean perch, canary rockfish and darkblotched rockfish.

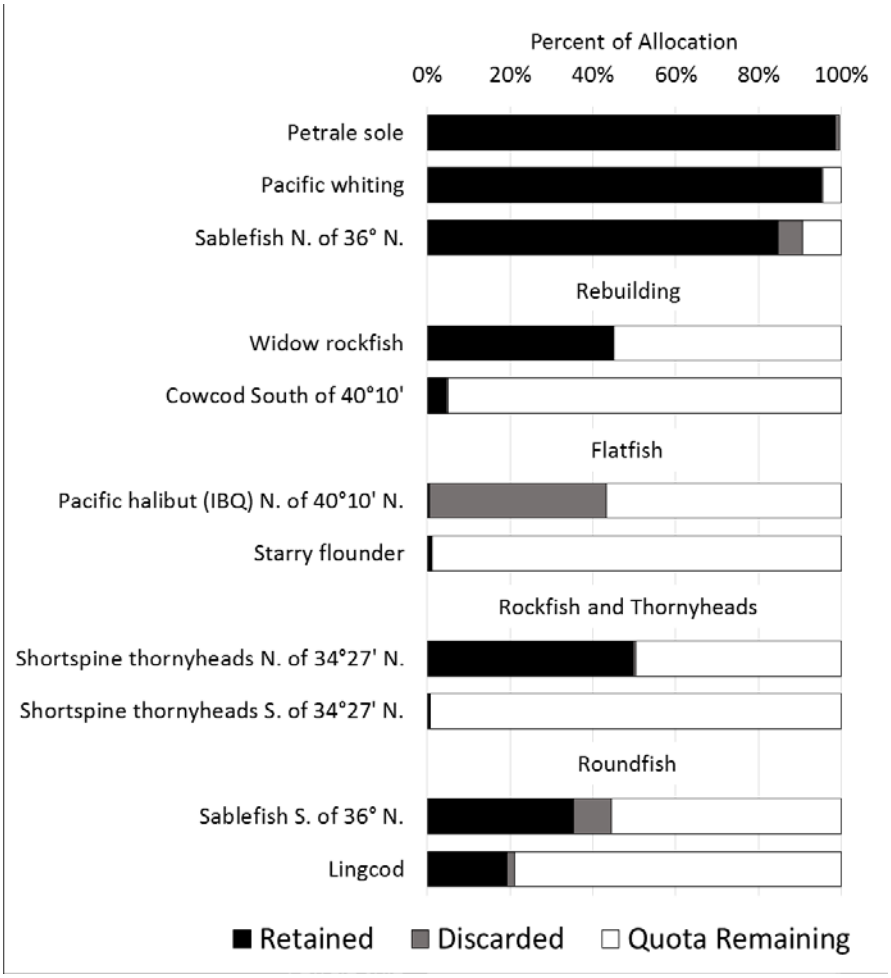


Figure 4-1. Percent of 2012 IFQ ACLs retained and discarded in the 2012 IFQ fishery.

Source PSMFC powerpoint, PFMC Council meeting November 2013)

Observers can miss discarded fish at times as noted in the PSMFC report 2014; however, at this time the information that is being used to manage the fishery is considered adequate for monitoring ACLs and IFQs. The risk of exceeding ACLs or IFQs under the No Action Alternative is low.

4.2.1.2 Whiting Fishery Action Alternatives Impacts on Target Species

Effects on the biological environment from fishery management actions primarily include potential changes in the estimation of total species mortality, certainty in the data produced from the logbooks or video, and their effect on the accuracy of IFQ and catch allocation accounting.

Table 4-1 provides a summary of the alternatives and options that may affect the biological environment. Many EM components are administrative and would not directly affect the biological environment so they are not considered in the biological impact analysis. We analyze each alternative regarding the video reading protocol options, retention requirements and discard accounting options. Indirect effects of the alternatives are also analyzed for biological impacts, such as the reduction in the level of biological sampling of the fleet and changes in sampling methods to estimate bycatch of protected species and total mortality.

Table 4-1. Table of alternatives for the midwater trawl whiting fishery with EM components that may affect the biological environment.

Analytical Scenario (AS)	**No Action (Status Quo)**	**Alternative 1a with Council Preferred Options**	**Alternative 1b with Council Preferred Options**
Discard Documentation Technology and Coverage	Human observers	**Alternative 1a -** Camera Recordings Used to Estimate Discard	**Alternative 1b** - Logbooks Use to Estimate Discard, with Camera Audits
Video Reading Protocol (percent review)	None	**Option A**. 100% video census for whiting with discard logbook	**No Options** – Implementation of 100% review of all video to audit logbook entries. Level of compliance review is determined by NMFS in future.
Retention Requirements	Maximize retention and sort at sea	**Option A: Maximized Retention**	**Option A: Maximized Retention**
Halibut Retention/Discard	For Max Retention:100% retained, 100% mortality; For sort at sea: discard, 100% mortality	**Option A: Discard Exemption (100% retained, 100% mortality)**	**Option A: Discard Exemption (100% retained, 100% mortality)**
Discard Accounting - Individual or Fleetwide	Human observers	**Option A.** One Discard Category for Whiting Shoreside and Mothership Sector. Aggregate discard estimate with species composition applied to the estimate.	**Option A.** One Discard Category for Whiting Shoreside and Mothership Sector. Aggregate discard estimate with species composition applied to the estimate.

In general, impacts of both Alternative 1a and Alternative 1b on the biological environment are expected to be similar to the No Action Alternative (the status quo of using 100% human observers). The current level of impacts that the fishery has on the biological environment would likely not change due to implementation of an EM program, including the Council's preferred alternative and options (Alternative 1a). Mortality levels are likely to remain the same under all alternatives; however, it's possible for some fish to not be accounted for under either action alternative. For example, if fish are not seen by the reviewer when enumerating small amounts of bycatch in the video data (Alternative 1a) or if an audit of the logbook data does not capture inaccurate accounting in the logbook (Alternative 1b).

Similarly, impacts under both Alternatives 2a and 2b (fixed gear) on the biological environment are expected to be similar to the No Action Alternative (the status quo of using 100% human observers). Some additional mortality of IFQ species could be realized if maximum retention was required. However, most of the species currently discarded under the status quo would not result in exceeding current ACLs or IFQ limits.

Table 4-2. Summary of impact mechanisms and the effect of each alternative for the midwater trawl whiting fishery.

Impact Mechanism	No Action	Alternative 1a	Alternative 1b
Total mortality accounting for IFQ species	No change	No change	No change
Accounting of overfished and rebuilding species	No change	Likely no change or slight increase in inaccurate accounting (potential for missing some discard if no other species are landed to apply species composition; potential for inaccurate estimates for MS minor discard events)	Likely no change (potential for slight change, depends on accuracy of logbooks and level of audit relative to similar issues with accuracy of observers, their logbooks, and their debriefing.)
Accounting of prohibited and protected species	No change	Likely no change or slight increase in inaccurate accounting (potential for missing some discard if no other species are landed to apply species composition; potential for inaccurate estimates for MS minor discard events)	Likely no change (potential for lower precision but depends on accuracy of logbooks and on level of audit; depends on WCGOP observations for protected species)
Change in precision and accuracy in accounting at Annual Catch Limit (ACL) and IFQ levels	No change	Likely no change	Likely no change

Risk of missing discarded fish	low	low	low
Risk of exceeding an ACL	low	low	low
Risk of affecting data used for stock assessments	low	Indirect (low to medium based on WCGOP scientific observation sampling)	Indirect (low to medium based on WCGOP scientific observation sampling)
Change to individual accountability	Likely no change	Likely no change	Likely no change

Alternative 1a - Impact on Total Mortality

Under Alternative 1a, maximized retention would be required. The fishery would operate in the same manner as the status quo whereby all fishermen currently opt to use maximize retention rather than sort whiting at sea. Under this alternative, the video data would be used to estimate discards that occur for safety reasons or by accident. Extensive data has been used to estimate discards in the whiting fishery from 2004 to 2010 (McElderry 2010) and via PSMFC field studies (PSMFC 2014). The results prove up that video data is a good source for accurate discard monitoring of the whiting fishery. Therefore, it's expected that total mortality estimates would be similar to the No Action.

Under Alternative 1a, video documentation of the discard events would be reviewed to identify and enumerate the discard through a census of all video. It's possible that Alternative 1a may provide more accurate estimations of discard or increase the accountability of IFQ species total mortality accounting than under the No Action because video monitoring may capture discard events that a catch monitor (at-sea observer) may not see. However, in some cases, an observer has provided more discard data than the video. The PSMFC field studies compared observer estimations with EM estimation of discard for the shoreside and MS fisheries (PSMFC 2014, F2b_PSMFC_Rpt_JUNE2014BB); both data sources miss discards (Figure 4-2 and Figure 4-3).

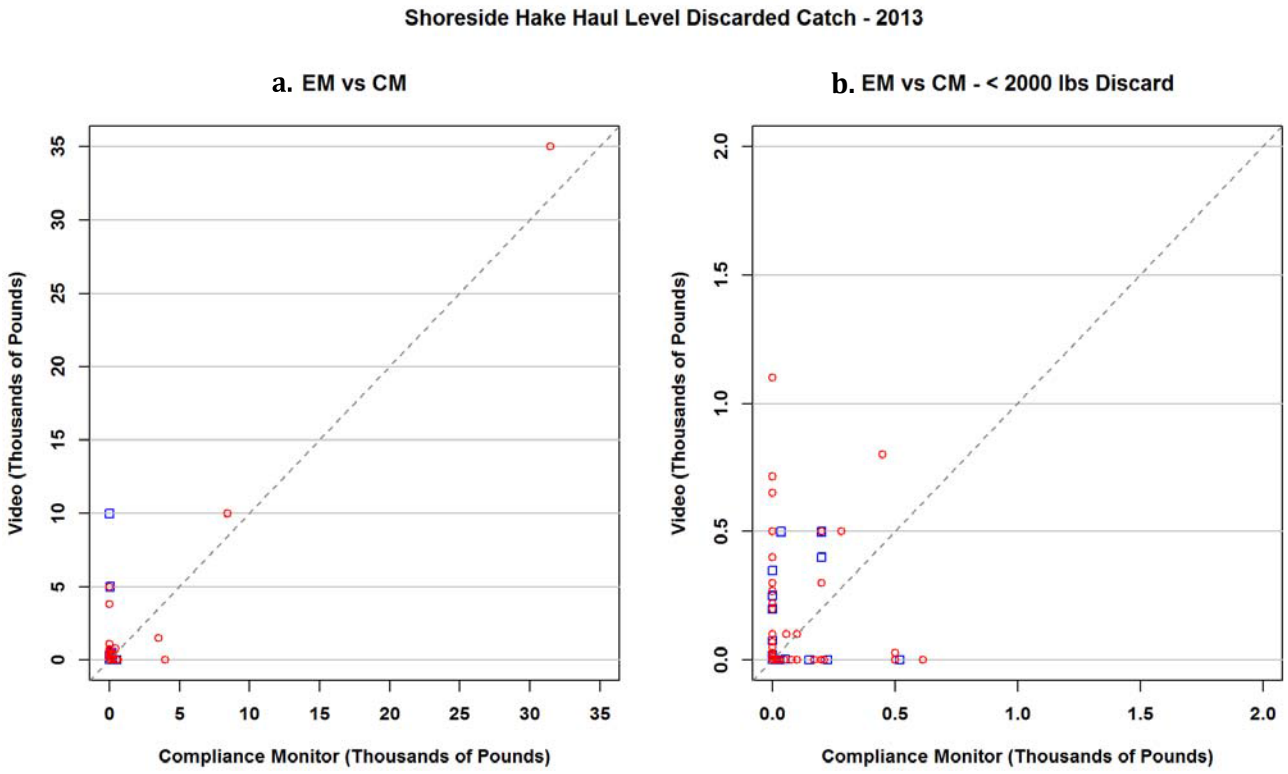


Figure 4-2. Shoreside Hake 182. Comparing on-board compliance monitor haul level discarded catch estimates with video reviewer estimates of all species aggregated to the haul level. Figure b. is the same data as figure a. with different axis scales to show the data clustered in the bottom left corner of figure a.

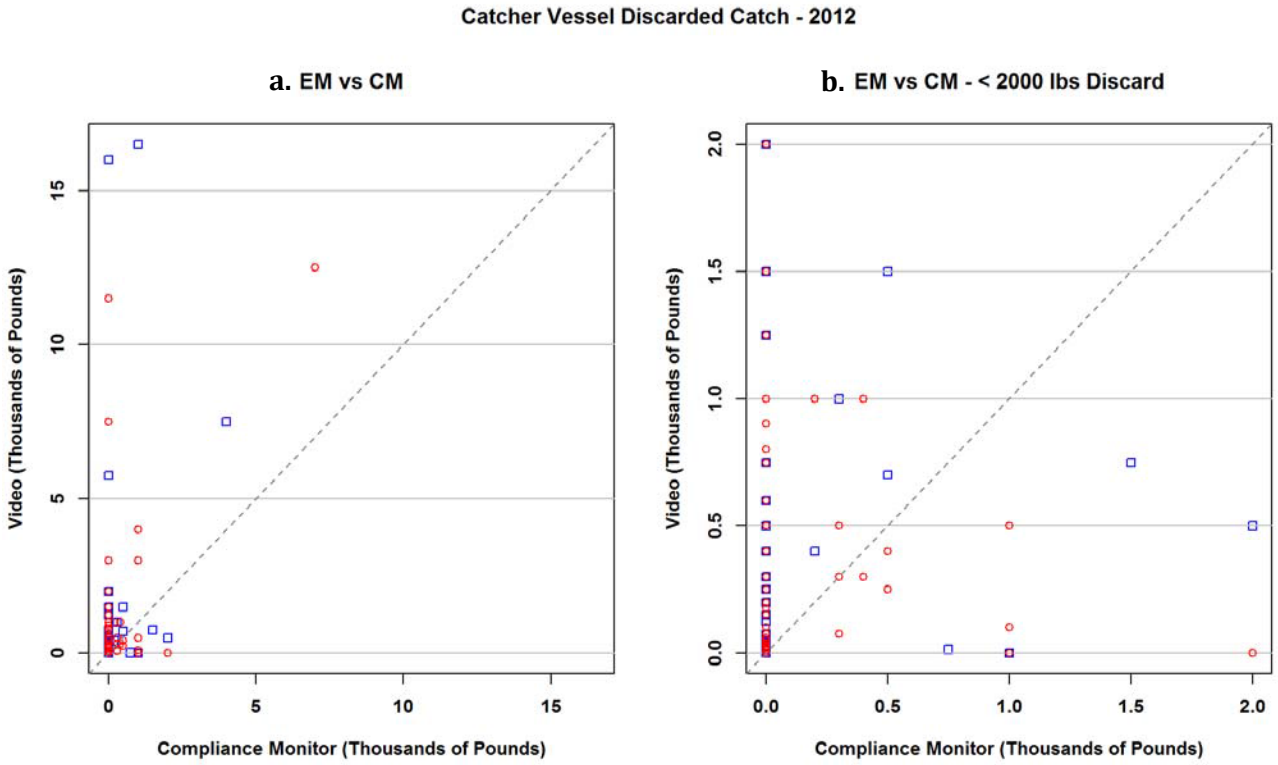


Figure 4-3. Mothership Catcher Vessel 2012. Comparison of compliance monitor and video discarded catch weight of all species aggregated to the haul level. Figure b. is the same data as figure a. with different axis scales to show the data clustered in the bottom left corner of figure a.

Sometimes the video captures the data but the observer does not. This can happen when, due to safety reasons, the observer cannot go to the rear of the vessel to observe unintentional discard or it's difficult to see and quantify discards that are in the water from the low angle of standing on the deck of the boat. It is important to note that the EM system has cameras mounted on the aft gantry that provide a long field of view behind the vessel that the observer cannot get. Also, the EM system has multiple views of the vessel and the water at once and can be reviewed multiple times if needed to get an accurate estimate of total discards. At times the observer has documented discards yet the video did not. This was due to poor image quality, crew blocking camera, or the EM system not being turned on. These issue tend to be minor in number and can be easily avoided or corrected through captain/crew education and adjustments in camera placement.

Confidence in the data is directly related to risk. There is some risk of increased mortality if fish discarded are not accounted for. Even under 100% video review, some discards can be missed by a video reviewer or the video image can be affected as noted Figure 4-4. The figure provides a the level of confidence in the data collected in the PSFMC field study and provides an analysis for the reasons for low confidence in the data. Much of the low confidence was related poor image quality, especially at night during shoreside hake (whiting) hauls in 2012 or if the crew handled the fish out of direct view of the camera. The reason for low confidence in the video images for the mothership the main issue was poor camera angles. Most of these issues were resolved in 2013. There will always be some image quality issues due to glare, night lighting or water on the camera lens; however, confidence levels in the high and medium range for the shoreside and mothership sector was 90% or more.

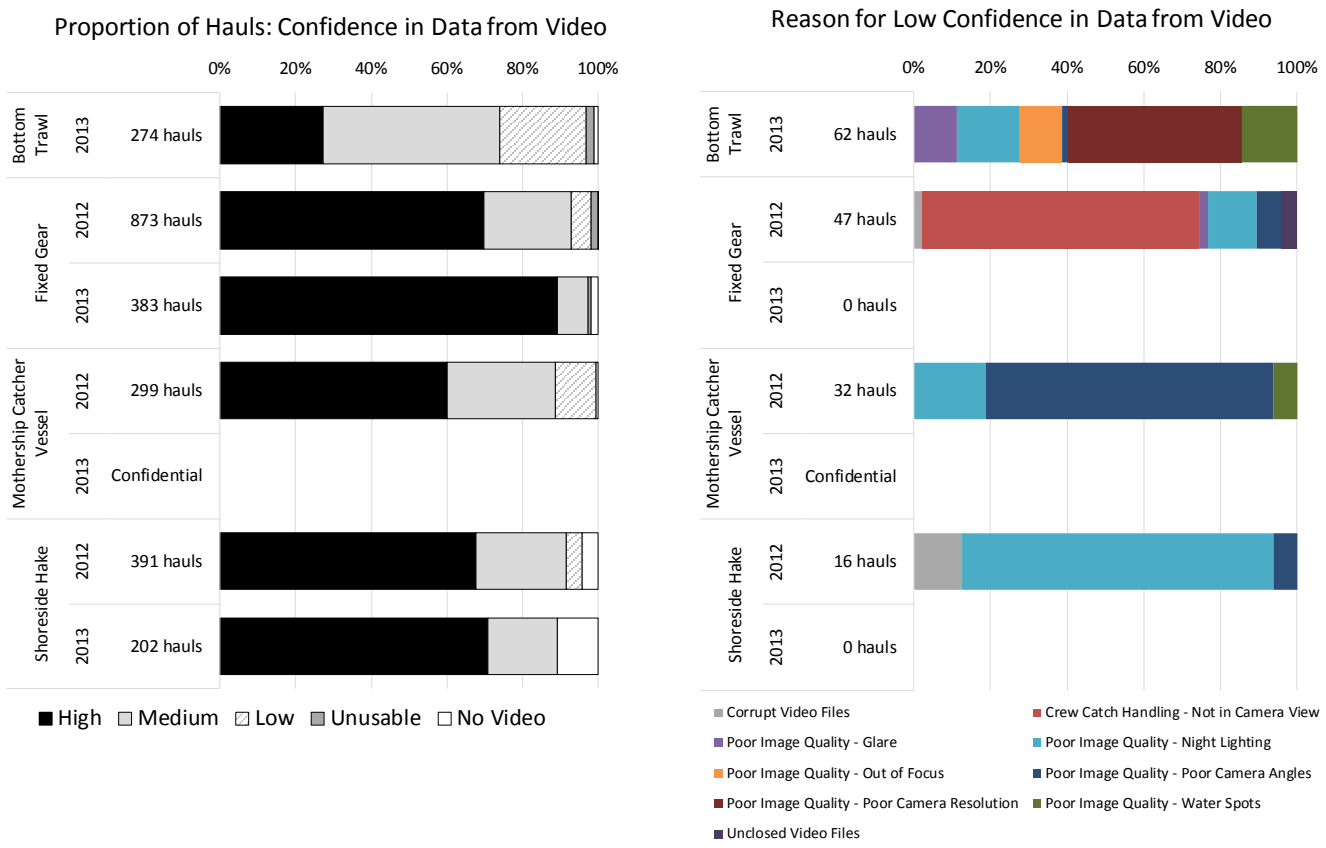


Figure 4-4. Distribution of confidence in data from video in all fisheries in all years (left). For hauls labeled low confidence, distribution of reason for low confidence in video (right).

Speciation of minor amounts of a species (e.g. sablefish) during a discard event can be difficult in a large volume fishery. The primary challenge is to estimate rare events (e.g. catch of an overfished species such as yelloweye). There is a reasonable probability that the event may be missed even at a 100 percent review rate; however, we expect the risk of increasing total mortality to a level that would exceed IFQs, ACLs or catch allocations to be low.

Total mortality would not increase under Alternative 1a. Total mortality would likely remain similar to the No Action Alternative since vessel operations are not likely to change under the video reading protocol of 100%. Based on the PSMFC field studies (2014) and McElderry et al. (2014) discard can be accurately estimated through video review if those discards are 2,000 pounds or larger. Discards less than this can be difficult to estimate but, when combined with total catch, these smaller discard event estimations would likely not cause exceedance of IFQs, ACLs or catch allocations. Fishery operations in the both the shoreside and mothership whiting fisheries are well documented through EM; therefore, the average fleet-wide and vessel specific volumes of whiting and bycatch that are annually discarded are known. These minor discard events are discussed and displayed in section 4.2.1.2.

If there are no discrepancies between the two data sources then the logbook data is used to debit the QP account. Protocols for resolving discrepancies would be used by NMFS and video reviewers. NMFS developed the following standards for comparison of logbook with EM data when conducting video reviews and estimating total discard. These business rules were applied to comparisons of logbook and EM discards on whiting trips (Table 4-7) and to determine which data will be used for debiting allocations of IFQ species.

Table 4-3. Business Rules for Pacific Whiting IFQ Trips

Species/Group	Rule
Total weight of discard	If a discard is reported on EM, but not in the LB, use the EM estimate. If a discard is reported in the LB, but not by EM, use the LB estimate.
Total weight of discard	If the absolute difference between LB and EM is 10% or less of the EM estimate, use LB. If absolute difference is greater than 10%, use the larger of the two estimates.
Total weight of discard	If there is no EM estimate (e.g., due to EM system failure), use LB estimate.

LB = logbook, EM = electronic monitoring

On whiting trips, the business rules were applied to the total weight of the discard, before species composition is extrapolated from the fish ticket, because whiting discards are not reported to species. The comparison is made at the trip level for shorebased trips and at the haul level for MS/CV trips. A haul level comparison for shorebased trips would also be appropriate, but would require time-consuming matching of the hauls between the two datasets. In order to debit vessel accounts as soon as possible, NMFS applied the business rules to trip-level comparisons.

Alternative 1a – Impact on Total Mortality from Discard Accounting Options

The EM component under Section 2.2.2.2 includes a couple options to change how the discards are accounted for in the data management system. The current system accounts for all discard by debiting the estimate during the fishing season (in-season) and from the IFQ or catch allocation for each sector.

Option A - Shoreside and Mothership IFQ accounting (*Council Preferred*)

Under Alternative 1a for the shoreside and MS fishery all fish that are discarded would be accounted for under the catch share program and count against the sector allocations during the fishing season. All bycatch of IFQ species would be debited from IFQ accounts and coops would monitor bycatch amongst themselves to manage vessels within the coop bycatch pools.

We expect that the discards for the shoreside and MS sector under Alternative 1a would be similar to No Action. For example in the MS fishery for 2014, the WCGOP calculated that 244 mt were discarded, and in 2013 and 2012, 174 mt and 155 mt were discarded, respectively. It's unlikely that this amount of discard would increase since vessel operations and the number of discard events would not change in any manner under Alternative 1a. Similarly, the shoreside sector discarded 493 mt in 2014 (

Table 3-6). Similar totals were realized in 2013 and 2012 of 459 mt and 509 mt, respectively. Again, this amount of discard would likely not increase since vessel operations would not change.

We estimated discard rates for vessels that tested EM during the EM study by PSMFC. The study used EM and an observer on the vessel (Table 4-4, PSMFC 2013). We applied the PSMFC EM discard rate, PSMFC observer discard rates, and the 2013 WCGOP observer discard rate to the 2014 Pacific whiting allocations for shoreside and mothership sectors to estimate the annual discard for the MS and shoreside fishery. The annual shoreside estimates from 2013 PSMFC EM rate was 420 mt and is comparable to what was actually estimated by the WCGOP in 2013 of 459 mt (Table 4-4).

Table 4-4. Estimated discard rates (PSMFC study and WCGOP) and estimated total allocation reductions based on 2014 Pacific whiting allocations for the shoreside and mothership fisheries.

	Shoreside observed discard rate	**Mothership catcher vessel observed discard rate**	**Total est. discard based on 2014 allocation: Shoreside (mt)**	**Total est. discard based on 2014 allocation: Mothership (mt)**
PSMFC EM rates	0.0039	0.0078	420	485
PSMFC observer rates	0.0024	0.0014	260	87
WCGOP rates	0.0020	0.0041	213	253

Note: 2014 Pacific whiting allocation for mothership was 62,249 mt and for shoreside 108,935 mt (79FR27198, May 13, 2014).

Full accounting for vessels that use EM in the shoreside fishery would likely not change the tracking and monitoring capabilities since the current program conducts full accounting of all discards. Estimates would be made and the data transferred to NMFS for IFQ accounting as it would under No Action.

Option D – Preseason deduction of minor discards

To examine the unintentional minor discards for the MS fishery, we used observer data and assumed that unintentional minor discards could be those events that were less than 2,000 lbs (Figure 4-5). We binned the discard events as “less than 2000 pounds” and “more than 2000 pounds.” All events in 2011 that were less than 2000 pounds were summed for a total discard amount of 24 metric tons (mt). In 2012 and 2013 the totals were 22 mt and 69 mt, respectively.

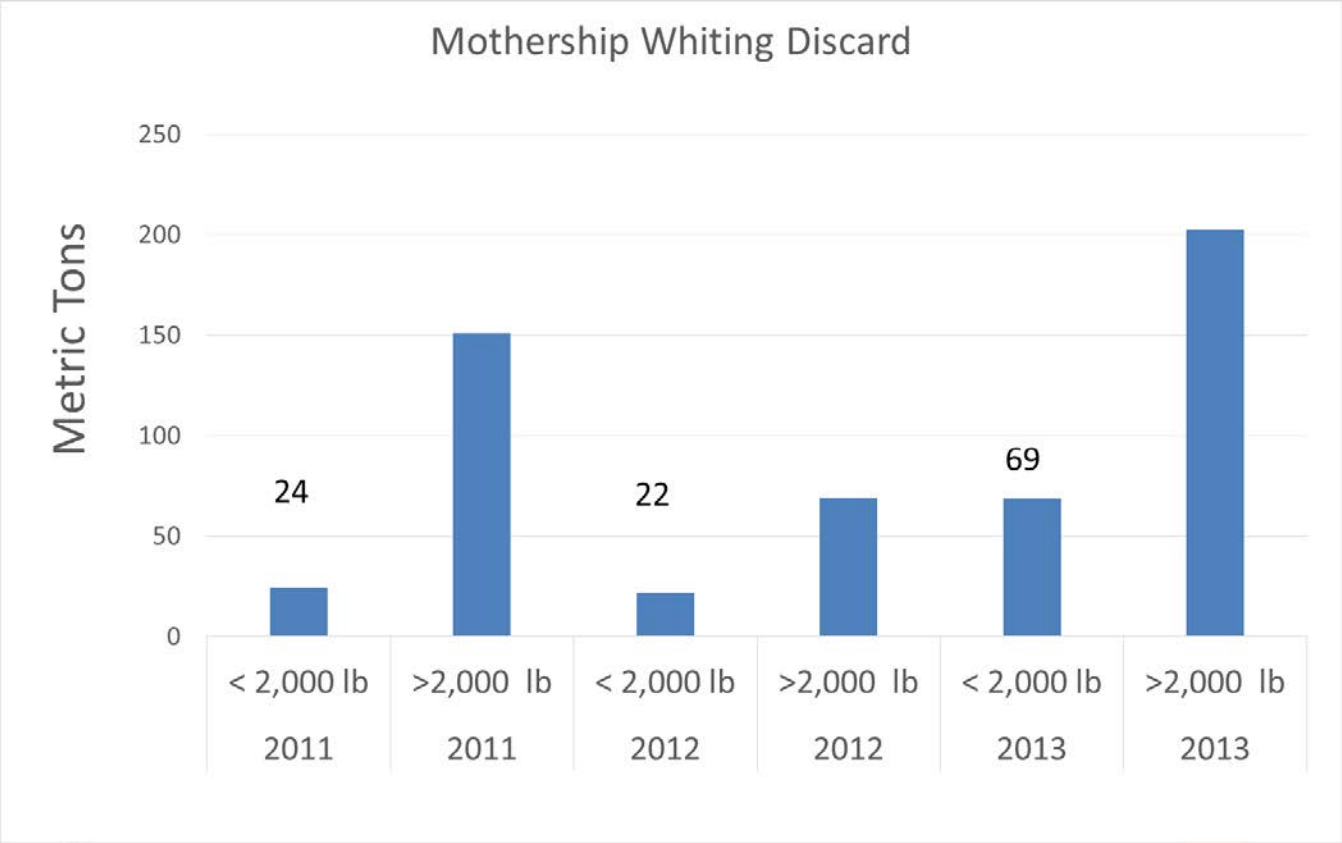


Figure 4-5. Total mothership discards events above and below 2,000 lb, 2011-2013.

We expect similar discard events and rates under the all alternatives; however, accounting of the total discard in the MS sector would be split between IFQ accounts and sector allocations. The total preseason deduction for the MS fishery would likely be similar to that seen in the mothership fishery (Table 3-5).

Table 3-5 shows that total discard of Pacific hake (whiting) in the MS sector as estimated by the WCGOP was 174 mt. In 2011 and 2012, the total discard estimates by the WCGOP were 179 mt and 155 mt, respectively. Based on the discard analysis in Figure 4-5 and total estimates from the WCGOP we would expect that less than 200 mt annually would be deducted preseason from the MS allocation.

Option D would reduce the individual accountability in the MS fishery sector but is not likely to increase total mortality or reduce tacking and monitoring capabilities. Uncertainty will increase since some other method would be needed to create the annual estimates for preseason deductions. As discussed, earlier fishery operations in the both the shoreside and mothership whiting fisheries are well documented through EM and observer data therefore the average fleet-wide and vessel specific volumes of whiting and bycatch discard could be applied to the sector allocations under the biennial specification process for groundfish and incorporated into total mortality estimates for the fisheries when developing the ACL and the fishery allocations.

Alternative 1b - Impact on Total Mortality (*Council Preferred*)

Impacts on total mortality are dependent on the risks of not accounting for fish in logbooks, the accuracy of the logbook reports, and the image quality of the video. If we assumed that all fishermen would be

compliant with accounting for discards then the risk in moving from at-sea observer to fishermen self-reporting in logbooks (Alternative 1b) would simply be a matter of whether or not there were any relative differences in the skills of observer versus the skills of crew with respect to species identification and weight estimations of discarded fish. A comparison of the accuracy for species identification and weight estimation between video reviewer estimates and logbook estimations from captain and crew is provided in the next two sections. The comparison shows good agreement between both the video reviewer estimates and the logbook estimates. Some inaccuracies were found through the analyses; therefore, a description of why and what can be done to bring the estimates into alignment is provided. We assume that overtime fishermen will become more accurate with experience, especially with feedback from video reviewers and vice versa. Feedback between reviewers and fishermen could increase accuracy for both parties.

A small amount of variability is to be expected, because both logbook and EM data are estimates, and can be improved over time as captains get more experience estimating discards. The majority of large differences were from nine tows on shorebased whiting trips (see PSMFC preliminary 2015 report for more detail: http://www.pcouncil.org/wp-content/uploads/2015/11/I5a_Sup_NMFS_EM_Rpt2_Nov2015BB.pdf) and for the fixed gear see http://www.pcouncil.org/wp-content/uploads/2016/02/G7a_NMFS_Rpt_EM_EFP_Update_MAR2016BB.pdf.

Shoreside Hake Sector

From PSMFC report:

In the shoreside sector, trip level comparisons of the video recorded discards and the logbook recorded discards reveal that 97% of the trips had less than 1,000 pound differences between the two data sources with nearly 50% of the trips having less than 10 pound differences. Both values are estimated weights and thus have inherent error (Figure 4-6).

At the trip level, the video recorded discard estimates tended to be larger than the logbook recorded discard estimates. Video reviewers can see fish in the water as the net comes to the surface and while it is being pulled towards the vessel much more effectively than fishers onboard the vessel. This could account for the larger values recorded by the reviewers. When discard estimates were aggregated to the vessel level, half of the vessels recorded more discarded catch on their logbooks than the video reviewer and half recorded less (Figure 4-6).

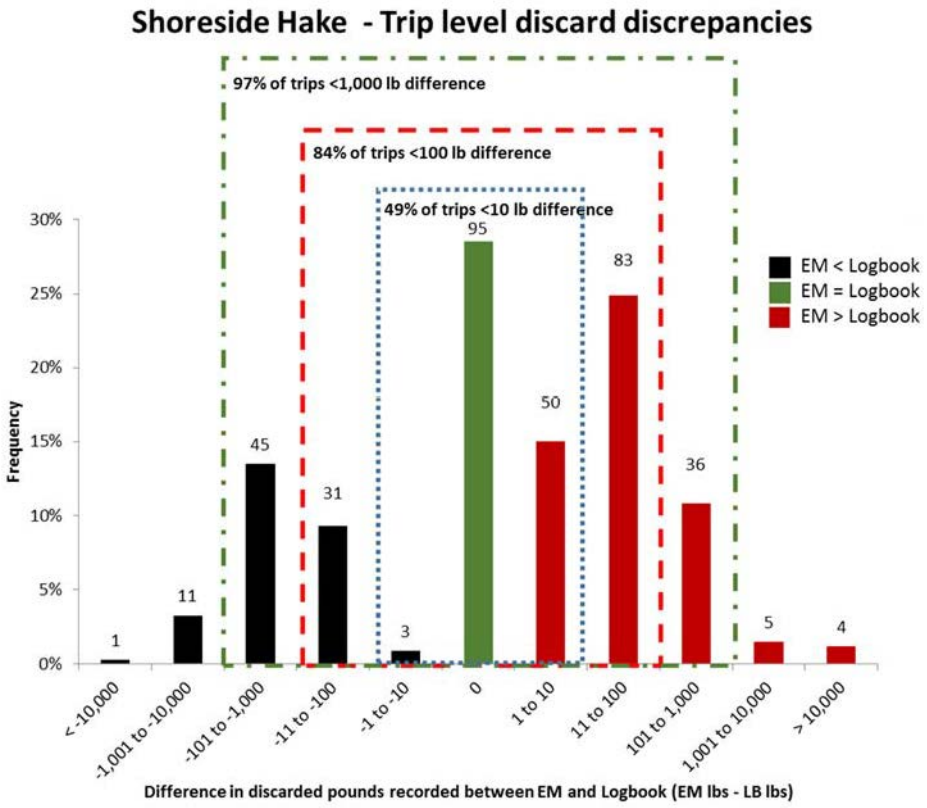


Figure 4-6. Shoreside hake sector. Histogram of difference in discarded pounds recorded between EM and logbook at the trip level.

There were five trips where differences were larger than 10,000 pounds at the trip level (Table 4-5). Vessels one through three were instances where the vessel logbook had a discard recorded but the magnitude of discard was estimated as much larger by the video reviewer. Vessel five was a large discard that was recorded on the vessel's logbook but not by the video reviewer.

Table 4-5. Shoreside hake sector. Magnitude of differences that are greater the 10,000 pounds.

Larger than 10,000 lbs difference	
Vessel 1	30,530
Vessel 3	17,105
Vessel 3	10,207
Vessel 2	10,021
Vessel 4	(19,915)

Mothership Catcher Vessel Sector

In the mothership catcher vessel sector, haul level comparisons of the video recorded discards and the logbook recorded discards reveal that 80% of the hauls had less than 1,000 pound differences between the two data sources with 55% of the trips having less than 100 pound differences. Both values are estimated weights and thus have inherent error. This sector is managed as a coop and thus, the sector level values will drive the management decisions made. In this case, as seen in table 1, there is a 71,000

pound difference at the sector level between what video reviewers have recorded and what was recorded on the vessel logbook (Figure 4-7).

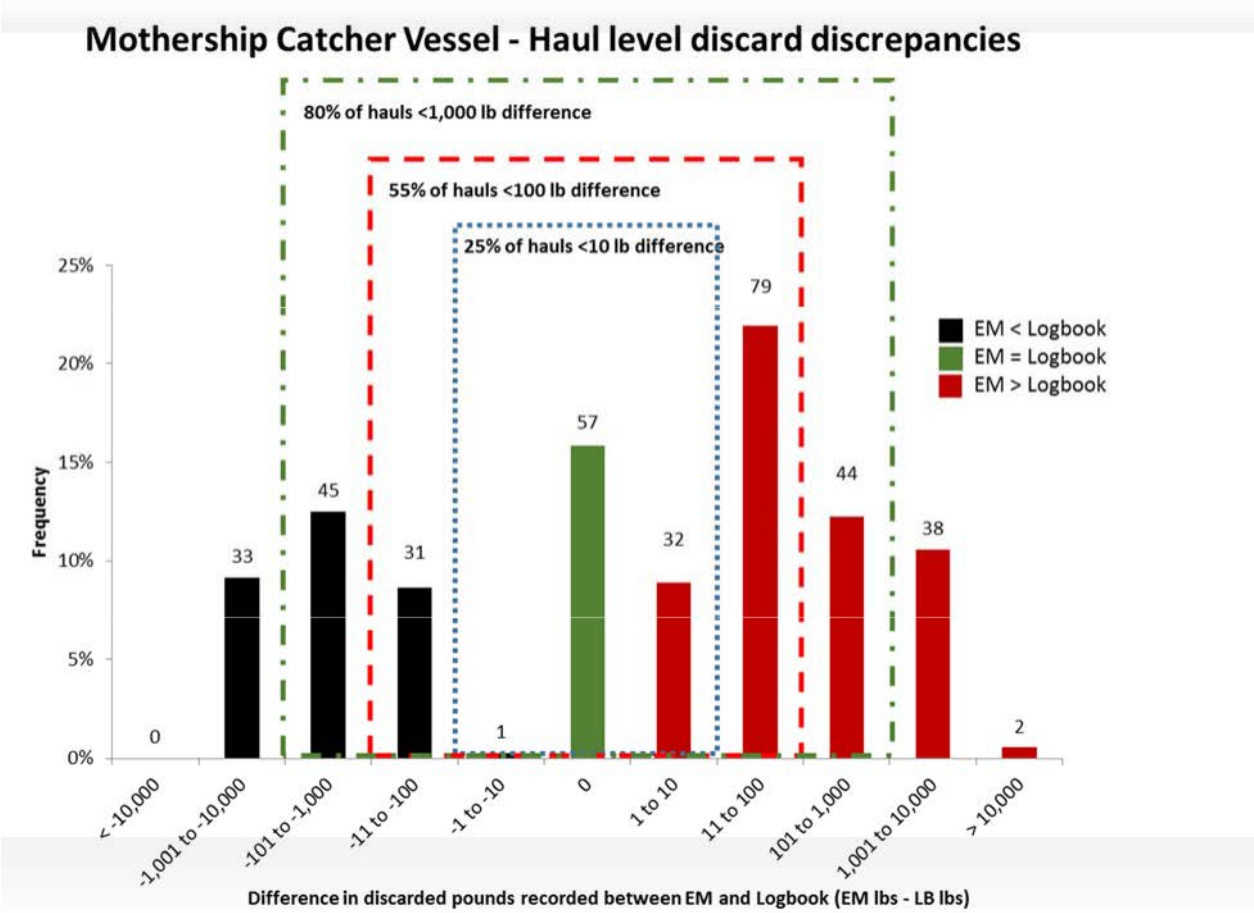


Figure 4-7. Mothership catcher vessel sector. Histogram of difference in discarded pounds recorded between EM and logbook at the haul level.

At the haul level, the video recorded discard estimates tended to be larger than the logbook recorded discard estimates. Video reviewers can see fish in the water as the net comes to the surface and while it is being pulled towards the vessel much more effectively than fishers onboard the vessel. This could account for the larger values recorded by the reviewers.

There were 2 hauls where differences were larger than 10,000 pounds at the haul level. Both were instances where the vessel logbook had a discard recorded but the magnitude of discard was estimated as much larger by the video reviewer (Table 4-6).

Table 4-6. Mothership catcher vessel sector. Magnitude of differences that are greater the 10,000 pounds.

Larger than 10,000 lbs difference	
Vessel 1	16,030
Vessel 2	11,800

It's possible that if incentives for compliance are not strict or enforced then some discard may occur and go undocumented when a low level (e.g., 10%) of review is implemented. At a low level of review it's possible that the audit may not capture discard events thereby missing any unreported fish. This could increase the uncertainty of total catch estimates. If fishers are found to be accurate in their discard estimations then we would expect total mortality to be similar to the No Action Alternative and Alternative 1a. Additional video review could be conducted under Alternative 1b if non-compliance or errors are found; this could increase confidence in the data for future trips.

The issue of providing quality video that can be reviewed with confidence is similar to Alternative 1a. Weather, water on lenses and glare can cause images to be distorted or unfit for accurate estimates. The risk factor is the reviewer's ability to speciate and estimate any IFQ species discarded to verify the logbook discard. Since the PSMFC study showed that these occurrences will likely occur at a low level we expect the risk to be low for exceeding IFQs, ACL, and catch allocation. We don't expect total mortally to change as a result of poor image quality since the logbook is the primary data source.

Of critical importance, is the level of risk that managers are willing to take to capture rare events such as yelloweye rockfish discard, which in a large volume fishery is extremely difficult to see when on deck or estimate from video when fish are dumped or spilling out of a net. Under the Alternative 1b, if fishermen report all rare events, then verifying them with video audit would provide the confidence needed in management. Fishery managers will need to examine what level of risk is appropriate and the cost implications for trying to capture all events to balance management of overfished species and the economics of fishing activity. A determination must be made as to how much video should be reviewed under Alternative 1b (for example 10, 25 or 50%) that would reduce the risk of missing undocumented discard activity yet provide high level of confidence in the logbook data for IFQ accounting. The Council would defer to NMFS to conduct this analysis and implement a protocol that is cost effective and meets this management goal.

Table 4-7. Business Rules for fixed gear IFQ trips.

Species/Group	**Rule**
All IFQ species/groups	If a discard is reported on EM, but not in the LB, use the EM estimate. If a discard is reported in the LB, but not by EM, use the LB estimate.
Canary rockfish, darkblotched rockfish, bocaccio rockfish South of 40°10'N, cowcod rockfish South of 40°10'N, and yelloweye rockfish, petrale sole, and pacific ocean perch North of 40°10'N (Overfished species*)	If the LB and EM estimate are not equal, use the larger of the two estimates.
All non-overfished IFQ species/groups	If the absolute difference between LB and EM is 10% or less of the EM estimate, use LB. If absolute difference is greater than 10%, use the larger of the two estimates.

All IFQ species/groups	If there is no EM estimate (e.g., due to EM system failure), use LB estimate.

LB = logbook, EM = electronic monitoring
*Although canary rockfish and petrale sole have been declared rebuilt, they are being managed under rebuilding plans in the current specifications cycle through 2016.

Alternative 1b – Impact on Total Mortality from Discard Accounting Options

Under Alternative 1b Impacts to total mortality would be the same as analyzed under Alternative 1a.

4.2.1.3 Fixed Gear Fishery Action Alternatives Impacts on Target Species

Table 4-8 provides a summary of the alternatives and options that may affect the biological environment. Many EM components are administrative and therefore would not directly affect the biological environment so they are not considered in the biological impact analysis. We analyze each alternative, the video reading protocol options, retention requirements and discard accounting options. Indirect effects of the alternatives are also analyzed for biological impacts, such as the reduction of biological sampling and changes in sampling methods to estimate bycatch of protected species and total mortality.

Table 4-8. Table of alternatives for the fixed gear fishery with EM components that may affect the biological environment.

Analytical Scenario (AS)	**No Action (Status Quo)**	**Alternative 2a with Council**	**Alternative 2b with Council Preferred Options**
Discard Documentation Technology and Coverage	Human observers	**Alternative 1a -** Camera Recordings Used to Estimate Discard	**Alternative 1b** - Logbooks Use to Estimate Discard, with Camera Audits
Video Reading Protocol (percent review)	None	**Option A**. 100% video census for whiting with discard logbook	**No Options** – Implementation of 100% review of all video to audit logbook entries. Level of compliance review is determined by NMFS in future.
Discard Accounting - Individual or Fleetwide	Human observers	**Option A. Estimate Discard with EM and Count against IFQ**	**Option A. Estimate Discard with EM and Count against IFQ**
Retention Requirements	Discard at will any species allowed by regulation	**Option A: Optimize Retention Retain Catch Share Species with Limited Discard Options**	**Option A: Optimize Retention Retain Catch Share Species with Limited Discard Options**
Halibut Retention/Discard	Apply WCGOP discard mortality rate for assessed fish in pot fishery, apply fleet-wide rate for longline (16% mortality rate)	**Option D: Discard Exemption (mortality rate of 18 % for pot, 16% for longline)**	**Option D: Discard Exemption (mortality rate of 18 % for pot, 16% for longline)**
Discard Species List Adjustments	Discard at will any species allowed by regulation	**Option B**: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).	**Option B**: Use Council process for changing species list using routine management measures if initial list is fully analyzed for environmental impacts (e.g., use groundfish specification process, or some other routine management measure).

Alternative 2a - Impact on Total Mortality from Retention Requirements

Overall, impacts to fish resources are not expected to change significantly under any alternative or option since most fish discarded (except halibut, lingcod and sablefish) are considered dead after release Table 4-9. Since the fishery is under an IFQ system, exceeding ACLs is unlikely. Most of the IFQ species are not being caught and there is room for increase. If fish are discarded and not reported or captured by EM then impacts could increase but it will be difficult to enumerate this.

Table 4-9. Summary of impact mechanisms and the effect of each alternative for the fixed gear fishery.

Impact Mechanism	No Action	Alternative 2a	Alternative 2b Council Preferred
Total mortality accounting for IFQ species	No change	No change	No change
Accounting of overfished and rebuilding species	No change	Likely no change or slight increase in inaccurate accounting (potential for missing some discard if no other species are landed to apply species composition; potential for inaccurate estimates for MS minor discard events)	Likely no change (potential for slight change, depends on accuracy of logbooks and level of audit relative to similar issues with accuracy of observers, their logbooks, and their debriefing.)
Accounting of prohibited and protected species	No change	Likely no change or slight increase in inaccurate accounting (potential for missing some discard if no other species are landed to apply species composition; potential for inaccurate estimates for MS minor discard events)	Likely no change (potential for lower precision but depends on accuracy of logbooks and on level of audit; depends on WCGOP observations for protected species)
Change in precision and accuracy in accounting at Annual Catch Limit (ACL) and IFQ levels	No change	Likely no change	Likely no change
Risk of missing discarded fish	low	low	low
Risk of exceeding an ACL	low	low	low
Risk of affecting data used for stock assessments	low	Indirect (low to medium based on WCGOP scientific observation sampling)	Indirect (low to medium based on WCGOP scientific observation sampling)
Change to individual accountability	Likely no change	Likely no change	Likely no change

Under the fixed gear fishery, two options are provided regarding species retention: A. Optimized (some allowable discard) and B. Maximize (no allowable discard with some safety exceptions). Allowing discard will hinge on whether video can appropriately capture the discard in a clear image so a video reviewer can identify the species and estimate the weight of the discard.

A comparison of discard estimations by an observer (catch monitor) and a video reviewer was conducted by the PSMFC using the PSMFC field study information (PSMFC 2014). Under this field study vessels were allowed to discard at will and estimates for retained catch were also done. Fish can generally be identified to the species group level (flatfish or rockfish) successfully, but this is not sufficient for the IFQ fishery.

Table 4-10. Summary of aggregated recorded catch by the catch monitor and the video reviewer in 2012 Fixed gear (counts only) and 2013 fixed gear (counts and weights). Source: PSMFC 2014.

	BottomTrawl - 2013				FixedGear - 2012				FixedGear - 2013							
	Weight				Count				Count				Weight			
	Discarded		Retained		Discarded		Retained		Discarded		Retained		Discarded		Retained	
IFQ Complex	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video	CM	Video
Lingcod	**3,494**	**3,488**	**3,868**	**4,021**												
Pacific Hake	**11,053**	**12,172**	**480**	**3,565**					**30**	**10**			**61**	**16**		
Pacific Halibut	**1,609**	**1,344**		**12**												
Sablefish	**123**	**205**	**61,028**	**62,595**	**372**	**373**	**36,407**	**35,652**	**1,435**	**1,361**	**51,401**	**52,042**	**6,493**	**5,067**	**272,926**	**258,283**
Flatfish																
Arrowtooth Flounder	7,693	5,897	14,400	16,905		4		4	1			1	15			6
Dover Sole	793	245	146,690	163,574	83	53	97	21	28	22	82	84	55	49	124	146
English Sole	734	709	3,878	2,712												
Petrale Sole	32	16	157,812	120,441					2		9		3		14	
Starry Flounder		3	70	40												
Other Flatfish	3,009	1,360	16,776	22,010					3		1	13	2		1	24
Unidentified Flatfish		907		5,485		21		41				1				1
NonIFQ	2,377	2,257		6					5	3	1	1	6	6	1	1
Flatfish Total	**14,636**	**11,392**	**339,626**	**331,173**	**83**	**78**	**97**	**66**	**39**	**25**	**93**	**100**	**81**	**55**	**140**	**178**
Rockfish and Thornyheads																
Rockfish																
Bocaccio Rockfish			632	413												
Canary Rockfish			257	286												
Chilipepper Rockfish	12	3	5,415	5,973												
Cowcod Rockfish			33	44												
Darkblotched Rockfish	9	5	8,158	6,860								5				12
Pacific Ocean Perch Rockfish	8	1	1,280	915							1				2	
Splitnose Rockfish	15,009	29	1,535													
Widow Rockfish			27	15												
Yelloweye Rockfish			7	8												
Yellowtail Rockfish			60	25												
Minor Shelf Rockfish	1,257	1	48	300								1				2
Minor Slope Rockfish	473	6	20,252	14,116	191	1	3,522	20	47	37	1,856	1,799	93	75	3,913	4,709
NonIFQ	15															
Rockfish Total	**16,784**	**44**	**37,704**	**28,954**	**191**	**1**	**3,522**	**20**	**47**	**37**	**1,857**	**1,805**	**93**	**75**	**3,914**	**4,723**
Thornyheads	203		**84,625**	**812**	**6**				**36**				**15**			
Longspine Thornyhead																
Shortspine Thornyhead	413	6	47,945	31,701	18	6	99	84	11	8	57	48	43	48	222	154
Mixed Thornyhead		395		87,160		7		6		22		13		12		25
Thornyheads Total	**616**	**401**	**132,570**	**119,673**	**24**	**13**	**99**	**90**	**47**	**30**	**57**	**61**	**57**	**60**	**222**	**178**
Unidentified Rockfish		12,404	6,385	19,823		173		3,261		17		77		25		184
Rockfish and Thornyheads Total	**17,399**	**12,849**	**176,659**	**168,450**	**215**	**187**	**3,621**	**3,371**	**94**	**84**	**1,914**	**1,943**	**151**	**160**	**4,136**	**5,085**
Unidentified Groundfish		**3**		**33,501**												
Grand Total	**48,314**	**41,453**	**581,661**	**603,316**	**670**	**638**	**40,125**	**39,089**	**1,598**	**1,480**	**53,408**	**54,085**	**6,785**	**5,298**	**277,202**	**263,545**

For the target species of this fishery, sablefish, compliance monitor and video reviewer estimates of retained and discarded catch tracked the reference line closely in 2012 and 2013 (Figure 4-8).

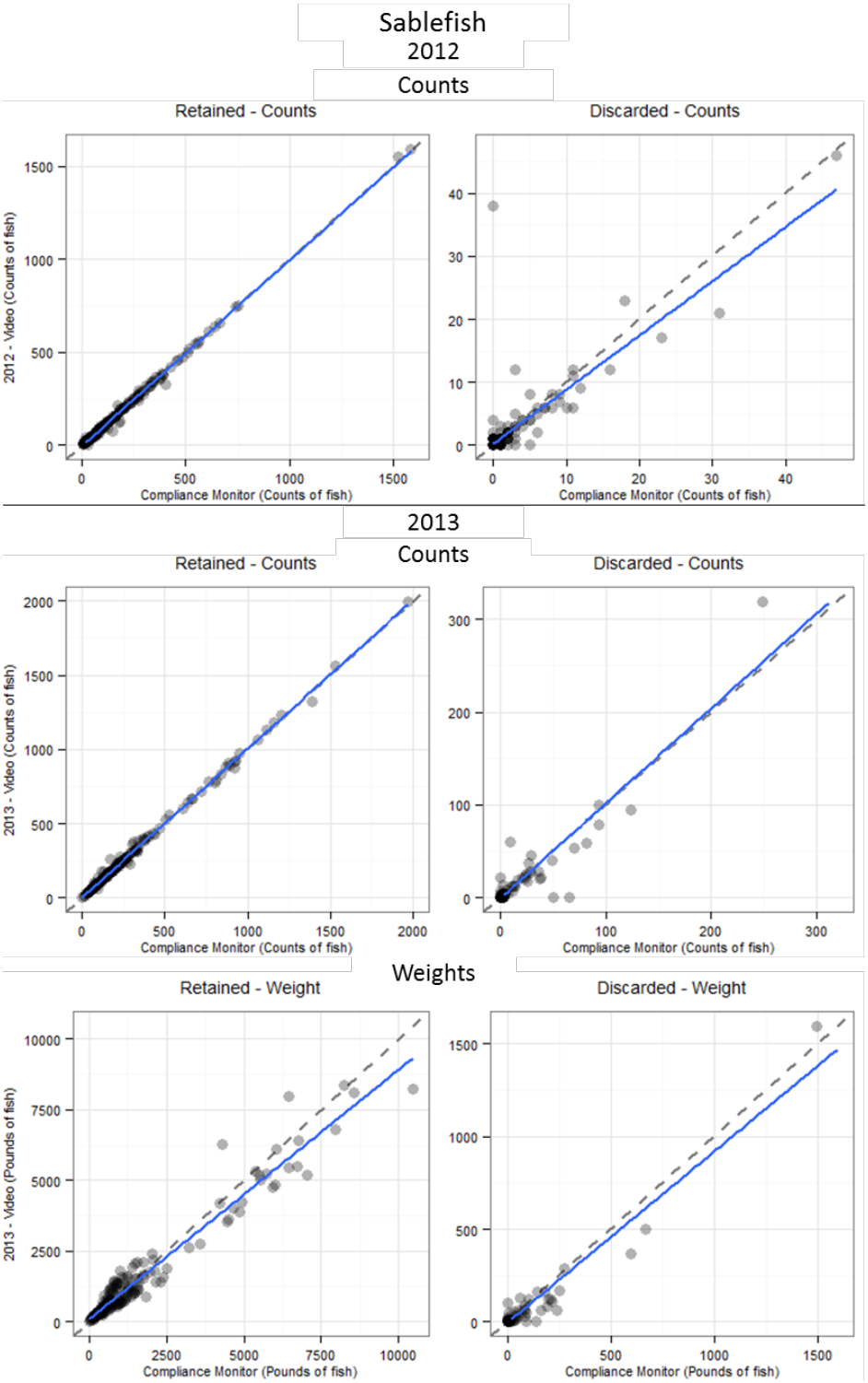


Figure 4-8. Fixed Gear. Sablefish. Comparison of compliance monitor and video retained and discarded catch counts and weights of Sablefish at the haul level. No weight estimates were made in 2012. Source: PSMFC 2014.

Dover sole were the most frequently seen flatfish in the fixed gear fishery. In 2012, CM recorded more dover sole retained than the video reviewer. This aggregate trend reversed in 2013 (Table 3). Video recorded fewer discards in both years (Table 3, Figure 11a).

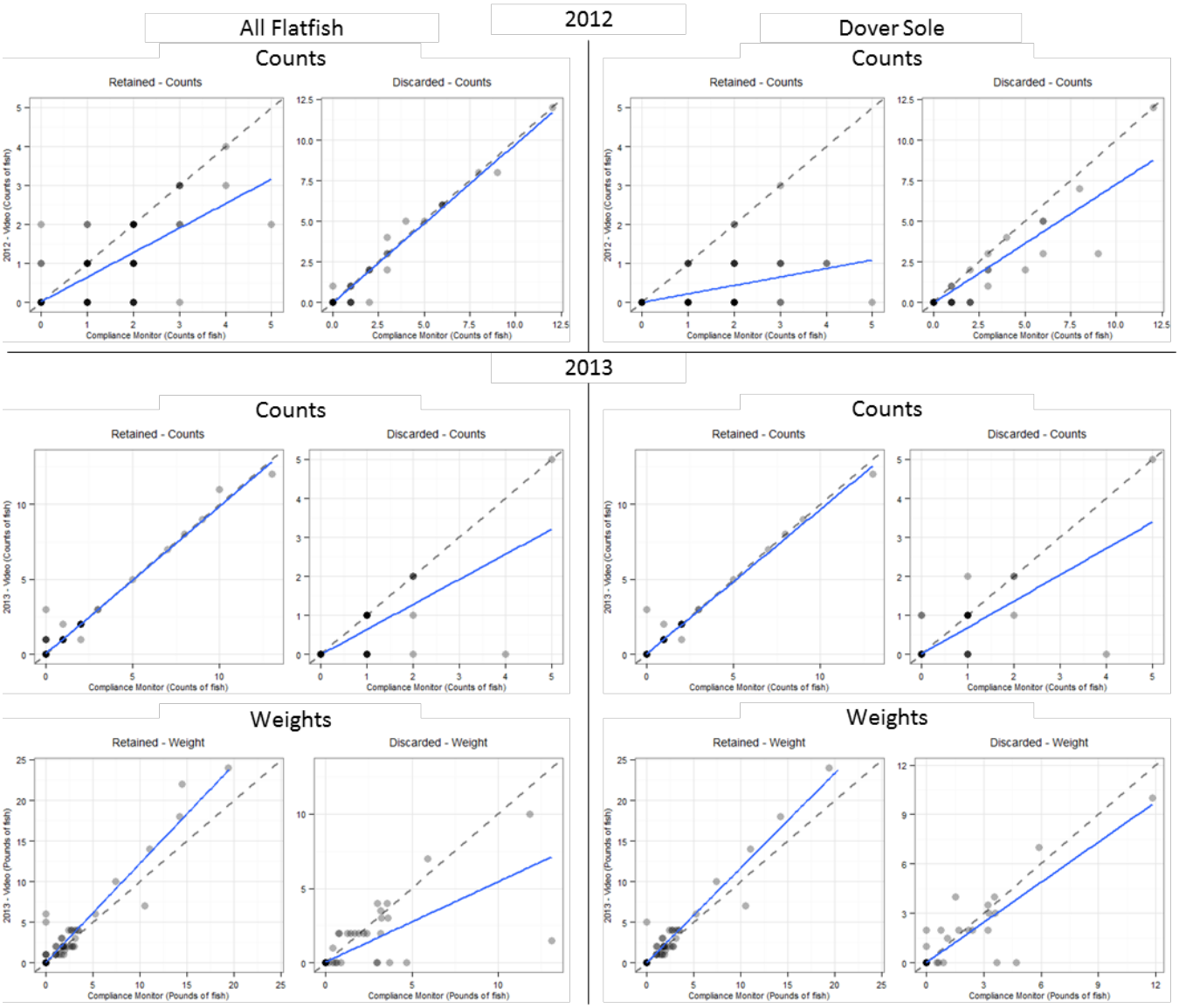


Figure 4-9. Comparison of compliance monitor and video retained and discarded catch counts and weights of Flatfish aggregated to the group and the individual component IFQ complexes at the haul level. No weight estimates were made in 2012.

At the haul level, the trend line for retained minor slope rockfish in 2013 tracked the reference line closely for counts and was slightly above for weights (Figure 4-10).

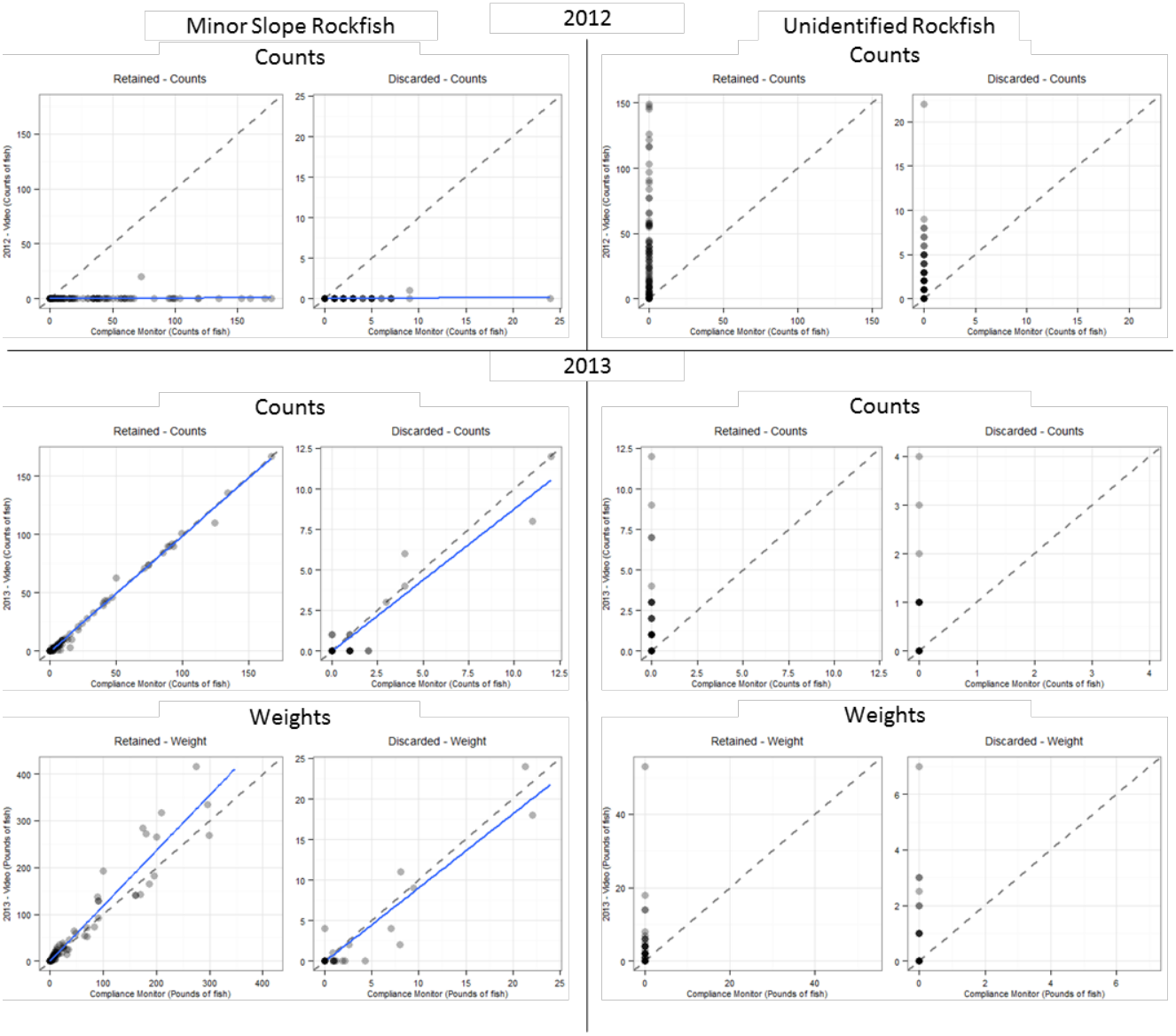


Figure 4-10. Comparison of compliance monitor and video retained and discarded catch counts and weights of Rockfish aggregated to the group and the individual component IFQ complexes at the haul level. No weight estimates were made in 2012.

A comparison of EM versus logbook data was conducted in 2015 by PSMFC using the EM EFPs study data (Figure 4-11). Generally, all vessels were required to retain all fish (Maximize Retention).

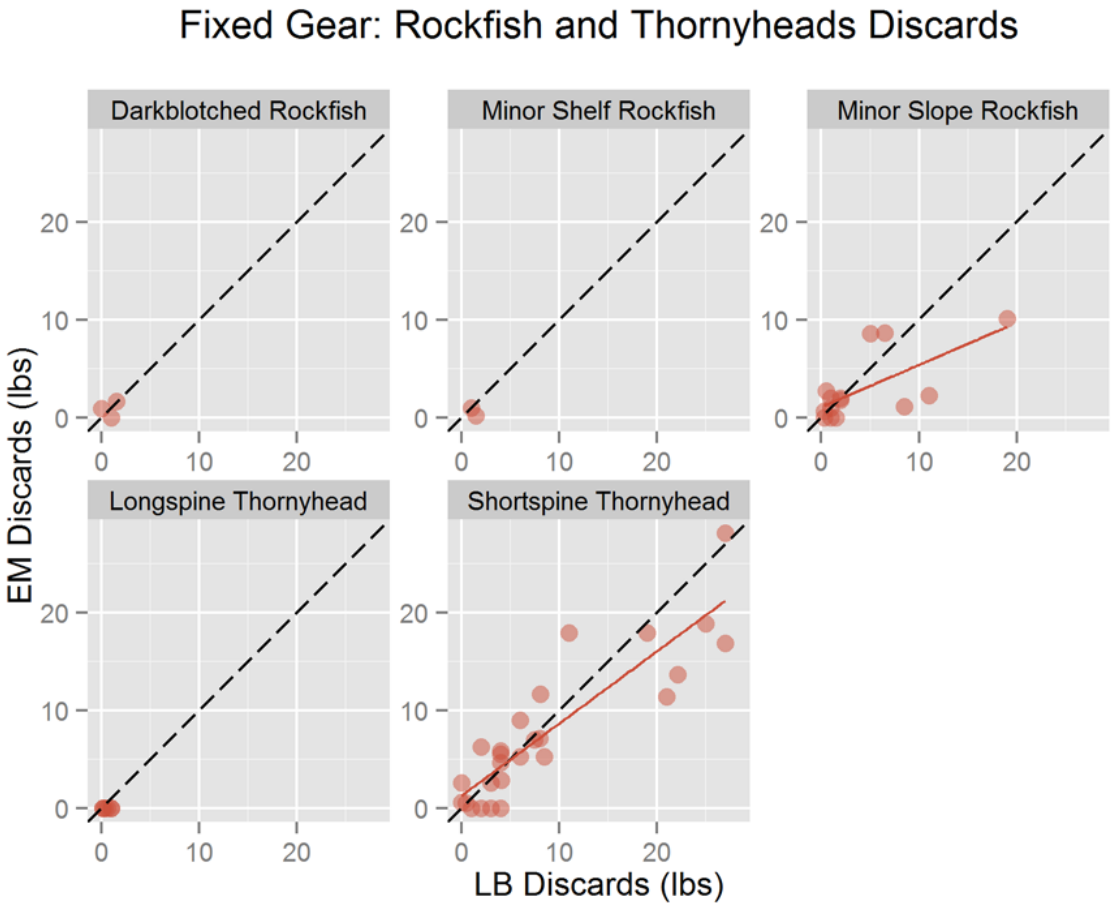


Figure 4-11. Relationship of EM to Logbook for Rockfish and Thornyhead Discards on Fixed Gear Trips.

Figure 4-11 shows overall close alignment between logbook and EM discard estimates. Figures with more than 10 data points have trend lines, which in some cases appear to show large deviations from the 1:1 line (where the trend line would be if logbook and EM estimates were equal). This is misleading, however, because the small scale of the discards (0-30 lb) exaggerate the small discrepancies. There were some instances where discarded fish could not be identified to species, but these were small amounts relative to the total discards. PSMFC used proportions of discards identified to species for the same haul, vessel, or fleet, to apportion these discards to species for debiting from vessel accounts.

Alternative 2b - Impact on Total Mortality from Discard Accounting Options

Impacts to target species would be similar to No Action and Alternative 2a.

4.2.2 **Impacts to Non-Target Species**

4.2.2.1 Impacts to Overfished Species and Rebuilding Plans (Alternatives 1a, 1b, 2a, and 2b)

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

There are currently six overfished rockfish stocks (bocaccio south of 40 º10' N. latitude, canary rockfish, cowcod south of 40º 10' N. latitude, darkblotched rockfish, Pacific ocean perch, and yelloweye rockfish) and one overfished flatfish stock (petrale sole) managed under rebuilding plans (PFMC 2014a). All species of overfished groundfish are actively managed in all ocean management areas and fisheries where they occur, as explained in Section 3.2.2. They occur as bycatch in the as shown in WCGOP data in

Table 3-4, Table 3-5, Table 3-6, Table 3-7, and Table 3-8.

New assessments and rebuilding analyses for these overfished stocks do not indicate any need to modify existing rebuilding plans since all these analyses indicate progress towards rebuilding is on track and, in most cases, ahead of schedule.

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

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

Generally, both sectors have been under-harvesting their overfished species allocations. Under the No Action and all other alternatives, impacts to overfished and rebuilding species would likely not exceed the bycatch limits or exceed the ACLs for these species. It's likely that total catch under Alternative 1a, 1b, 2a, and 2b would be similar to the No Action Alternative.

Under Alternative 1a, species composition conducted at the dock can be applied to discard events seen on video to account for some discard events. Unintentional minor discards that are deducted from the allocations in the MS under Alternative 1a would be accounted for preseason. These estimates though may not reflect the actual discards that are occurring in the fishery, they may be higher or lower. Some other mechanism may be needed to verify the estimates rather than relying on historical observed discards. It's possible that WCGOP observers that are deployed on EM vessels for biological sampling could be used to confirm the reliability of the preseason estimations each year. However it's expected that this type of observer coverage would be rather low due to lack of available biological samples and need to obtain them at sea. Therefore, we cite that there may be a slight increase in inaccurate accounting for the minor operational discards for the MS fishery under Alternative 1a.

Under Alternative 1b and 2b logbook audits would verify discard accounting in logbooks and further investigation to any logbooks with discrepancies would ensure that full accounting of catch is conducted appropriately. The accuracy of logbooks is critical and full accounting is expected. However, the precision and accuracy of accounting for overfished species would be most important since there are IFQs assigned to each fishermen. Video audit of the logbooks would need to be sufficient and at a level that would provide the confidence that managers need to be sure all fish are accounted for by the fisherman. It's likely that there will be no change in

the accounting of overfished and rebuilding species however the potential remains for inaccurate reporting or the possibility of an audit missing fish that are inaccurately accounted for or video image quality may prevent verification of discard.

4.2.3 Impacts ESA-Listed Species and Protected Species

A change in impacts to prohibited and protected species are not expected under any alternative. Accounting for species that are discarded would either be documented by a human observer (the No Action Alternative), video (Alternative 1a), or observed by the captain or crew and documented in a logbook (Alternative 1b). The only species that has been encountered on a larger scale are salmon; other species interactions tend to be rare or in very low volumes (See Section 3.2.3 and

Table 3-4, Table 3-5, Table 3-6, Table 3-7, and Table 3-8).

4.2.3.1 Impacts to ESA-Listed Species:

Marine Mammals, Seabirds, Sea Turtles, and Endangered Species: The alternative actions are not likely to affect the incidental mortality levels of marine mammals, seabirds, sea turtles, and endangered species over what has been considered in previous NEPA analyses because fishing operations are unlikely to change under all alternatives. Rates of incidental catch under Alternative 1a and Alternative 1b would be similar under the No Action Alternative; See 3.2.3.3, Table 3-11,

Table 3-14, Table 3-15, Table 3-16.

Table 4-11. ESA-listed species that may be found in the area of operation for groundfish fisheries.

ESA Species	
Green sturgeon *(Acipenser medirostris)*	Southern Resident killer whales *(Orcinus orca)*
Eulachon *(Thaleichthys pacificus)*	Guadalupe fur seals *(Arctocephalus townsendi)*
Humpback whales (*Megaptera novaeangliae*)	Green sea turtles *(Chelonia mydas)*
Steller sea lions *(Eumetopiasjubatus)*	Olive ridley sea turtles *(Lepidochelys olivacea)*
Leatherback sea turtles (*Dermochelys coriacea*)	Loggerhead sea turtles (Carretta carretta)
Sei whales *(Balaenoptera borealis)*	Short-tailed albatross *(Phoebastria albatnfs)*
North Pacific Right whales *(Eubalaenajaponica)*	Marbled murrelet *(Brachyramphus marmoratus)*
Blue whales *(Balaenoptera musculus)*	Southern sea otter *(Enhydra lutris nereis)*
Fin whales *(Balaenoptera physalus)*	California least tern (*Sterna antil/arum browni*)
Sperm whales *(Physter macrocephalus)*	

4.2.4 **Impacts to Prohibited Species**

Salmonids: None of the alternatives would cause additional impact to salmonids since fishing behavior is unlikely to change. The shoreside and at-sea whiting fishery operates under a limit and an EM program would not increase the limit nor cause an increase in catch rates. Rates of incidental catch under Alternative 1a and Alternative 1b would be similar under the No Action Alternative (

Table 3-14 and Table 3-17).

Halibut: Halibut impacts are expected to be similar to those realized in recent years (Table 3-18 and Table 3-19). All catch is considered dead in the whiting fishery. Impacts may reach a maximum but would not exceed current IBQs and sector allocations for each sector. Halibut impacts are not expected to increase unless vessels are required to retain them under maximized retention, as is the current practice in the shoreside and at-sea whiting fishery. If all catch is considered dead then impacts may reach a maximum but would not exceed current IBQs and catch allocations for each sector.

If a fixed gear vessel discards halibut and current IPHC halibut mortality rates are applied then impacts in the logline fishery would likely be similar to the status quo. Impacts in the pot fishery may be slightly greater than or less than the status quo and is dependent on the individual vessel's handling of the halibut. The longer the halibut is on deck the higher the mortality rate. Since an observer would not be present to provide an assessment of the fish condition, a general discard mortality rate will need to be applied (18%). This may slightly impact a vessel's IBQ accounting. Overall, it's not likely that the individual vessel variability will not impact the annual mortality of fish at an ACL estimates for the fleet.

Dungeness crab: Minimal impacts is realized by both the whiting and fixed gear fisheries. Impacts are not expected to change under all alternatives and will be similar to the No Action.

4.3 Impacts on the Socio-Economic Resources

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

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

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

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

4.3.1 Analysis of Program Costs for Compliance and Biological Monitoring

There are some significant uncertainties in the assessment of costs including uncertainties about

1. EM program participation rates in aggregate and by port
2. Additional fleet consolidation
3. Organization of the shoreside monitoring function
4. Changes to fees charged by providers for compliance observers and shoreside catch monitors

The outcomes in some of these areas of uncertainty will depend on how fishery participants respond to the program. Others uncertainties depend on the eventual design of the program. There are also a number of decision points that will affect the cost estimates and distribution of costs such as:

1. Whether all video must be reviewed (Section 2.2.2.1, 2.2.3, 2.3.2.1, and 2.3.3); and
2. Who will carry out and who will pay for the video review function (Section 2.2.2.9).

Another decision point that may have a noticeable impact on costs is the scope of the program. The current action alternatives include whiting catcher vessels (approx. 30 vessels) and fixed gear vessels (approx. 18) participating in the trawl catch share program. It's expected that at least 20 or more whiting vessels will participate and possibly 9 fixed gear vessels will participate.

It's estimated that a shoreside vessel may save roughly 183 per day using EM rather than an observer. A catcher vessel may save roughly 2,400 per trip using EM rather than an observer (Table 4-12). This number assumes an average cost for human observers of $450 per day minus the cost of EM use to get the total cost savings. If a vessel uses EM on all trips rather than an observer, a vessel may spend less per day for the observations.

Table 4-12. Preliminary estimates of video review costs for the whiting fishery.

Updated Cost Estimates for Agenda Item I.5.a Supplemental NMFS Report 4

Major Cost Elements Related to Electronic Monitoring in Shorebased and At Sea (Mothership) Catcher Vessels								
Per Trip Analysis (observer cost per day is $425, observer data on trip length/deploy time, No deadtime review mothership catcher vessels)								
cost-per -trip -addition -correction and $450 per day								
Percent Level of Video Review is			100%					
		Shorebased		At-Sea		Shorebased %		At-Sea %
Average Video Review Cost per Trip		$86.31		$296.94		20.0%		8.9%
Average Storage Cost per Trip		$125.34		$1,720.18		29.0%		51.7%
Average Field Service Cost/trip		$135.20		$632.07		31.3%		19.0%
Average Admin Cost/trip		$82.22		$661.28		19.0%		19.9%
Hard Drive Submission Cost per trip		$3.00		$15.00		0.7%		0.5%
Total Costs per Trip		$432.07		$3,325.47		100.0%		100%
Average Days per Trip		1.4		12.8				
Observer Cost Per Day		**$450**		**$450**				
Total Observer Cost Per Trip		$615.66		$5,742.15				
Industry Cost Savings		$183.59		$2,416.68				
If Industry pays 3rd party reviewer, NMFS will need to have video reviewers and other services to do the audit.								
If NMFS needs to have the capability of reviewing and storing 50% of the video, the audit costs can be approximated								
at 50% of the Video Review Cost and Average Storage Cost.								
Audit Cost		$105.83		$1,008.56				
Total Costs per trip with Audit		$537.90		$4,334.03				
Industry Cost Savings with Audit		$77.77		$1,408.12				
Number of Trips		962		32				
Total Observer Costs		$592,266.62		$183,748.89		Total		
Projected Total EM Costs		$415,652		$106,415		$522,067		
Projected Total EM Costs w Audit		$517,455		$138,689		$656,144		
Projected EM Fleets Estimates--Based on 2011-14 fleet averages and EM EFP								
	Vessels	Average Trips Per Vessel	Average Trip length (Days)	# of Trips	Total Days			
Shorebased	19.0	50.6	1.4	961.4	1315.3			
At-Sea	12.0	2.6	12.8	31.7	404.3			

Cost savings information for the fixed gear fishery is forthcoming.

4.3.1.1 Cost Categories--

The costs considered in developing this analysis are listed in Table 4-13 with an indication of the sectors (private or government) that is expected to directly cover the costs. IN the following text, there is a general assessment of expected costs under No Action, followed by a detailed discussion of the cost categories listed in Table 4-13.

Table 4-13. Cost centers for consideration in cost estimation

Component	Private	Government a/
Electronic Monitoring		
Individual Vessel Monitoring Plans (IVMPs)		
Development of standards for IVMPs (1x)		x
Development of IVMPs by vessels(1x)	x	
Approval of IVMP by NMFS (1x)		x
Maintenance and revision of IVMP	x	x
Vessel Equipment		
Development of standards for equip. (1x)		x
Purchase cost (1x)	x	
Installation cost (1x)	x	
Maintenance - annual	x	
Data Transfers		
Development of protocols and software (1x)		x
Retrieval/submission of data		
-video	x	
-logbook	x	
Video/Data Processing		
Development of protocols and software (1x)		x
Video/logbook review		
- during gear retrieval & catch sorting b/	x	
- after sorting and stowage until offload	x	
Transmission of Data From Reviewers to Catch Accounting System		x
Data Storage and Maintenance		
Development of protocols, software etc. (1x)		x
Equipment costs (1x)		x
Equipment maintenance		x
Resp to data req.		x
Compliance and Biological Observers		
Government Costs (WCGOP)		
Program planning and development (1x)		x
Ongoing admin costs (e.g. trip notifctn sys)		
Observer training admin costs		x
Observer debriefing admin costs		x

Component	Private	Government a/
Data QA/QC, summary, and analysis		x
Gear and equipment		x
Costs – At-Sea for Biological Observers	-	
Observer provider fees	- ?	?
Observer boarding costs (e.g. food)	x	
Costs – At-Sea for Compliance Observers		
Observer provider fees	x	
Observer boarding costs (e.g. food)	x	
Shoreside Catch Monitor (CM) c/		
First Receiver - Shoreside CM		
CM training & admin costs		x
CM debriefing & admin costs		x
Gear and equipment		x
CM provider fees	x	

a/ Some government costs could be passed on to industry through a cost recovery fee, however, the shoreside sector is already being charged the three percent maximum fee.

Costs for Electronic Monitoring (EM)

No Action Alternative

Under the No Action Alternative, there would be no administrative cost related to EM other than the likely continuation of developmental initiatives, including EFPs. Even with the implementation of EM, some such initiatives will likely continue under the Electronic Technologies Implementation Plan. The following are the other categories of EM related cost impacts identified under the action alternatives.

- Equipment Costs
- Video Review Costs
- Logbooks

Under No Action, there would be no discard monitoring related EM costs for any of these categories. Non-EM related direct and indirect discard monitoring costs are discussed below in subsections entitled *Costs for Observers - Biological and Compliance Observers and Shoreside Catch Monitors*.

Action Alternatives

Government - Policy Development, Implementation and Administrative Costs

Government costs have been broken out into a number of categories in Table 4-13 to ensure the full scope of cost implications are considered. The categories may be rolled up and a single cost estimate provided for the program as a whole. Under the action alternatives, EM related program planning and administrative costs would be required for tasks such as

- Developing criteria for and then approving individual vessel monitoring plans and electronic monitoring equipment;
- Organizing the retrieval, transmission, and storage of data from the field;
- Coordinating the video review function (whether carried out as a government or contractor activity); and
- Summarizing data and responding to data requests.

Government costs related to adjustments to observer and shoreside monitoring are discussed below in sections related to those two topics.

The government activities in these cost categories are the same for Alternative 1a, 1b, 2a and 2b with the exception of the video reading protocols (Section 2.2.2.1), and therefore would likely entail equal direct administrative costs cost for EM. For these cost categories, the administrative costs would be greater than the No Action Alternative because additional personnel will be needed to govern the program. Possible savings in governing costs, if any, are discussed in the sections on observers and catch monitors. Section 2.2.2.10, itemizes costs that would be the responsibility of NMFS including:

- Observer Exemption Process
    - Application and Approval Process (including an application for fishermen, PRA)
    - Eligibility Criteria (Initial and Continued)
    - Individual Vessel Monitoring Plan Approval (including a form for submission to NMFS for review, PRA)
- EM Equipment and Protocol Provisions
    - Equipment Type Approval (including a list of specifications for EM providers to accommodate, PRA)
    - Approved EM Provider List (including a list of specific criteria for providers to demonstrate their capability and standards, PRA)
- WCGOP Scientific Observation Sampling Scheme

The government costs associated with the EM program might be considered costs associated with a LAPP in which case those costs would be recoverable through fees of up to three percent of total ex-vessel value (maximum on total cost recovery for the trawl rationalization program as a whole). The shorebased IFQ sector is already being charged the maximum 3 percent fee, therefore any increases in government costs for that sector would have to be covered from other sources. The mothership sector is being charged less than the three percent maximum, therefore it might be that some of the government costs associated with the program would be passed through to that sector. It should be noted that for the WCGOP there might be some administrative savings as a result of managing fewer observers but also possible increases related to paying for biological observers. These would have to be taken into account in determining any fee for program costs. Additionally, if the government is responsible for video review costs,

some of the associated costs may be charged against the mothership sector, limited by the 3 percent cap.

If some government costs are passed on as cost recovery fees two complexities may arise. First, the costs could only be passed on for catcher vessels in the MS sector trips, creating a differential between the MS and shoreside whiting fisheries in the costs of the EM program. Second, a determination would have to be made as to whether vessels not participating in the EM program would pay for the additional costs related to the EM. If not, this would add a layer of complexity to the cost recovery fee structure.

Equipment Costs - Private

The costs for the camera and related electronic systems would vary between vessels, depending on the configuration of the vessel, the gear used but are not likely to vary among the alternatives. Equipment cost estimates have not yet been developed but information is available from other programs. Equipment costs for the whiting EFP program from the previous decade were reported to be $52 per day for vessels that purchased their equipment and $132 per day for vessels that leased their equipment (CITE).

Video Review Costs - Governmental or Private

Under the action alternatives, there would be a new cost for video review that is not present under the No Action Alternative. Alternative 1a and 2a specifies that industry would pay the costs of third-party video review but that there may be an interim period during which government pays these costs. Alternative 1b and 2b specifies that the EM provider would be the third party, however, it would be expected that industry would pay the EM provider. Estimates have been developed for the cost of video review time during initial catch retrieval and sorting. These are displayed in Table 4-12. These estimates currently include time required to identify catch being retained. Time required for video review may be less than used in these estimates since only discard events would have to be evaluated for species identification. Additionally, other innovations could be developed which speed video review time.

In the shoreside whiting fishery, vessels may need to be monitored for discard events for the entire time fish are onboard the vessel until they are offloaded. Such monitoring would not be required for vessels delivering to motherships since the fish are never brought onboard the vessel. The costs associated with monitoring non-sorting time is not included in the current video review time estimate. In the shoreside whiting fishery, the total fleet hours with fish onboard the vessel has been estimated at 13,700, 15, 100, and 14,000 in 2011, 2012, and 2013, respectively (personal communication from the WCGOP, November 14, 2014). It may be possible that video review between catch sorting activities and arrival in port may be assisted through programming software that identifies video segments where back deck activity is occurring, thus reducing the amount of transit video that needs to be reviewed. Other technologies such has hatch sensors may be useful in increasing the efficiency of reviewing video or eliminating the need for it

Costs of review and who pays for the review may vary depending on the entity providing the services. If NMFS handles the video review task it would be difficult to create a funding

mechanism by which industry would pay for the task. If industry pays for the review there would have to be third party reviewers and a process for NMFS to certify those reviewers to perform the task. Also, if industry pays there would be more private incentive for innovation to develop technologies and software to increase efficiency of the review process. However, at the same time those doing the video review would be relying on contracts with and payments from those being monitored.

Logbooks - Governmental or Private

Under both alternatives, fishermen would be required to report discards by species and provide an accurate estimate of the weight in a logbook. The states already require trawl logbooks for reporting retained catch for shoreside deliveries. For shoreside deliveries, some initial set-up costs would be incurred either to change current logbooks in order to incorporate a data field for discards or to establish a separate additional discard log. For mothership sector a discard logbook would be implemented. In addition, data management systems would need to be adjusted to accommodate the entry of data at the state level (if desired) and at the Federal government level. The logbook system might be implemented as an augmentation to the existing paper logbooks or as an electronic logbook program.

Costs for Observers - Biological and Compliance Observers

No Action Alternative

Under the No Action Alternative the West Coast Groundfish Observer Program would continue to administer a program which supports 100 percent observer coverage to vessels operating in the catch share program, with observers provided by provider companies and paid for by fishermen at a rate of $400 to $475 per day plus travel expenses—up to a total of $600 per day in southern ports. The current Federal program for reimbursing observer costs would come to an end, increasing the amounts paid by vessels for observer coverage (Table 4-14).

Table 4-14. Federal reimbursement rates for observers and observer provider fee rates.

	Observer Subsidy	Observer Provider Fee Rates
2011	$328.50/day (90% to a maximum of $328.50)	
2012	$328.50/day (flat rate)	
2013	$258/day (flat rate)	
2014	$216/day at sea (flat rate)	$400-$475 per day plus travel expenses a/
2015	$108/day	

a/ Higher rates tend to apply for area south of San Francisco.

Action Alternative

Government Costs

With respect to adjustments to at-sea observer activities resulting from EM, the governmental operations most affected would be those of the NWFSC and its WCGOP. The primary impact mechanisms would be

- a reduction in the number of compliance observers in the field, and
- additional tasks related to managing data and developing total catch estimates from a mix of data sources: compliance observers and cameras.[19]

Prior to the trawl rationalization program, there was no biological observer coverage on catcher vessels and for purposes of this economic analysis it is expect that under EM there would no need to establish such biological observer coverage. Prior to trawl rationalizations, there was less need for such coverage, in part, because there was no individual incentive for fishermen to discard or underreport their catch. Under the action alternatives, it is possible that from time to time NMFS might choose to place biological observers on vessels to help validate EM results or to collect data that could not be collected shoreside under maximum retention (e.g. marine mammal and sea-bird interactions). While these data could be collected by compliance observers that might still present in the whiting fishery (on whiting vessels that choose not to participate in the EM program), biological observers might be required on whiting EM vessels in order to randomly sample activities of the entire fleet. However, given that such observers were not place on whiting catcher vessels prior to the trawl rationalization program it seems likely that any such placements under EM, if they occurred, would be at relatively low levels.

Thus, under the action alternatives there may be some compliance observers by vessels that chose not to participate in the EM system and there could still be some biological observer coverage but overall a substantial reduction in the number of at-sea observers would be expected. This reduction would reduce

- training costs,
- equipment replacement costs (all equipment has already been purchased),
- costs related to positioning and maintaining observers in the field, and
- debriefing costs.

Depending on the amount of participation in the EM program and advance declaration requirements (Section 2.2.2.6), there may be a need to develop a new system for vessels to provide advance notification of trip in order to allow the WCGOP to achieve the needed coverage.

Under both action alternatives, it is likely that a portion of the fleet would still use observers rather than switching to EM. There may be costs associated with merging information from two different types of data sources to produce combined estimates and associated statistics.

Both action alternatives include options that specify the party responsible for paying for biological observers, the government, industry, or a mix. The Council FPA places responsibility with the government, see Section 2.2.2.9. Placing responsibility with industry would likely alleviate some governing costs but could also reduce the level of participation in the EM program, changing the governing costs. However, given that biological observer coverage is not

[19] The NWFSC would likely use information from video review combined with observer data to develop total mortality estimates and other biological information needed to manage the fishery. Additional, NWFSC or some other NMFS unit might also take on the video review function discussed in the previous section.

expected to occur, or would be expected only at very low levels, the impact of the choice of who pays for such observers on governing costs would not likely be noticeable

Private Costs

With respect to industry borne observer costs, factors to consider include

- payment for biological observers, and
- impact of EM on observer fees paid by those who continue to use an observer

As described in the previous section, both action alternatives include options that specify the party responsible for paying for biological observers, the government, industry, or a mix; and the Council FPA places responsibility with the government, see Section 2.2.2.9. However, given that such observers were not placed on whiting catcher vessels prior to the trawl rationalization program it seems likely that any such placements under EM, if they occurred, would be at relatively low levels (see previous section for further discussion). If some low level biological observer coverage is required on EM vessels and the vessel is required to pay, assuming that such coverage is randomly distributed there may be some small impact on vessel profits for the covered trip but overall the impact would not be expected to be significant enough to affect the vessels choice of whether or not to participate in the EM program.

The EM system as a whole may impact observer fees. With EM in place, fewer vessels would be using observers and any fixed costs that providers incur in providing observer services would be spread among fewer observer trips, potentially resulting in a reduction in profits for observer companies or an increase in observer fees. Currently, total observer demand on the West Coast includes both that arising from the need for compliance observers for the catch share program (100 percent coverage) and biological observers for other sectors (XX% coverage, on average). The catch share program accounted for XX percent of the West Coast observer days (biological and compliance observers combined). Within the catch share program, roughly one-third of the observed sea-days occurred on whiting vessels in 2012 and 2013 (approximation derived from Table 4-20). Thus, if all whiting vessel participated in the EM program, the total demand for biological and compliance observers combined could drop by approximately XX percent—not including the biological observers that might be assigned to EM vessels.

For companies that supply observers to other regions and fisheries, some of the fixed costs may be spread out over a number of trips which are much larger than those associated with the West Coast groundfish fishery. At the same time, these companies may have some fixed costs which are specifically incurred as a result of providing services to the West Coast groundfish fishery. The fixed costs of concern are those which are incurred solely due to the provision of observer services for the West Coast and which, given sufficient time, cannot be scaled down in proportion to the reduction in demand for observers. If fixed costs dedicated to the West Coast trawl fishery are small relative to overall costs and revenues, or the industry is highly competitive, some or all of the changes might be absorbed through a reduction in the profit margins. However, in a competitive situation providers would be expected to achieve normal profits (see Section 4.3.7 for additional discussion). The larger the West Coast related fixed costs the more likely it is that an action alternative there have be some impact on observer fees.

There is no reason to expect there to be a difference in participation rates between the two action alternatives and therefore no difference in the impacts on observer fees.

Travel costs are another factor that may impact what vessels pay for observers. Even if per day fees remain unchanged, with a small observer corps it may become more likely that a vessel will have to pay observer travel related expenses to bring an observer in from another part of the coast if there is not one available when needed by the vessel. The impacts on observer fees, including travel costs would affect those not participating in the EM program, including non-whiting participants.

Shoreside Catch Monitors

No Action

At present, the catch monitoring function is almost always carried out by the at-sea compliance observers who, upon arriving in port, go to shore and fulfill the monitoring function at the first receiver site. Observer time fulfilling the shoreside monitoring function is paid by the first receiver. This is expected to continue under the No Action alternative.

Costs related to catch monitors involve training, equipment, and time (recovered as fees first receivers pay to observer provider companies). Currently, in addition to observer training with the NWFSC, most every observer goes to a separate training with PSFMC to learn how to fulfill the shoreside catch monitoring function. Additionally, the PSMFC checks data quality of the reports submitted by catch monitors on a bimonthly basis and debriefs catch monitors annually. The expenses PSMFC incurs for training and debriefing are covered through a government contract.

In the first several years of the program, catch monitors have been trained three times a year at a total cost per training session of roughly $7,000, varying depending on the number of trainees (Table 4-15). Roughly 80 to 90 debriefing sessions are held per year at a total cost of around $8,000 per year (Table 4-16). These cost estimates do not include the costs of time for the catch monitors, which are covered by the observer providers (ultimately paid for by vessels and first receivers). These levels are expected to continue under the No Action alternative, though there could be some diminishment in training needs if there is additional fleet consolidation. Some additional consolidation might be expected with the end of the observer cost reimbursement program.

Table 4-15. Catch monitoring trainings and costs, 2010 through 2013 (Source: PSMFC, IFQ Catch Monitoring Program).

CM Training	2010	2011	2012	2013	2014
Trainees (count)	34	78	45	38	14
Trainings (count)	2	4	3	3	1
Length of Training (days)	7[a/] & 3	2.5	2.5	2.5	2.5
Fixed cost per training per training (labor, space, travel etc)	$6,285 per training				
Variable costs per person (manuals, printing etc)	$55/per person				
Example 2014 training cost:	$6285 + (55 * 14) = $7055				

a/ In 2010, one 7 day training was conducted for a non-observer. This included species identification and greater detail on some aspects than is normally covered in standard training.

Table 4-16. Catch monitoring debriefings and costs, 2010 through 2013 (Source: PSMFC, IFQ Catch Monitoring Program).

Debriefings[a/]	2011	2012	2013	2014 as of June 30
Debriefings (count)	55	86	90	47
Total Debriefing hrs (x 2.5 hrs)	138	215	225	In progress
Total Debriefing Cost (labor)		$7,740	$8,100	In progress

a/ Debriefing does not include data review

Catch monitors use the equipment provided by the NWFSC to fulfill their shoreside monitoring tasks.

Currently, the shoreside catch monitoring task takes from an hour or two up to a half-day or more to complete, depending on the type of delivery (Table 4-17). These statistics cover both whiting and nonwhiting deliveries with trawl and non-trawl gear. Deliveries at southern ports tend to take longer than deliveries at northern ports. In Westport and Bellingham, 56 percent of the deliveries required more than six hours to offload, while in Astoria/Ilwaco the majority, 65 percent required between two and six hours. From Coos Bay down to Fort Bragg, between 70 and 85 percent of deliveries were between two and six hours while from San Francisco south the majority of landings, 56 percent on average, were less than two hours. In this southern area, Moss Landing was an exception; there the majority of landings took between two and six hours. There is no expectation that this pattern would change in any particular way under the No Action Alternative.

Table 4-17. Offload times by port, 2012 and 2013 combined (Source: PSMFC, IFQ Catch Monitoring Program).

		Offload Time (hours)							
		<1	1 to <=2	>2 and <=4	>4 and <=6	>6 and <=8	>8 and <=10	>10	Total Count (2 years)
Bellingham-Astoria	Landings	36	68	456	628	317	188	102	1,795
	Percent	2%	4%	25%	35%	18%	10%	6%	
Newport	Landings	33	81	467	318	70	18	16	1,003
	Percent	3%	8%	47%	32%	7%	2%	2%	
Coos Bay - Brookings	Landings	9	76	187	165	45	9	3	494
	Percent	2%	15%	38%	33%	9%	2%	1%	
Crescent City to Fort Bragg	Landings	9	34	246	168	44	1	1	503
	Percent	2%	7%	49%	33%	9%	0%	0%	
San Francisco south	Landings	250	161	201	101	18	5	5	741
		34%	22%	27%	14%	2%	1%	1%	

Catch monitor billing methods vary by company. One company charges the observer rate for shoreside monitoring but in partial day increments that break at three hours (a half day for less than three hours and a full day for more than three hours). The other company charges by the hour at an hourly rate of approximately $50 for catch monitors. Travel expenses, if any, would be in addition to these rates. The current observer reimbursement program also applies to catch monitors, however, as with the observer reimbursements, the reimbursements for catch monitors are scheduled to phase out.

Vessels and processors (buyers) need someone available to carry out the shoreside monitoring task wherever landings are occurring. Figure 4-12 shows the distribution of landings among ports for the shoreside whiting, nonwhiting, and FG fleets. The ports with the greatest number of landings, in order, are Astoria, Newport, Coos Bay, Eureka, Westport, and Morro Bay. Whiting IFQ landings have been concentrated in Westport, Astoria, and Newport, while nontrawl (FG) IFQ landings have been concentrated in Morro Bay and Avila. Without their whiting landings, Newport would be more toward the smaller end of the trawl ports, and Westport would be one of the smallest trawl sector ports. Nonwhiting landings are more spread along the coast, with the greatest numbers of landings occurring in Astoria, Coos Bay, Eureka, and Fort Bragg. Figure 4-13 and Figure 4-14 show the numbers of vessels and number of processors making those landings. Landings by time of year are discussed below in the section on Action Alternatives.

Table 4-18. Key to port abbreviations.

Port Abbreviation	Port
BLL	Bellingham, Washington
WPT	Westport, Washington
ILW	Ilwaco, Washington
AST	Astoria, Oregon
NWPT	Newport, Oregon
COS	Coos Bay, Oregon
BRK	Brookings, Oregon
CC	Crescent City, California

Port Abbreviation	Port
ERK	Eureka, California
FB	Fort Bragg, California
SF	San Francisco, California
HLF MN	Half Moon Bay, California
MNT	Monterey, California
MOS	Moss Landing, California
MOR	Morro Bay, California
AVL	Avila, California

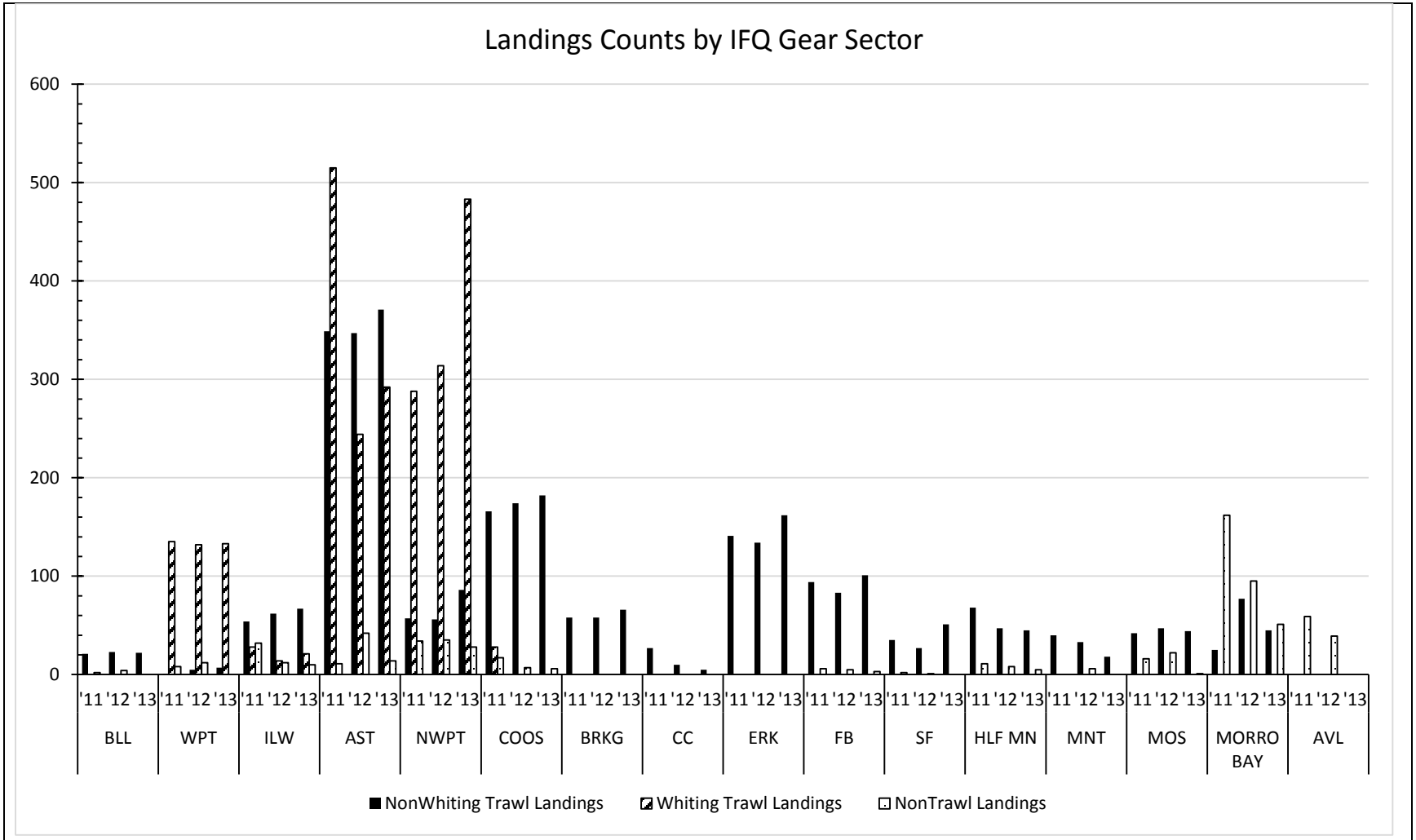


Figure 4-12. Number of nonwhiting trawl, whiting trawl, and nontrawl IFQ landings by port for 2011, 2012, and 2013 (see Table 4-18 for key to port names).

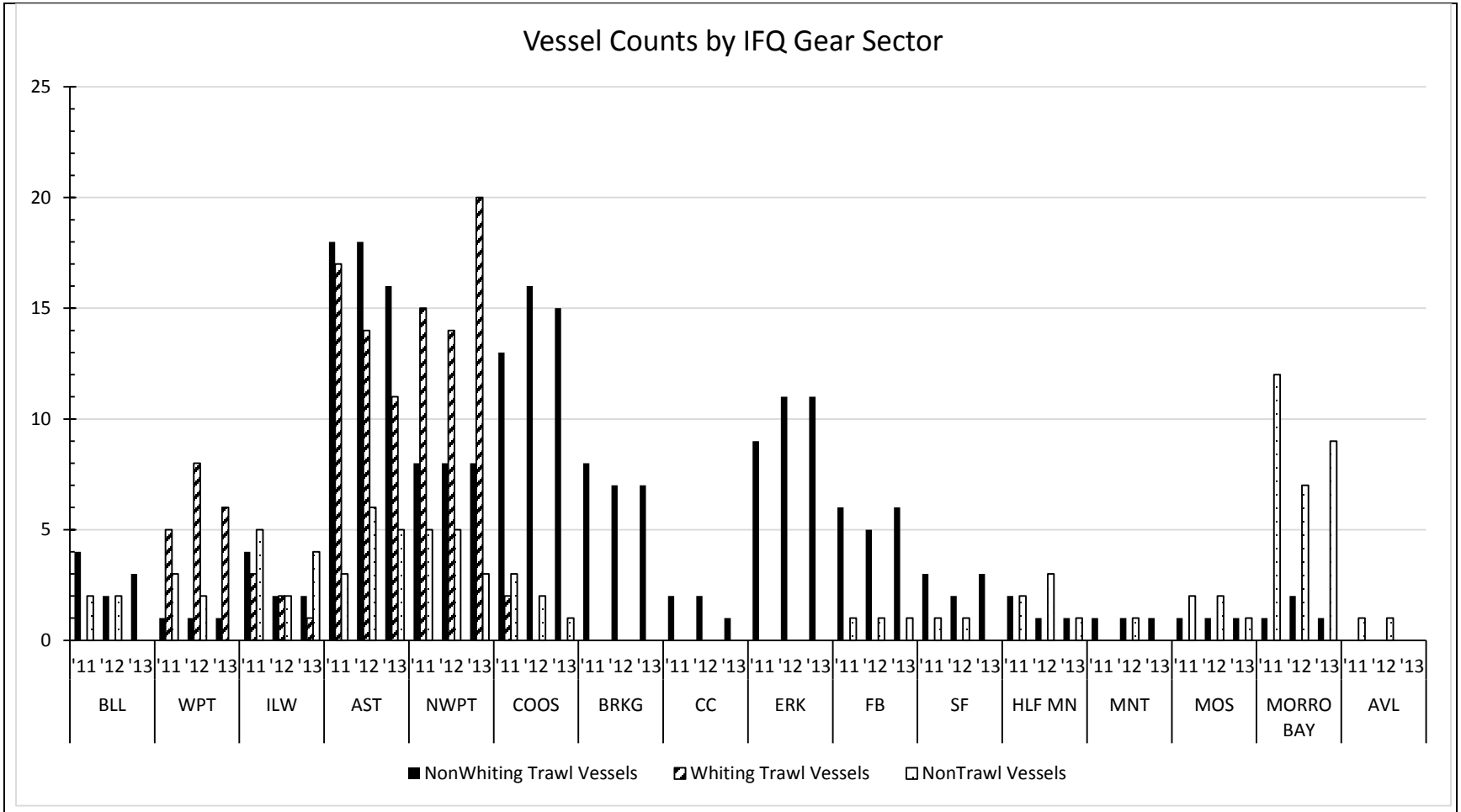


Figure 4-13 Number of nonwhiting trawl, whiting trawl, and nontrawl IFQ vessels by port for 2011, 2012, and 2013 (vessels participating in more than one IFQ gear sector or landing in more than one port are counted more than once, see Table 4-18 for key to port names).

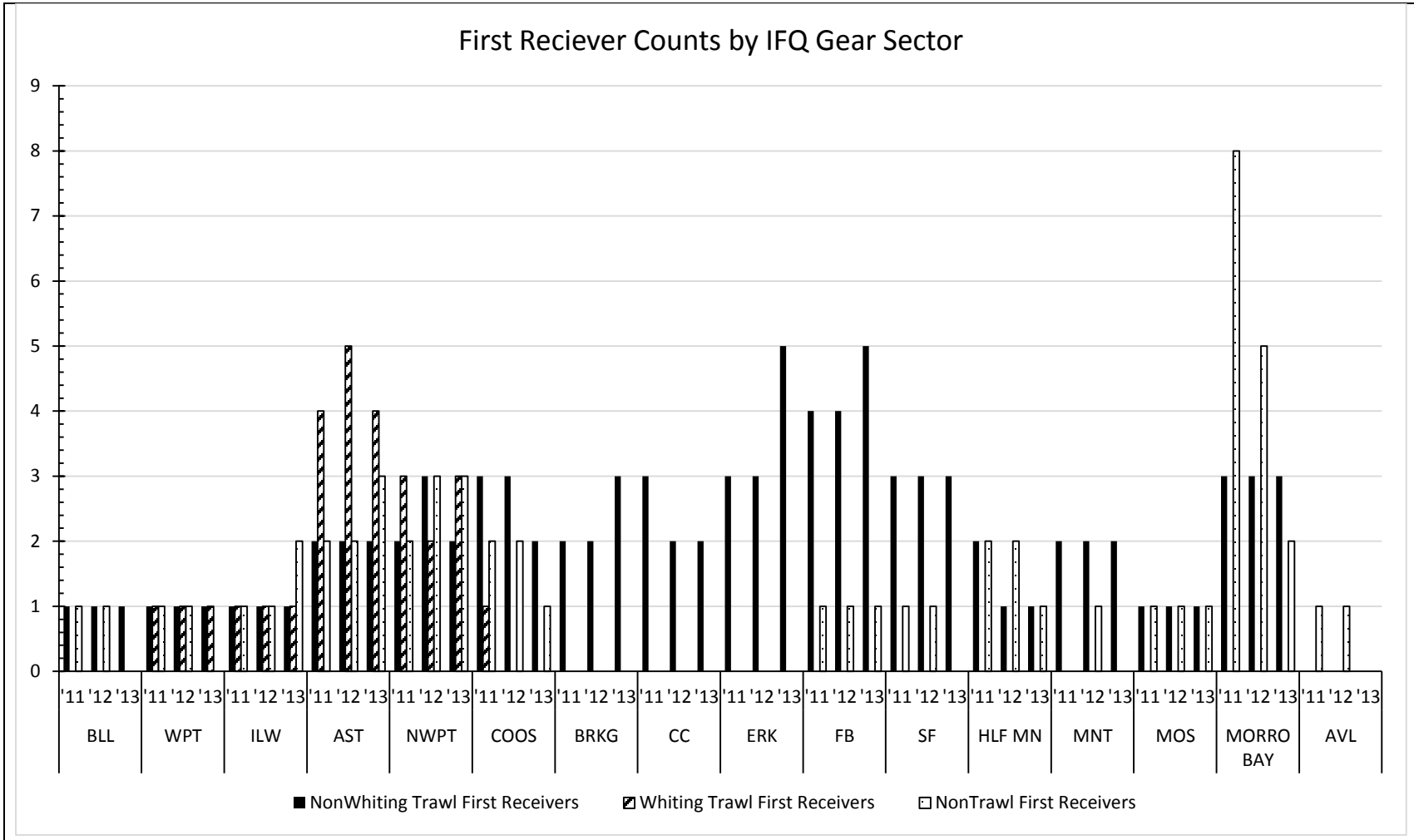


Figure 4-14 Number of nonwhiting trawl, whiting trawl, and nontrawl IFQ first receivers by port for 2011, 2012, and 2013 (first receivers receiving from more than one gear group are counted more than once, see Table 4-18 for key to port names).

Action Alternatives

Under the action alternatives, to the degree that vessels opt into the EM Program, observers would not be available to fulfill the shoreside catch monitoring function and other arrangements would have to be made. This reorganization of the shoreside monitoring task is expected to impact costs for catch monitors in a number of ways:

1) Training costs
2) Debriefing costs
3) Catch monitoring equipment costs
4) Catch monitoring fees, including time in trainings and debriefing

The first three of these costs would be incurred by government and the last by private industry.

The impacts of action alternatives Alternative 1a and Alternative 1b would depend on the degree to which vessels participate in the EM program. That degree of participation may vary among the alternatives but we do not have enough information to develop models to assess under which of the action alternatives participation would be greater. Other factors affecting shoreside monitoring costs include how industry decides to organize itself to fulfill this function (including harvesters, processors, and providers).

Government Costs

Catch monitoring training and debriefing costs are likely to be impacted under the action alternatives. For vessels using EM, there will no longer be compliance observers available to come on shore and conduct shoreside monitoring tasks, therefore personnel stationed shoreside will likely be identified to carry out this function. While under No Action the compliance observer stationed on a vessel generally covers shoreside monitoring for all deliveries by that vessel, a single shoreside monitor will likely be able to cover deliveries by multiple vessels, resulting in a net reduction in the total number of individuals which need to be equiped, trained, and debriefed on the shoreside monitoring task. On the one hand, this means that there would be fewer catch monitors to train and debrief under the action alternatives, potentially reducing the estimated costs provided in Table 4-15 and Table 4-16 and related equipment costs. On the other hand, to the degree that catch monitors have not already been trained as observers, additional training would be required. As indicated in footnote a to Table 4-15, for the one individual trained only as a catch monitor and not as an observer, a seven day training was required, as compared to the three days required for individuals already trained in species identification and sampling techniques by the observer program. While the number of individual catch monitors to debrief may diminish (reducing the number of periodic debriefings and related costs), the total number of landings for which data must be reviewed is not expected to change as a result of the action alternatives. Table 4-15 and Table 4-16 cover administrative costs only and do not include costs for the catch monitor time during training and debriefing. These costs (compensation for the catch monitor's time) are covered by providers and eventually recovered through fees they charge for providing observer and catch monitoring services.

As discussed in the section on observers, if EM replaces onboard observers there would be a reduction in the amount of equipment required for observers. Because observers generally fulfill the shoreside monitoring role this equipment is shared between the two tasks. Shoreside monitors would continue to require some of this equipment but because a single shoreside monitor can cover more trips than observers, there is likely to be some reduction in the total number of sets of equipment required. The approximate total cost for a full set of gear for observers is about $10,000. The cost of gear for catch monitoring, including laptop, camera, species ID materials, forms, and miscellaneous gear is about $1,500. All of these expenses have been incurred (equipment already purchased) and over the next 5 years only maintenance cost of less than $1,000 per observer would be required (a high side estimate, personal communication, WCGOP).

Private Costs

The fees observer providers currently charge for supplying catch monitoring services are influenced by the efficiencies related to having a compliance observer fulfill the shoreside catch monitoring function. Since the observer is already positioned on site at the time of the landing the primary cost of fulfilling the shoreside monitoring function is the additional observer time involved. If these services are provided by someone not already on site or locally stationed, the fees for shoreside monitoring might increase due to fixed costs associated with positioning and maintaining a person in the field: increased field coordination would be required to position monitors in ports when landings are occurring; there may be travel time and expense involved in that positioning; and once catch monitors arrive the duration of the work available may be substantially less (as compared to the time involved when an individual travels to a port to go out on a trip as an observer and then tags the catch monitoring function on at the end of the trip) reducing the hours across which fixed costs of positioning the catch monitor must be defrayed. [20] Observer providers generally charge for catch monitoring services on a time basis (hourly or fraction of a day) plus charges for travel (if a compliance observer is not already on site).

The impact of EM on the costs of catch monitoring services will depend on how industry is able to organize itself to fulfill this task. In some ports, deliveries may be of sufficient number to support full time catch monitors in a port with minimal change in costs and the related fees (Astoria may be one such port). However, even with a high volume of deliveries there may be a number of logistical and market challenges that have to be taken into account, including: additional monitors would be required to allow deliveries at multiple sites at the same time (if first receivers do not coordinate with one another on the timing of offloads); more than one monitor in a port may also be required to cover the multiple shifts across which deliveries occur; and more than one monitor may be required if the receivers in a port desire to use different service providers. In any particular port these challenges could be increased to the degree that some vessels opt not to participate in the EM program and observers off the vessel are used to cover the catch monitoring function for their deliveries.

There are likely alternative ways to organize the monitoring tasks that could reduce these logistical and market challenges. For example, if there are individuals that have other

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

responsibilities in the port who could also take on the catch monitoring responsibilities. Another approach to meeting the need for catch monitors might be to retain part time employees in a port for intermittent work. However, observer/monitor providers indicate that it is very difficult to retain individuals for such part time work over the long term; and in a part time/intermittent work situation, when a catch monitor is needed other life circumstances often conflict such that the catch monitor is not available.

The current practice is for first receivers to pay the costs for the catch monitor. Increases in cost could impact the first receiver's profits. However, an increase in cost might also be passed on as a fee to the vessel or in lower prices paid for fish delivered. Ability to pass increase costs to consumers is limited to some extent by costs of competing foods. Current rates for catch monitors charged by providers are discussed under the no action alternative.

Unless there are a large number of landings in a particular port or port area, or individuals with other responsibilities in a port are able to also fulfill catch monitoring functions, it seems likely that the average catch monitoring fees (labor and transportation) are likely to be higher under an action alternative than under the current system where the at-sea observer fulfills the shoreside monitoring function.

4.3.2 Trawl Catch Share Program Fishing Operations (Harvesters)

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

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

1 Changes in Operating Costs
2 Changes in Operational Flexibility
3 Changes in Privacy
4 Changes in Skill Requirements

4.3.2.1 No Action Alternative

Under the no action alternative, the current Federal subsidy is no longer available. Daily observer costs tend to be a small part of total vessel variable costs (compare observer costs of around $400 to $500 per day from Table 4-12 with the per day variable costs in Figure 4-15). However, when multiplied over the number of days of fishing the impact on vessel revenues can be more substantial. For example, shoreside whiting vessels averaged 86 fishing days per year in 2013 (Table 4-19), which implies that on average in 2013 vessels would have generated $8,600 more profit per $100 per day saved in at-sea monitoring costs. We include other fisheries here to demonstrate the costs of participation in each fishery since vessels may participate in multiple IFQ fisheries on the West Coast. If EM is implemented in whiting there may be cost savings when participating in that fishery, however observer costs for all non-whiting trips will remain.

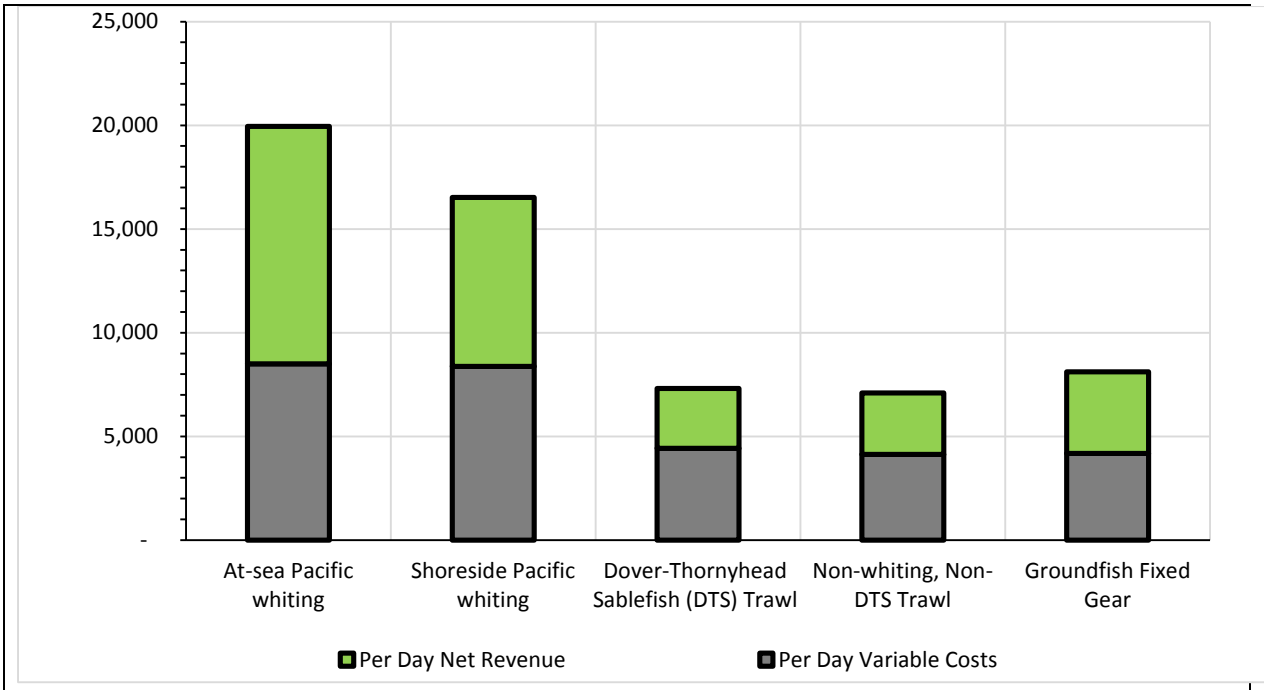


Figure 4-15. Cumulative per day variable costs and per day net revenue, per vessel in 2011 (data from Steiner, 2014).

Table 4-19. Days at sea, number of vessels and average days at se per vessel in 2012 and 2013 (Al-Humaidi and Colpo, 2014).

	Days At Sea	Vessels	Average Days/Vessel
2012			
MS Whiting	530	16	33
Shoreside Whiting	1,881	24	78
Bottom Trawl	not available	not available	not available
FG	913	25	37
2013			
MS Whiting	not available	not available	not available
Shoreside Whiting	2,053	24	86
Bottom Trawl	4,340	68	64
FG	465	18	26

As the current observer reimbursements (subsidies) expire, the importance of any cost increase in total costs may be greater for vessels which have lower net revenue per day of fishing than vessels with higher net revenue per day. Observer costs for each day of fishing will erode a greater proportion of the profits of lower net revenue per day vessels than higher net revenue per day vessels. With the end of this subsidy, the increased financial costs may lead to an increase in consolidation within the fleet, resulting in fewer fishing vessels. Depending on cost structures this could change the size of the fleet. Net vessel revenues, excluding daily at-sea monitoring costs, are provided in Table 4-20. These values are based on 2011 gross revenues and variable costs and 2009-2011 fixed costs (Steiner, et. al. 2015). The rows of this table shows the effects of various levels of per-day at-sea monitoring costs on vessel revenue taking into account total

costs. It can be seen, for example, that in general smaller vessels tend to have lower net revenue per day (with the exception of the largest vessels in the mothership sector). For whiting vessels, the levels of net revenue are high enough that an increase in payments for at-sea monitoring will not likely affect economic viability of the vessels.

Table 4-20. By length class and home port for mothership sector and shoreside whiting vessels in the groundfish limited entry fishery: average annual total cost net revenue per vessel for a range of assumed daily at-sea monitoring costs (electronic or observers)--excludes annual fixed costs associated with at-sea monitoring.

Monitoring variable costs per day	Small vessel (< 90 ft)	Medium vessel (> 90 ft, <= 110 ft)	Large vessel (> 110 ft)	Seattle	Newport	Fished in AK	Only West Coast
			Mothership Sector				
$0	$215,637	$303,905	$153,481	$212,280	$209,726	Withheld to preserver	
$150	$210,668	$298,720	$149,341	$207,066	$205,285	Confidentiality	
$300	$205,699	$293,536	$145,201	$201,851	$200,844		
$450	$200,730	$288,352	$141,061	$196,637	$196,404		
$600	$195,761	$283,168	$136,921	$191,423	$191,963		
$750	$190,792	$277,983	$132,781	$186,209	$187,523		
	Small vessel (< 80 ft)	Medium vessel (> 80 ft, ≤ 90 ft)	Large vessel (> 90 ft)	Washing-ton	Oregon	Fished in AK	Only West Coast
			Shorebased Whiting Sector				
$0	$159,967	$151,961	$214,227	$64,317	$214,902	$251,836	$82,401
$150	$151,643	$143,420	$207,116	$57,250	$206,771	$243,830	$74,680
$300	$143,319	$134,879	$200,006	$50,183	$198,640	$235,824	$66,958
$450	$134,995	$126,339	$192,896	$43,116	$190,509	$227,817	$59,237
$600	$126,671	$117,798	$185,785	$36,050	$182,377	$219,811	$51,516
$750	$118,347	$109,257	$178,675	$28,983	$174,246	$211,805	$43,795

Excerpted and adapted from Steiner, et. al. 2015, Tables 14, 15, 21, 22, and 23.

In the following figure, vessels are ordered by total cost net revenue in groups of five in order to provide another sense of relative profitability within the fleet. For example, the first group of five vessels averaged over negative $250,000 in total cost net revenue and the last group of five (number 23) averaged close to a half million in total cost net revenue. The large negative values would not be economically sustainable and may represent the occurrence of significant capital investments during the study period. Participants in the whiting fishery tend to be toward the right side of the graph (more profitable) than those in other fisheries (see Steiner et. al., 2015 for more details).

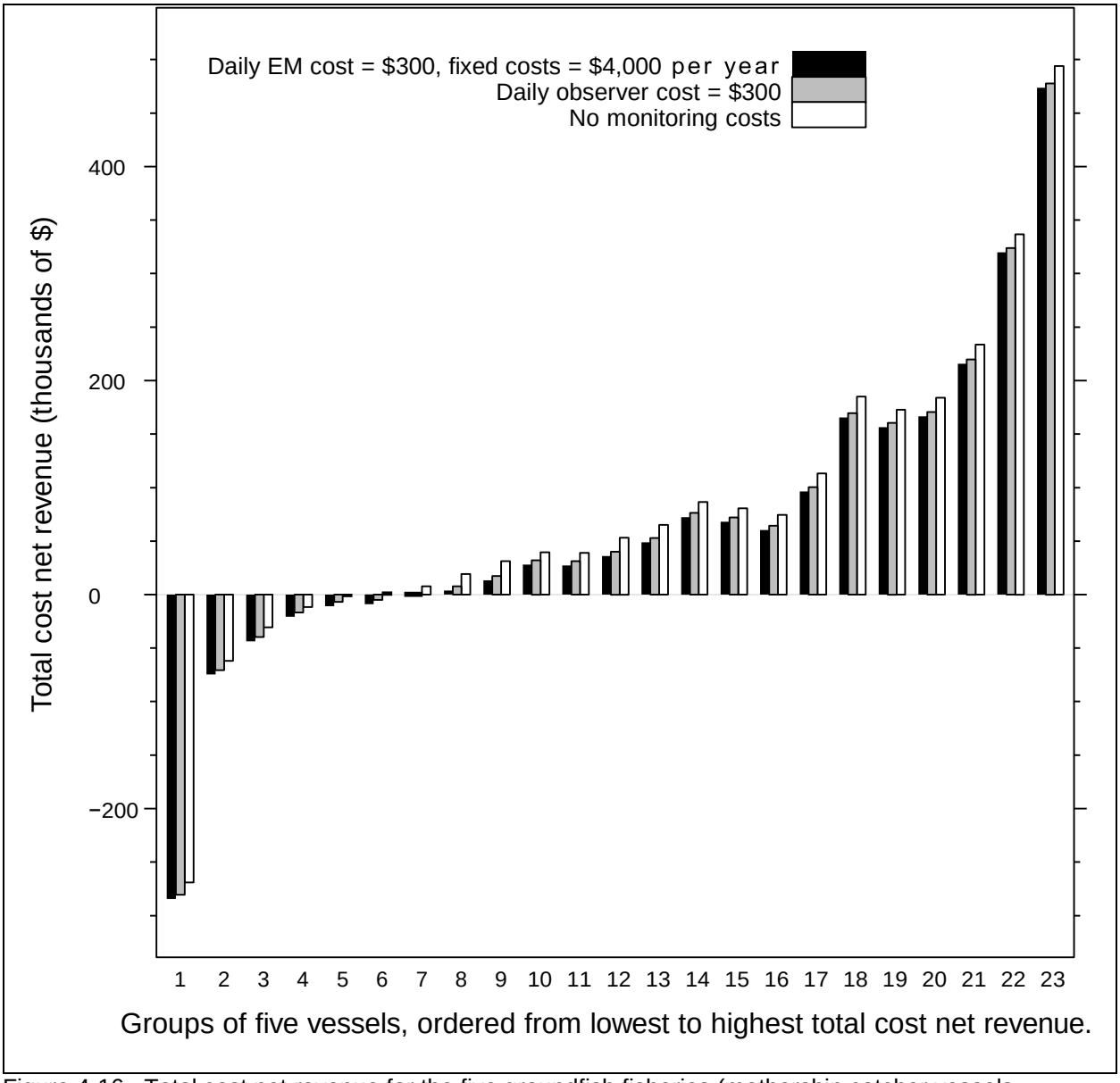


Figure 4-16. Total cost net revenue for the five groundfish fisheries (mothership catcher vessels, shoreside whiting catcher vessels, nonwhiting DTS vessels, non-whiting non-DTS vessels, and vessels participating in the trawl fishery with nontrawl gear). The vessels are grouped into groups of 5 to protect confidential data. Total cost net revenue is shown for three levels of monitoring costs, no costs (white), observer costs set to $300 (grey), and a daily electronic monitoring cost of $300 and an annual fixed cost of $4,000 (black) (from Steiner, 2014).

For the other potential impact categories, no impact mechanisms have been identified that would be operative under the No Action Alternative. Impacts for these categories that are anticipated under the action alternatives are discussed in the following section.

Summary of No Action: Impacts relative to current conditions (including categories of impacts that are affected by the action alternatives).

1) Operating costs - Increase as subsidies for observers end
   a) Fleet consolidation may result
   b) Vessels with lower per day profits will likely be more affected
2) Change in Operational Flexibility – None
3) Change in Privacy – None
4) Change in Skill Requirements – None

4.3.2.2 Action Alternatives

Impacts will vary depending on whether or not vessels choose to and are able to participate in the EM program. The EM program is expected to directly lower at-sea monitoring costs for those who decide to participate. The higher the participation rate in the EM program the lower the likely per fishing day costs of the program relative to an EM program with lower participation rates. At the same time, the lower the participation rate in the at-sea observer program, the higher the likely per day fishing costs for those carrying compliance observers.

Effects on Participants in the EM Program

This section contains a description of the impacts relative to No Action and of the action alternatives relative to one another for EM program participants. A following section covers non-participants. Following is the list of impact categories and then a more detailed discussion of each category. The different impacts categories have different relative importance, however, absent a quantitative assessment the designation of the relative importance is largely a judgment call. A preliminary assessment of relative importance is provided using icons, with  representing the least impact and  representing the most). The reader should evaluate for his or her self which types of impacts are most important.

1) Operating Costs
   a) Elimination of observer costs 
   b) New costs for electronic equipment (acquisition and maintenance) 
   c) New costs for data reporting (retrieving and transmitting/transferring data) (responsible party still to be determined) 
   d) New costs for video review (responsible party still to be determined) 
   e) Time required to fill out discard logs 

f) IVMP filing burden: time to file and related fees associated with the IVMPs that vessels would be required to have. 

g) Time required to declare whether a vessel will be using observers or EM. 

h) Increased cost recovery fees (MS Sector only) 

2) Operational flexibility (flexibility increases generally improve economic efficiency)

a) Increased operational flexibility with respect to departure and duration of fishing trip 

b) Increased operational flexibility with respect to certainty of quota pound account status. 

3) Privacy Impacts 

4) New Skills Required 

The EM program is not expected to change the quantity or quality of the fish landed and therefore is not expected to have an impact on gross revenues. Whiting is taken in tows that are generally 99 percent or more whiting. Since virtually all the whiting quota is caught there is no opportunity to increase harvest of whiting.

The following is a detailed discussion of each of these categories of impact listed above.

1) Operating Costs

a) Elimination of observer costs (see Table 4-14 for current costs)

Relative to No Action, the action alternatives would reduce vessel expenses for observers for EM participants. Table 4-20 provides an assessment of net revenue taking into account total costs with separate rows for different per day costs for at-sea monitoring. Current observer fees run about $400 to $475 per day (Table 4-14). Table 4-20 provides an indicator of the order of magnitude of net revenue for different levels of cost for at-sea monitoring. If total per day EM costs run $300 for the less than 80 foot shorebased whiting vessels, then the annual additional net revenue would be about $9,300 (the $143,319 in the row for $300 per day expenditures on monitoring minus the $134,995 in the row for $450 per day expenditures on monitoring in Table 4-20). This potential increase in annual total cost net revenue will be offset to some degree by expenses related to acquisition and operation of the EM system which are not taken into account in this table.

b) New costs for electronic equipment (acquisition and maintenance)

Relative to No Action, under the action alternatives there will be new costs associated with acquiring equipment for the EM system. The level of these potential costs are discussed in more detail in Section 4.3.1. There would be no difference among action alternatives. In using Table 4-20 to assess impacts on vessel net revenue, annual equipment acquisition and maintenance costs should be subtracted from the net revenue estimates. The per vessel equipment costs for the 2010 West Coast shoreside whiting

fishery EFP was reported to run an average of $52 per day for those that purchased their equipment and $132 per day for those that leased. Field service and travel expenses were reported as $123 per day (Lowman et. al., 2013).

c) New costs for data reporting (retrieving and transmitting/transferring data) (responsible party still to be determined)

Relative to No Action, under the action alternatives there will be new costs associated with data transfers related to the EM system. Under No Action, all discard data recorded during the trip is transmitted by observers. Under the action alternatives, camera images would have to be transferred as well as logbook information. Data transfer processes would likely entail swapping out a hard drives and mailing the hard drive to the video reviewer.

The costs associated with the task will vary depending on who carries it out. The options available are the same under Alternative 1b and the No Action Alternative. Under the Council's final preferred alternative the shoreside catch monitor (Data Transfer Process Option C) or vessel operator (Data Transfer Process Option D) would carry out this task. The vessel operator may have a relatively low opportunity cost for the labor that would be used to make the swap. If the shoreside monitor carries out this task then the vessels would likely have to pay for the additional work. However, transfers by catch monitors already on site could make this a very low cost. The level of these potential costs are discussed in more detail in Section 4.3.1. For the 2010 shoreside whiting EFPs, per vessel data reporting cost was reported as $13 per day (Lowman et. al., 2013). Under other options PSMFC (Option A) or the EM provider (Option B) would conduct the data transfer. Unless combined with other tasks, this would likely entail substantially more costs than Option C or Option D, since neither entity would have staff stationed in a port solely to conduct the transfers. It's likely that personnel would need to drive to ports (or fly). Some costs saving could occur through scheduling of several pick-ups at one port for several vessels.

d) New costs for video review

Relative to No Action, under the action alternatives there will be new costs associated with video review. At this time, it's expected that the industry will pay for video review costs. Vessel costs for video review will vary depending on the level of video review required and whether the government or the vessels pay for review. Additionally, the amount of discard allowed/required will also impact video review costs. PSMFC has provided a preliminary evaluation of video review costs.[21] For 100% review those costs were approximately $25/day or less for whiting. For 20% review as might occur under Alternative 1b those costs were roughly $12/day. However, staff time to load loagbooks and tie video segments to the logbook dates and times of haul may take more time under Alternative 1b than Alternative 1a so it's possible that video review costs may be similar

[21] PSFMC report to the Council April 2014 (Agenda Item C.1.b; Supplemental PSMFC PowerPoint (Colpo); April 2014.

for both Alternative 1a and Alternative 1b. Further discussion on cost estimates for video review is provided in Section 4.3.1.1.

Alternative 1a and Alternative 1b includes an option to deduct Category 2 discards from sector allocations or ACLs (Discard Accounting Option B) or to not account for discards (Discard Accounting Option C). Either of these would have a downward influence on video review costs because review of certain events that are difficult and time consuming to evaluate would not be required (e.g. fish in the water). However, the Council's FPA, selected Option A, which would continue to require full discard accounting.

e) Time required to fill out logbooks

Under no action, on groundfish trawl vessels all discards are recorded by observers. Under Alternative 1a and Alternative 1b, the task of recording discards for catch share species would be transferred to the vessel personnel, increasing the demands on vessel labor.

f) IVMP filing burden: time to file and related fees associated with the IVMPs that vessels would be required to have.

Under No Action, IVMPs or their equivalent are not required but would be required under both action alternatives. The first filing is expected to be most labor intensive. NMFS will have to determine whether application fees will be charged for the filing. Suboptions are provided on expiration for the IVMPs. Under IVMP Expiration Option A, the IVMPs would be valid until something changes about the vessel situation; this may reduce the vessel paper work burden relative to Option B which would require annual renewal.

g) Time required to declare whether a vessel will be using observers or EM.

Under No Action, vessels are not required to make any declarations relative to their intent to use observers during the year but under both action alternatives would be required to declare whether they will use observers or EM for an upcoming period. Options are provided for different durations of commitment and limits on the frequency with which vessels may switch between EM and observers. Declaration Option A would required a vessel to commit to one or the other (EM or observers) on an annual basis, while Option B would require annual commitments but allow that commitment to vary during the year (e.g. commit to use observers for first half of the year but EM for the second half). Option C (part of the Council's FPA) provides for a declaration that remains in place until changed with a limit on the number of times it can be changed in a year. Option D is the same as Option C with no limit on frequency. No information is available that would indicate the frequency with which vessels would elect to change their declarations therefore it is not possible to estimate the cost differential between the options. Impacts of the options on vessel operational flexibility is discussed below.

h) Increased cost recovery fees (MS Sector only).

If there is an increase in administrative costs for the trawl catch share program as a result of electronic monitoring, those cost increases may be passed on to industry as part of the cost recovery program. Those costs will depend in part on which activities are government funded and which are paid for by industry. Since the shoreside IFQ portion of the catch share program is already at the MSA mandated cost recovery limit of three percent of exvessel value, there would be no opportunity to pass on cost recovery for that sector. For the MS sector cost recovery is only at about two percent and therefore there is a possibility that, if Federal EM costs are high enough, fees may increase. Some of the increase in EM related governmental expenses may be offset by a reduction in observer coverage related government expenses. If the costs of the EM program take the MS fishery to the three percent limit, then there would be no difference in fees among the alternatives, the fee would be three percent under all alternatives. A decision would also need to be made on whether to charge all participants in the MS sector the higher percentage or to create a differential fee depending on whether or not EM is being used.

3. Operational flexibility (flexibility increases generally improve economic efficiency)

   i) Increased operational flexibility with respect to departure and duration of fishing trip

   Relative to the no action alternative, the action alternatives are expected to increase operational flexibility in that while using EM the exact timing of a vessel's trip will not be dependent on observer availability and, if a vessel finds reason to delay a planned departure it will not incur costs for standby time in the form of additional observer expenses.

   The flexibility may be limited depending on the EM declaration option. Declaration Option A would required a vessel to commit to one or the other (EM or observers) on an annual basis, while Option B would require annual commitments but allow that commitment to vary during the year (e.g. commit to use observers for first half of the year but EM for the second half). Option C (part of the Council's FPA) provides for a declaration that remains in place until changed with a limit on the number of times it can be changed in a year. Option D is the same as Option C with no limit on frequency. These options are in order of increasing flexibility for vessel operations. On the one hand, increased operational flexibility may allow vessels to more optimally select the services that best suit their need at a particular time, on the other hand, that increased vessel flexibility may increases the cost of those services because service providers will have less opportunity for advance planning and optimal scheduling.

   Under declaration Option A or Option B, if during the declaration period the catch monitoring method the vessel chose was not available (e.g. the camera system were down or an observer not available) then they would have no option to use the alternative monitoring method, unless the situation was determined to be an emergency for that vessel. For Option C and Option D, more flexibility would be provided in that vessels would be allowed to switch between EM and observer methods by simply changing a

declaration (though the frequency of such changes would be limited under Option C, the Council's final preferred alternative).

j) Increased operational flexibility with respect to certainty of quota pound account status.

When a vessel is more certain about the balances of QP in its vessel account it is able to operate with more flexibility than when constrained by uncertainty about those balances. Under the No Action alternative, there is a substantial lag time between when a vessel makes its landing and the time its discards are applied to QP in its vessel account. During this time, the vessel is in a period of uncertainty about the exact balance of unused QP remaining in the account. During the course of the catch share program the duration of this lag has been shortening but still remains. Fish landed are recorded on electronic fish tickets and are relatively quickly debited against the vessel account. Under Alternative 1a it has been suggested that logbook records might be used to provide a preliminary debiting of discards against the vessel accounts and that these might be processed rapidly, relative to the video review. Under Alternative 1b, the vessel's own logbook records would be the primary data source for documenting discards and could also be processed relatively rapidly. Logbooks would be audited using the video records and changes might be made if there were errors in the logbook entries; but if the vessel ensures that the logbook entries are made accurately the vessel should be in a relatively certain position regarding the balances of the QP in its accounts.

2) Privacy

Observers and cameras impact privacy differently. Under No Action, the current observer coverage will be maintained. Observers are considered by some an intrusion on privacy. Observers can show up most anywhere throughout the ship and be privy to many types of personal information (visual behavior, visual observation of personal objects, conversations, etc.). Under all of the action alternatives, observers would not be present but there would be a privacy intrusion factor associated with the cameras. Cameras are a more restricted intrusion with respect to the scope of what is recorded but within the scope there are a number of qualities of camera monitoring that might be considered more intrusive of privacy: constancy of the intrusion (once fish are on board some cameras will always be on); relative permanency, veracity, and verifiability of the images recorded; and anonymity and multiplicity of those who will have access to the images (those whose images are being recorded don't know and have little control over who will be looking at the images or how many people will be viewing them). The action alternatives do not vary with respect to the degree and type of privacy intrusion.

3) Skills

Under the No Action alternative, observers are available to help with species identification where required. Under the action alternatives, to the degree that discards are allowed, crew members may need to become more proficient in species identification and quantification, including juveniles and rockfish species for which species identification can be more problematic. Both action alternatives require maximum retention however species identification is critical when discards occur and information on discards, including species and weights, would have to be noted and recorded in logbooks. This measurement and clerical chore is not one that is currently a requisite of the back deck work of crew members. This is more of a concern for shoreside vessels, which bring fish on board, than mothership vessels, which generally pass codends to motherships without bringing fish onboard.

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

Effects on Non-EM Participants

Non-participants may include those who do not choose to participate in the EM program, those who are restricted from participating because of past violations, or those participants in the trawl catch share program for whom EM is not an option (those targeting non-whiting with either trawl or other gears).

Relative to the No Action alternative, the action alternatives main impacts on those who do not participate would be indirect and occur through possible changes in the costs structures for observer providers as a result reductions in the economies of scale. With EM in place, fewer vessels would be using observers and this might cause an increase in observer fees as discussed in Section 4.3.1.1, in the subsection*: Costs for Observers - Biological and Compliance Observers.* Whiting days-at-sea comprised 33% of all West Coast trawl program days-at-sea in 2012 and 36% in 2013 (Figure 4-17). Travel costs are another factor that may impact what vessels pay for observers. Even if per day fees remain unchanged, with a small observer corps it may become more likely that a vessel will have to pay observer travel related expenses to bring an observer in from another part of the coast if there is not one available when needed by the vessel.

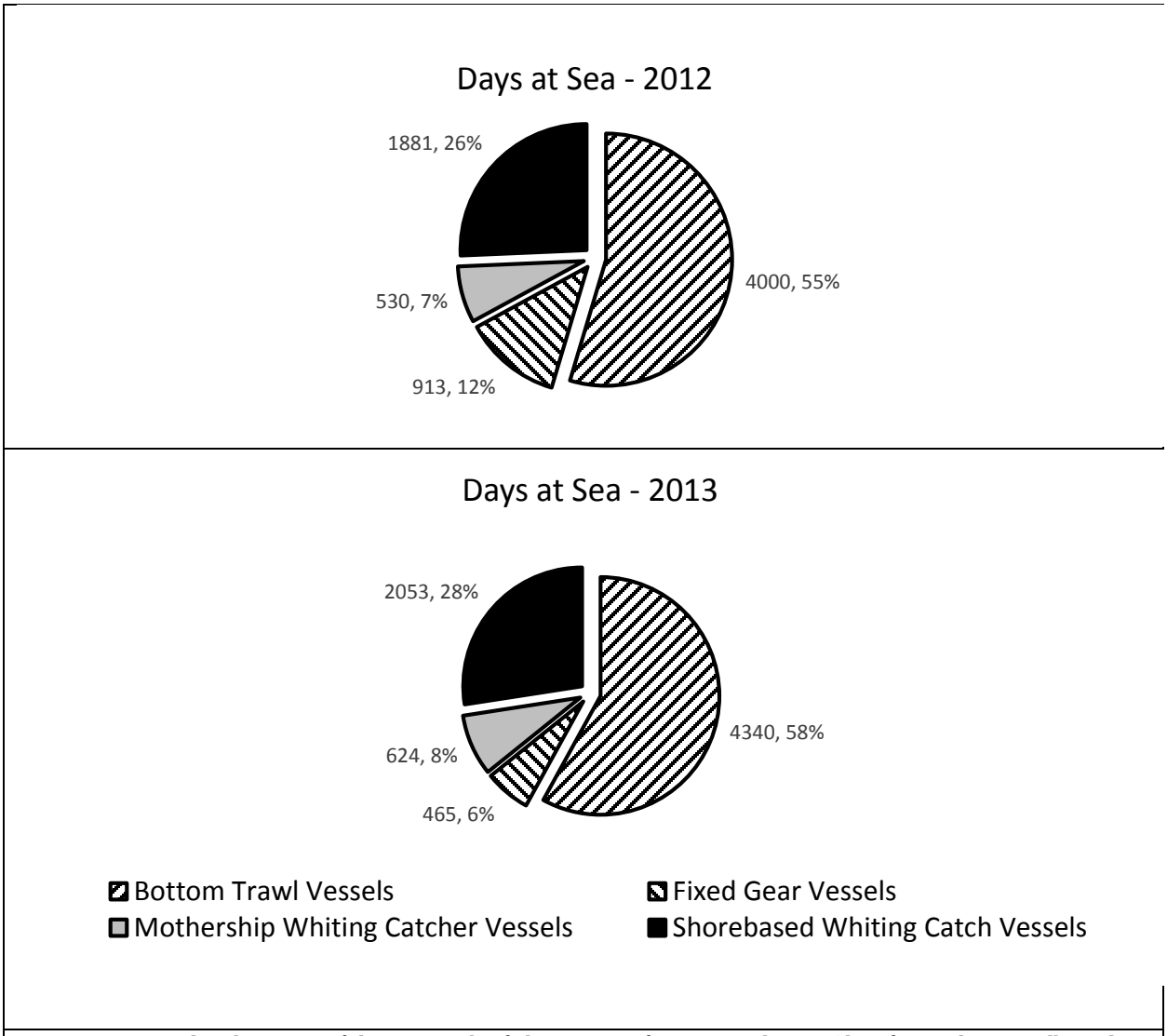


Figure 4-17. Total and percent of days-at-sea by fishery sector for 2012 and 2013 (data from Al-Humaidhi and Colpo, 2014, plus personal communication with the authors, July 23, 2014).

Advance Declaration Option A and Option B would require that harvesters make declarations at the start of the year stating whether they will use EM or observers. This advance planning opportunity could help limit the increased average operational costs for observer companies and keep observer fees lower than they might be with more flexible requirements for advance declaration (advance Declaration Option C and Option D).

4.3.3 Quota Share Owners (and MS History Endorsement Owners)

Under a catch share program, on average over the long-term, the fishing operations are expected to make zero economic profit, which is a technical way of saying that the industry is achieving normal profit levels. Under a normal profit situation, QS owners (and MS history endorsement owners) will capture any unexpected economic profits (above normal profits) or losses which result from changes in economic conditions in the fishery that occur unexpectedly after the quota

is purchased. For example, an unexpected increase in exvessel prices would increase profits and therefore increase QS value. Similarly, an unexpected increase in fuel costs would decrease profits and decrease QS value. QS trading for all species except widow rockfish began at the start of 2014 and market prices for QS should reflect current expectations of future profitability in the fishery.

4.3.3.1 No Action Alternative

Under the no Action Alternative, there are a number of factors in transition affecting vessel profitability and hence quota and MS history prices. The degree to which these factors are being taken into account in current transactions is uncertain.

Among the factors on the horizon that may negatively affect quota and MS history prices are decreases in profitability related to:

4. An end to the observer cost reimbursements.

Among factors on the horizon that may positively impact quota and MS history prices are increases in profitability related to:

5. increases in the OY for 2015-2016 (gross revenue for trawl vessels is projected to increase by roughly 13 million dollars (about 45 percent) PFMC, 2014, Tables 4-58, 4-124 and 4-125), and
6. possible reductions in regulatory restrictions on the use of trawl gear, pursuant to trawl trailing actions.

It is possible that quota and MS history sellers and buyers may also be building into their selling and offering prices anticipated changes in profitability expected to result from a move to electronic monitoring. Any anticipated changes in profitability related to EM would likely be heavily discounted because of substantial uncertainty as to whether or not the policy change will occur, uncertainty about the costs of electronic monitoring versus observer costs, and uncertainty about the degree to which related costs will be paid for by industry.

Under the no action alternative, it is expected that the fishery will operate at normal profit levels on average over the long term with lower quota share prices than would occur under EM.

4.3.3.2 Action Alternatives

Under the action alternatives, if the EM program reduces operational costs, a portion of that reduction will be capitalized in the value of the quota and MS history. Absent other changes in the market place, those holding the quota or MS history at the time of the change will experience increased revenue up until they sell the quota or permit and then a higher revenue from the sale of the quota or MS history. That increase will be experiences as either through greater vessel profits, for quota owners that fish their own quota, or as higher prices for annually issued QP (or shares of allocation for MS history owners).

As a result of higher quota prices, those buying the quota or MS history after prices increase will have a higher cost, benefiting the quota sellers and reducing profits from quota ownership toward normal levels. Thus, as under the No Action alternative, under the action alternatives it is expected that the fishery will operate at normal profit levels on average over the long term, but with higher share prices than would otherwise be present under No Action.

The action alternatives would result in a price increase primarily for whiting QS and MS history with a potential very minor indirect impact on nonwhiting QS for species taken as bycatch in the shoreside whiting fishery. Alternative 1a and Alternative 1b are expected to perform similarly for the shoreside whiting fishery because, for whiting, 100 percent video review (Alternative 1a) is expected to entail costs similar to logbooks with a minimum of 10% video review (Alternative 1b). This is due to the minimal amount of fish handling which occurs on whiting vessels. This assessment of impacts on costs and hence QS and MS permit values assumes that industry will pay some of the video review costs.

4.3.4 **Vessel Owners**

In this analysis, impacts on harvesting operations are covered in Section 4.3.2. Owners of the harvesting operations may be the same as the owners of the vessels or harvesting operations may lease their vessels from vessel owners. Here, vessel ownership is treated as a separate activity, distinct from the harvesting operation.

Assuming competitive conditions, the change in profits from any change in monitoring costs would most likely accrue to quota owners but may be spread between the harvesting operation, quota owners, vessels and potentially crew, depending on how the change affects the value of the contribution made by each.

4.3.4.1 No Action

Vessels for which per day profits, when operating most efficiently for any given market conditions, are lower than other vessels are more adversely impacted than those other vessels by daily fixed costs for at-sea monitoring by observers. Consequently, the value of those vessels would be expected to be lower than vessels with a higher per day profit. [22] Therefore, under the No Action Alternative, as subsidies for observer fees expire, increasing per day costs, there may be some diminishment in the value of vessels that generate lower profits on a per day basis.

4.3.4.2 Action Alternatives

Under the action alternatives, per-day costs for at-sea monitoring are expected to decrease for vessels participating in the EM program, relative to the unsubsized costs of observers. On this basis, under an action alternative, the asset value for vessels which are less efficient than others on a per-day basis (but competitive on an annual basis) may increase under the action

[22] A complete explanation of overall efficiency and profit generation would need to take into account factors such as the amount of fish caught, whether vessels which can generate similar profits in fewer days have alternative fisheries in which they would then participate, and income to crew for lesser and greater numbers of hours of work. However, it is not necessary to go into this detail to discuss the general point.

alternatives relative to the no action alternative. Differences in the degree of increase among the alternatives will be proportional to differences in changes in the degree of profitability between the alternatives. These differences are discussed in Section 4.3.3.

Some smaller vessels may have been challenged in providing space to accommodate an observer. In contrast, for the action alternatives there is no reason to expect that a vessel, because of its physical configuration, would be unable to participate in the EM program if its operator so desired.

4.3.5 **Crew Members**

Crew members may be directly affected by

- Changes in privacy and social circumstances (cameras compared to observers)
- Changes in fish handling task

There may be an indirect effect on

- crew income, depending on the structure of crew share contracts,

4.3.5.1 No Action Alternative

Under the no action alternative no impact mechanism has been identified that would cause a change in privacy conditions or crew skill requirements relative to current conditions. If crew shares include a deduction for observer costs, crew income may decline as observer cost reimbursements end. Otherwise, it is assumed that the labor market is competitive and on that basis changes in observer costs would not have a noticeable effect on crew income.

4.3.5.2 Action Alternatives

The impacts of the action alternatives on privacy (a shift in the kinds of privacy available) and the fish handling (a possible increased need for skills in species identification and data recording for the shorebased whiting fishery) are described in Section 4.3.2.2, paragraphs 2) and 3) respectively. If crew shares include a deduction for observer costs, crew income may increase as observer cost reimbursements end depending on how the vessel treats EM related costs. EM might be a lower alternative to achieving at-sea monitoring in isolated, low demand ports.

4.3.6 **Processors (First Receivers)**

4.3.6.1 No Action Alternative

Under No Action current practices would likely continue unchanged: when a vessel lands the vessel observer comes on shore and fulfills the shoreside catch monitoring function. First receivers are generally charged $50 per hour or charged the observer daily rate (Table 4-14) in partial day increments for shoreside monitoring services with fee structures varying by provider company. Fees are generally higher in the area south of San Francisco. These fee levels are contingent on the observer coming to shore to fulfill the catch monitoring function.

4.3.6.2 Action Alternatives

The most likely direct effect of EM on first receivers will relate to possible increases in the costs of shoreside catch monitoring services (since vessel observers previously on hand at time of landing would no longer be available to fill this function). A more detailed discussion of the reasons cost increases would be expected is provided in Section 4.3.1.1 in the subsection entitled *Shoreside Catch Monitors*.

Alternative 1a and Alternative 1b would implement EM for whiting fisheries, primarily affecting shoreside monitoring tasks in Westport, Ilwaco, Astoria, and Newport (Coos Bay has not had a delivery since 2011, Figure 4-12). The monthly volume of whiting landings in those ports, other than Ilwaco, may be enough to maintain a catch monitor in the ports during the peaks of the active periods of the whiting season. Ilwaco would benefit from its proximity to Astoria and on that basis would likely be able to meet its shoreside monitoring needs relatively efficiently. However, there may still be challenges and additional costs related to ensuring that shoreside monitors are available across multiple shifts and possible offloading locations, as discussed in Section 4.3.1.1.

4.3.7 Observer/Catch Monitor Provider Companies and Observers/Monitors

4.3.7.1 No Action Alternative

Under the no action alternative, provider companies will likely continue to provide as-sea observers and shoreside monitors to the fishery and demand the services of individuals who fill those positions. As the Federal reimbursement program phases out, observer providers may experience some greater uncertainties with respect to on time payments for services rendered.

4.3.7.2 Action Alternatives

Both action alternatives would be expected to have similar effects on the provision of observers and shoreside monitors. A transition to EM would likely inject considerable uncertainty into the business planning for provider companies during the adjustment period. The whiting fishery's demands for observer and catch monitoring services are substantial and the number of personnel required to meet those needs may provide some efficiencies and flexibilities for the trawl sector as a whole that will be reduced if EM is used by the majority of the whiting sector. Nevertheless, over the long run, assuming the fishery remains economically viable, providers should be able to maintain at least a normal profit level. However, economic viability of the fishery includes the industry's ability to pay observer companies a rate which keeps them in the business of supplying compliance observers and catch monitors to the West Coast fishery.

The demand for observer and catch monitor services will depend both on the amount of participation by vessels not using EM and the at-sea biological observations contracted for by the WCGOP. The provision of shoreside catch monitoring services might present some particular logistical challenges (see Section 4.3.1.1). The relatively low number of people deeded to fulfill

catch monitoring functions may make it difficult for more than one provider to service a port, affecting competition and fees. The possibility of increases in provider fees is covered in Section 4.3.1.1 in the subsection: *Costs for Observers - Biological and Compliance Observers*.

Under the action alternatives, jobs for observers and shoreside monitors will decline and would likely be partially replaced by jobs for technicians maintaining video equipment, reviewing video, and maintaining data systems. The characteristic and many of the required skills for these shoreside jobs is likely to be very different than those of at-sea observers and at-sea compliance monitors. Some of the previous at-sea observer positions will likely convert to dedicated shoreside compliance monitor positions.

4.3.8 EM Providers and Video Review/Reviewers

4.3.8.1 No Action Alternative

Under the No Action Alternative, EM providers and video reviewers are working on pilot projects to develop and explore EM programs for the West Coast. Additionally, potential providers for the West Coast system are providing EM and other fishery monitoring services in other fisheries.

4.3.8.2 Action Alternatives

Under the action alternatives, new business opportunities would be created for EM providers and video reviewers. There are a number of tasks for which support would be required

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

EM providers will most likely handle the EM equipment and EM software but data retrieval and video review might also be handled by observer/catch monitor providers, other third party providers, or the government. Additionally the data retrieval process might be handled by the vessel.

In general, with respect to effects on EM providers and video reviewers, the main difference between the action alternatives is the amount of time that would be required for video review. Alternative 1a with Video Review Option A (100 percent video review) would require the most video reviewer time. Alternative 1a with Video Review Option B or C, or Alternative 1b would likely require comparable amounts of video review time and less time than Alternative 1a with Option A. On a per trip basis, the amount of effort required for video review is relatively small and hence the differences between the alternatives is relatively small, as reflected in the cost estimates provided in Table 4-12.

The Council's final preferred alternative specifies that data retrieval be handled either by the shoreside catch monitor (Data Transfer Option C) or vessels operators (Data Transfer Option D),

in which case these tasks would not be specifically delegated to EM providers (Data Transfer Option B).

With respect to video and data processing and analysis the Council's final preferred alternative specifies that these tasks be handled by a third party, which could be an EM provider or some other third party (e.g. an observer provider), either of which would have to establish themselves as authorized video reviewers. Other options would have delegated this task to NMFS or PSMFC.

4.3.9 Communities

4.3.9.1 No Action Alternative

The geographic distribution of landings among ports is provided in Section4.3.1.1 in the subsection entitled *Shoreside Catch Monitors.* Section 4.3.2.1 includes information on differences in vessel net revenues by geographic area. Under No Action there may be some fluctuation in the distribution of landings among ports based on changing stock distributions and investment decisions but no prediction can be made about the timing or pattern of such shifts, if they occur.

4.3.9.2 Action Alternatives

No impact mechanism has been identified by which movement from observers to EM would affect the distribution of harvest among communities. Under the action alternatives, there may be a few additional jobs located in communities if the shoreside monitoring responsibilities are taken over by individuals working in the community (as compared to the current situation in which the observers that come shoreside to do the job are most often not residents of the community). This impact would not vary between the action alternatives.

4.3.10 Government

4.3.10.1 Federal

No Action

Under No Action, the Federal government would continue to arrange for training, debriefing and other support for industry paid for compliance observers.

Action Alternatives

Under the both action alternatives, in addition to the direct costs of the EM program and adjustments to the program for biological observers (see Section 4.3.1.2 for a complete discussion), there may be additional burden associated with maintaining a regulatory framework and administrative support for two separate but linked monitoring programs – one for vessels choosing to use EM and one for vessels choosing to carry observers.

4.3.10.2 States

No Action

Under the No Action alternative no changes are expected to state responsibilities or activities.

Action Alternatives

Under the action alternatives, there may be a possibility that states could become providers for shoreside catch monitoring services. if they so desired.

Under Alternative 1a Video Review Protocol Option A and Option B and Alternative 1b discard logs would be required. All three states have requirements for retained catch logbooks for the groundfish trawl fishery and Oregon has a requirement for discard logbooks for vessels participating in the trawl catch share fishery with FG. If a Federal requirement for recording discards is met with state logbooks there may be some additional changes required for both existing state logbooks and the computer reporting system. See Section 4.3.1.1 for further discussion. Catcher vessels in the mothership sector are not currently required to have logbooks, therefore a new logbook requirement would likely be established. Since fishery information from this sector is generally reported through the Federal government it is likely that such a logbook would be a Federal rather than state reporting requirement.

4.3.10.3 Pacific States Marine Fisheries Commission

No Action

PSMFC currently receives Federal money for training, debriefing and data quality checks for shoreside catch monitors.

Action Alternatives

Under either action alternative, the PSMFC contract for training, debriefing and data quality checks for shoreside catch monitors could be modified depending on how the catch monitoring task is organized. Additionally, the action alternatives include suboptions under which PSMFC would take on other roles in the EM system, including the role of video reviewer, though these suboptions were not included as part of the Council FPA. As the central repository of fishery information on the West Coast, PSMFC may need to make changes to the PacFIN data system to incorporate information from new discard logs.

4.4 Cumulative effects

A cumulative effects analysis is required by the Council on Environmental Quality (CEQ) (40 CFR part 1508.7). The purpose of a cumulative effects analysis is to consider the combined effects of many actions on the human environment over time that would be missed if each action were evaluated separately. Cumulative effects are the net result of the proposed action in

addition to all past, present, and reasonably foreseeable future actions on the human environment over time. One could think of it as an equation where it is important to note that Past, Present, and Reasonably Foreseeable Future Actions include those that are Federal and non-Federal actions as well as those that are fishery (e.g., trawl rationalization trailing actions) related and non-fishing (e.g., non-point source pollution) related:

Proposed Action + Past Actions + Present Actions + Reasonably Foreseeable Future Actions = Cumulative Effects

CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful. A formal cumulative impact assessment is not necessarily required as part of an EA under NEPA as long as the significance of cumulative impacts has been considered (U.S. EPA 1999). The following addresses the significance of the expected cumulative impacts as they relate to the federally-managed groundfish fishery.

4.4.1 Consideration of the Affected Resources

In Chapter 3 (Description of the Affected Environment), the affected resources that exist within the fishery environment of Target and Non-Target species are identified. Therefore, the significance of the cumulative effects will be discussed in relation to these affected resources listed below.

1. Physical Environment, including EFH and Ecosystems.
2. Biological Resources, including:
    - Groundfish Target Species (Section 3.2.1),
    - Non-target Fish Species (Section 3.2.2),
    - Prohibited Species (Section 3.2.3);
    - Protected Species, including ESA species, marine mammals and seabirds (Section 3.2.33.2.3.1).

3. Socioeconomic Environment, including harvesters, first receivers, communities, observer providers and government:

Geographic Boundaries

The analysis of impacts focuses on actions related to the management unit of species in the Groundfish FMP. The core geographic scope for each of the affected resources listed above is focused on the Eastern Pacific Ocean (Chapter 3), and in particular within the U.S EEZ off the coast of Washington, Oregon, and California. The core geographic scope for endangered and protected resources can be considered the overall range of these resources in the Eastern Pacific Ocean. For human communities, the core geographic boundaries are defined as those U.S. fishing communities directly involved in the harvest or processing of the managed resources, which were found to occur in coastal states.

Temporal Boundaries

The temporal scope of past and present actions for the affected resources encompasses actions that occurred after FMP implementation (1982) and more specifically during the baseline period, 2003-2012, which is the temporal context within which affected resources are described in Chapter 3. For endangered species and other protected resources, the scope of past and present actions is determined by analysis pursuant to the ESA and MMPA, including biological opinions for the groundfish fishery and marine mammal stock assessment reports. The temporal scope of future actions for all affected resources extends about 15 years into the future. This period was chosen to characterize conditions during future biennial management periods for which harvest specifications and management measures will be set.

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

A regular cycle of stock assessment, setting harvest specifications, and establishing related management measures allows the Council and NMFS to regularly assess the status of the fisheries and to make necessary adjustments to ensure that there is a reasonable expectation of meeting the objectives of the Groundfish FMP and the MSA, especially the objective of achieving optimum yield (OY). Achieving OY involves monitoring stock characteristics (fishing mortality, recruitment, etc.) and formally assessing stocks where the data are available. The management framework is adaptive such that the receipt of new information informs decisions about setting harvest limits in future years through each biennial harvest specifications cycle. Compliance with this regulatory regime should result in positive long-term outcomes taking into account the cumulative impacts of past, present, and reasonably foreseeable future Federal fishery management actions. Limiting fishing effort through regulatory actions can often have negative short-term socioeconomic impacts. These impacts are usually necessary to bring about long-term sustainability of a given resource, which should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon groundfish stocks.

Past and present fishery management actions and their effects are described in Chapter 3. In addition to fishery management actions, other past, present, and reasonably foreseeable future actions are considered (e.g., water pollution and climate change). The cumulative effect results from the combination of the effects of these past and present actions, reasonably foreseeable future actions, and the proposed action. Ongoing and reasonably foreseeable actions with detectable effects are summarized below. (Note that establishing harvest specifications and management measures for future biennium's is part of the proposed action.)

Fishery Management Related

- Past groundfish harvest specifications and management measures. Past harvest specifications contribute to the current status of managed stocks. Management measures directly or indirectly control catch, affecting stock status, fishing opportunity, harvester costs and net revenue, and personal income and employment in fishing communities.
- Review of groundfish essential fish habitat designation and mitigation measures. The Council has completed Phase II of a three-phase review process. Phase I compiled available information on Pacific Coast groundfish habitat associations, fishing activities, prey species, and many other elements of groundfish EFH. During Phase II proposals for revised designations of groundfish EFH and additional mitigation measures were

solicited and eight proposals were reviewed and reported on to the Council in November 2013. In Phase III the Council will consider action to amend the components of groundfish EFH.

- The Council's Fishery Ecosystem Plan. The Council is developing measures to protect unfished and unmanaged forage fish species pursuant to an initiative identified in the FEP. This action involves amending all current FMPs to prohibit targeted harvest of specified forage species. These protections could benefit both currently unmanaged fish stocks and managed stocks that depend on forage fish.
- Regulatory adjustments to the trawl rationalization program. Through a series of rulemakings based on Council recommendations, a variety of adjustments to the trawl rationalization program are being implemented. In general, these measures are intended to make rationalized fisheries operate more efficiently and/or clarify the intent of regulations. Measures that have been implemented or are in the rulemaking process include, but are not limited to, eliminating the prohibition on further quota pound trading after December 15 each year, changing requirements for observer/catch monitor contractors, establishing chafing gear regulations, and establishing fees to recover costs of the program as required by the MSA. Future measures include establishing a common start date for the Pacific whiting season for all sectors and allowing a vessel to be registered to permits with both trawl and FG endorsements and use the resulting combined limit. The Council is also developing a regulatory package to allow electronic monitoring as an alternative to human observers. Beginning in 2014, the Council will prioritize the development of all new management measures not implemented through the biennial process. The first of these "omnibus" considerations is scheduled for the June 2014 Council meeting. This will create a useful inventory of external fishery-related actions.
- Seabird avoidance measures. A regulatory package to implement requirements from the Section 7 consultation for short-tailed albatross is currently in development.
- Regulation of fisheries for species other than groundfish. Other fisheries contribute to the mortality of biological resources also affected by groundfish fisheries, particularly protected species. (Catch of groundfish in non-groundfish fisheries is regulated and accounted for through the biennial management process and therefore, directly affected by the proposed action.) Adverse impacts from other gear types may also combine with impacts to EFH from groundfish gear. Fishery removals from all sources also have long-term effects on the trophic structure of the California Current ecosystem.

Not Related to Fishing

- Water pollution. A variety of activities introduce chemical pollutants and sewage and cause changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment. Although these activities tend to affect nearshore waters, they adversely impact identified affected biological resources if a substantial part of their life cycle occurs in these waters. Examples of these activities include, but are not limited to, agriculture, port maintenance, coastal development, marine transportation, marine mining, dredging, and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources.

- Other authorities to conserve biological resources considered in this EIS. The MSA (50 CFR 600.930) imposes an obligation on other Federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH. NMFS also reviews certain activities that are regulated by Federal, state, and local authorities causing adverse effects to the marine environment through processes required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The jurisdiction of these activities is in "waters of the U.S." and includes both riverine and marine habitats. Under the Fish and Wildlife Coordination Act (Section 662) agencies must consult with the USFWS over certain activities affecting freshwater habitats. This Act provides another avenue for review of actions by other Federal and state agencies that may impact resources that NMFS manages. NMFS and the USFWS share responsibility for implementing the ESA. Activities that may jeopardize the continued existence of a species listed under the Act may be regulated directly and through the designation of critical habitat for such species. This provides a way for NMFS to review actions by other entities that may impact endangered and protected resources whose management units are under NMFS' jurisdiction.
- Cyclical and ongoing climate change. Sections 3.4.5 (System Forcing and Climate Change), 3.4.6 (Implications of Climate Change for Groundfish Fisheries), and 3.4.7 (Baseline Status of the California Current Ecosystem) describe the effects of climate on ecosystem components. Cyclical phenomena include ENSO, PDO, and NPGO. As noted in Section 3.4.6, range shifts of target species may cause the biggest climate change-related impact on fisheries.

The following sections discuss the effects of these past, present, and reasonably foreseeable future actions on the environmental components evaluated in this EIS.

Groundfish Stocks

4) Past groundfish harvest specifications and management measures. Specification of catch limits and management measures. Improvements in stock assessment methods and the management system have ended almost all overfishing since the beginning of this century. Rebuilding plans have been implemented and overfished stocks' stock sizes are increasing. The OFL has been exceeded occasionally for some stocks but not persistently enough (e.g., more than once in four years) to require broad reevaluation of the management system. The OFL contribution for some stocks managed in complexes may have been exceeded.
5) Review of groundfish essential fish habitat designation and mitigation measures. Mitigation measures that reduce adverse impacts to EFH may result in increased stock productivity.
6) The Council's Fishery Ecosystem Plan. Forage fish protection measures may have a marginal effect on maintaining stock abundance of prey species for piscivorous groundfish. The Council has more information to inform management decision-making through Annual State of the Ecosystem reports.
7) Regulatory adjustments to the trawl rationalization program. Since these adjustments primarily focus on program efficiency and reducing harvester costs they will have negligible impacts on groundfish stock status. The exception are revisions to midwater trawl chafing gear regulations to allow greater coverage of midwater trawl codends.
8) Seabird avoidance measures. These measures have negligible impacts on groundfish stock status as they are not anticipated to affect fishing effort levels. Thus, implementation of

seabird avoidance measures are not considered further as contributing to a cumulative effect on groundfish stocks.

9) Regulation of fisheries for species other than groundfish. Actions that mitigate adverse impacts to groundfish EFH from activities other than fishing could have a beneficial impact on groundfish stock productivity, to the degree benthic habitat quality is related to stock productivity. Measures implemented to reduce takes of protected species could also indirectly affect fishing opportunity and catch. Decreased fishing mortality would have a beneficial impact on groundfish stocks.
10) Water pollution. Impacts are localized in nearshore areas and marine project areas where they occur. Therefore, water pollution has negligible impacts on groundfish stock status.
11) Other authorities to conserve biological resources considered in this EIS. These authorities do not affect groundfish management and therefore have negligible impacts on groundfish stock status.
12) Cyclical and ongoing climate change. Warm water phases in cyclical climate phenomena decreases the productivity of many groundfish stocks. Climate change may lead to range shifts decreasing local abundance of groundfish.

Socioeconomic Environment

13) Past groundfish harvest specifications and management measures. Implementation of stock rebuilding measures in the late 1990s caused a substantial decline in fishing opportunity and ex-vessel revenue.
14) Review of groundfish essential fish habitat designation and mitigation measures. If mitigation measures indirectly reduce catch there would be an adverse impact.
15) The Council's Fishery Ecosystem Plan. This initiative could potentially have negative short-term socioeconomic impacts if actions taken to protect forage species and unmanaged species resulted in reduced harvest opportunity for managed species.
16) Regulatory adjustments to the trawl rationalization program. For the most part, these actions are intended to increase efficiency and flexibility, which would have a beneficial impact.
17) Seabird avoidance measures. These measures impose modest capital costs on FG vessels to install tori lines and may increase operational costs modestly for these vessels.
18) Regulation of fisheries for species other than groundfish. Management regulations for other fisheries will have negligible impacts on groundfish ex-vessel revenue but may affect total revenue accruing to fishing communities.
19) Water pollution. Nearshore water quality has negligible impacts on groundfish stock productivity and therefore, is unlikely to affect ex-vessel revenue.
20) Other authorities to conserve biological resources considered in this EIS. Reinitiation of Section 7 consultations for ESA-listed species affected by the groundfish fishery could result in additional reasonable and prudent measures and terms and conditions. These measures could reduce fishing opportunity and/or increase operational costs. Since there is no information to suggest that the operation of the groundfish fishery will change substantially in the foreseeable future, it is unlikely that groundfish fisheries would impose substantially higher takes on listed species; the same is true for marine mammals and seabirds not listed under the ESA. However, other external factors (e.g., water pollution, climate change) could affect population productivity, changing the assessment of the contributory impacts of the groundfish fishery.

21) Cyclical and ongoing climate change. Over the very long term (>10 years), sea level rise and changes in storm activity could increase costs for maintaining and/or replacing fishery-related infrastructure in fishing communities. If infrastructure is not maintained/replaced in a port, fishery landings would be made elsewhere, reducing income in the affected port. Shifts in the distribution of economically important groundfish, such that less of the stock is available to the fishery, would have adverse impacts.

Essential Fish Habitat

22) Past groundfish harvest specifications and management measures. Groundfish Conservation Areas, which are closed to specified gear types to reduce bycatch of overfished species, have been implemented through the harvest specifications process beginning in 2003. EFH may have recovered from the adverse impacts of fishing in areas continuously closed to fishing for sufficient time. The length of time needed depends on habitat type and gear type (see Section 3.3.1). As discussed in Section 3.3.3.2, NMFS has indicated that any decision to change the configurations of GCAs that would open areas of potentially recovered habitat would need sufficient rationale and likely could not occur until the current EFH review process is completed. This will have continued positive impacts on EFH.
23) Review of groundfish essential fish habitat designation and mitigation measures. The current review could result in the Council adopting additional mitigation measures to address the adverse impacts of fisheries on EFH. The Council is scheduled to initiate an FMP amendment process for this purpose in the second half of 2014. It may be several years before any such amendment is finalized.

    The Council's Fishery Ecosystem Plan. One of the initiatives identified consequent of the FEP is a cross-FMP EFH initiative. The concept is to "identify habitat areas that are considered highly productive or biodiverse under more than one FMP" and coordinate mitigation measures. However, the Council has not yet scheduled any action related to this initiative so it is not reasonably foreseeable.
24) Regulatory adjustments to the trawl rationalization program. These regulatory changes by and large have negligible effects on EFH except for proposed regulations to define chafing gear on midwater trawl codends. The draft EA for this action concludes that it will result in "a minimal increase in contact with benthic habitat as the result of additional chafing gear coverage, particularly relative to soft bottom and minimal to no increase in contact with hard bottom."
25) Seabird avoidance measures. These measures do not affect fisheries in a way that would change the level of adverse impacts to EFH from fishing.
26) Regulation of fisheries for species other than groundfish. Other than non-groundfish trawl (e.g., pink shrimp, California halibut), gear types used for other species have negligible to no impact on groundfish EFH. There are no foreseeable regulatory changes for other fisheries likely to affect adverse impacts of fishing to groundfish EFH.
27) Water pollution. Water pollution has localized adverse impacts to groundfish EFH, for example in estuaries (designated as a habitat area of particular concern).
28) Other authorities to conserve biological resources considered in this EIS. As described above, NMFS has several means under which it can review non-fishing actions of other Federal or state agencies that may impact NMFS' managed resources and the habitat on which they rely prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of direct and indirect negative impacts those actions could have on habitat utilized by resources under NMFS' jurisdiction.

29) Cyclical and ongoing climate change. The way in which climate forcing will affect EFH is not well understood. Effects will depend on the location of EFH and changes in climate forcing vectors such as water temperature and chemistry, currents, and upwelling.

California Current Ecosystem

30) Past groundfish harvest specifications and management measures. As discussed in Section 3.4.3, simulation indicates that past groundfish harvests have had substantial direct effects on managed groundfish stocks but modest indirect effects on other components of the ecosystem.
31) Review of groundfish essential fish habitat designation and mitigation measures. Groundfish EFH is also habitat for other benthic biota ranging from interstitial microorganisms to sponges and corals. The Atlantis simulation described in Section 4.11 did not take into account adverse impacts to EFH.
32) The Council's Fishery Ecosystem Plan. The purpose of the FEP is to enhance the Council's species-specific management programs with more ecosystem science, broader ecosystem considerations, and management policies that coordinate Council management across its Fishery Management Plans and the California Current Ecosystem. To the degree this purpose is met, the FEP may have a marginal positive effect on the CCE as measured by the indicators described in Section 3.4.3. However, as discussed in that section and in Section 4.5 and Section 4.12, the range of harvest policies likely to be implemented by the Council does not result in substantial indirect impacts as measured through model simulation.
33) Regulatory adjustments to the trawl rationalization program. These changes have a negligible effect on the CCE. Even if increased program efficiency allows higher attainment of allocations, Atlantis simulation suggests that substantially higher harvest would be necessary to result in more than negligible changes in ecosystem indicators.
34) Seabird avoidance measures. Abundance of marine mammals and seabirds is one of the metrics used in the Atlantis CCE Model evaluation of harvest specifications policies (Section 4.12). This implies that greater abundance is a positive ecosystem attribute. The seabird avoidance measures are intended to reduce the mortality of seabirds in fixed fisheries and thus, would have a positive impact on the CCE.
35) Regulation of fisheries for species other than groundfish. As noted in Section 3.4.3, simulation results suggest that CPS purse seine fisheries have substantial indirect effects on CCE attributes. A substantial change in current harvest policies would be necessary to produce a discernible change in ecosystem attributes.
36) Water pollution. As already noted, relative to the fishery management area, pollution is concentrated in relatively small areas generally along the coastline closest to terrestrial sources. Therefore, pollution has a relatively marginal effect on the ecosystem of affected resources.
37) Other authorities to conserve biological resources considered in this EIS. As noted above, these authorities may have a small effect on the overall quality of marine habitats. To the degree that these improvements contribute to the productivity of organisms, there may be a marginal benefit to the CCE.
38) Cyclical and ongoing climate change. Cyclical changes have transient effects on the productivity of constituent organisms and thus CCE structure. These variations may be considered part of the baseline. Climate change is likely to have moderate to substantial impacts on CCE structure.

Protected Species

39) Past groundfish harvest specifications and management measures. Past fishery management actions taken through the FMP process have had a positive cumulative effect on ESA-listed and MMPA-protected species through the reduction of fishing effort (potential interactions) and implementation of gear requirements.
40) Review of groundfish essential fish habitat designation and mitigation measures. Mitigation measures adopted through this review process that restrict fishing by area would reduce the likelihood of fishery interactions with protected species in those areas, but may be expected to increase interactions with protected species in areas bordering/surrounding these restricted areas.
41) The Council's Fishery Ecosystem Plan. There are no initiatives stemming from the FEP likely to change fishery interaction rates with protected species.
42) Regulatory adjustments to the trawl rationalization program. There is no information to determine how these changes may affect overall fishing effort or interaction rates. Establishing a common start date for all Pacific whiting fishery sectors takes into account minimizing Chinook salmon bycatch. To the degree that measures to increase operational efficiency allow harvesters to increase CPUE, there may be a marginal beneficial impact.
43) Seabird avoidance measures. These measures will have direct positive impacts by reducing mortality of seabirds in FG fisheries.
44) Regulation of fisheries for species other than groundfish. Other fisheries also take protected species and therefore, contribute to cumulative effects in terms of total mortality. The cumulative effects analysis in relevant biological opinions (NMFS 2006; NMFS 2012a) contain detailed information on these other sources of mortality (see Section 3.5.2).
45) Water pollution. Of the ESA-listed species likely to be adversely affected by the proposed action (see Section 3.6.2), Chinook salmon, eulachon, and green sturgeon reside or transit coastal and estuarine waters where pollution from terrerestrial sources may be locally concentrated. These species may be adversely affected. The biological opinion (NMFS 2012a) identifies the adverse impact of water pollution on green sturgeon prey resources.
46) Other authorities to conserve biological resources considered in this EIS. NMFS authority under the ESA (and USFWS authority for seabirds) directly affects prosecution of the groundfish fishery so that it does not jeopardize the continued existence of any listed species. Permitting of activities under the MMPA is intended to achieve optimal sustainable population levels for marine mammals for both ESA-listed and non-listed marine mammals.
47) Cyclical and ongoing climate change. As with other biological resources, climate change is likely to affect population productivity and occurrence. Effects may be beneficial or adverse depending on the species and its requirements. The net effect of climate change on protected species cannot be predicted.

Non-groundfish Species

48) Past groundfish harvest specifications and management measures. Biennial specifications and management measures generally have not regulated the catch of non-groundfish species except for Pacific halibut, but have affected fishing opportunity and behavior, which may indirectly affect bycatch of these species. Catch of these species is monitored, and the effect on population abundance is negligible.

49) Review of groundfish essential fish habitat designation and mitigation measures. Any benefit from the development of additional mitigation measures could benefit non-groundfish species that also depend on groundfish EFH.
50) The Council's Fishery Ecosystem Plan. No initiatives are identified that address bycatch.
51) Regulatory adjustments to the trawl rationalization program. None of these measures are likely to materially affect non-groundfish bycatch.
52) Seabird avoidance measures. These measures are not likely to materially affect bycatch of non-groundfish, because they are intended to be minimally disruptive to fishing operations.
53) Regulation of fisheries for species other than groundfish. Non-groundfish species with directed fisheries are managed under other Council FMPs, other Federal authorities, or state authority (e.g., Dungeness crab, Pacific halibut, Pacific sardine, salmon, squid; see Table 3-36). For those species, catch in groundfish fisheries is generally accounted for when determining catch limits and management measures for target fisheries.
54) Water pollution. As discussed for other biological resources, water pollution could adversely affect species that occur in coastal or estuarine areas where pollution levels are elevated.
55) Other authorities to conserve biological resources considered in this EIS. These authorities (habitat protection, measures pursuant to the ESA) are likely to have negligible effects on protected species bycatch, given how indirectly they would affect productivity of protected species populations.
56) Cyclical and ongoing climate change. As with other biological resources, climate change could positively or negatively affect non-groundfish population productivity and occurrence. The overall effect cannot be predicted.

Summary of the Direct and Indirect Effects of the Proposed Actions
This section briefly summarizes the direct and indirect effects of the proposed actions

Magnitude and Significance of Cumulative Effects
In determining the magnitude and significance of the cumulative effects, the additive and synergistic effects of the proposed action, as well as past, present, and future actions, must be taken into account. This analysis of total cumulative effects considers: (1) impacts from past and present actions, forming the environmental baseline; PLUS (2) reasonably foreseeable future actions; PLUS (3) impacts from the proposed action and alternatives.

Table 4-21 summarizes the combined effects of past, present and reasonably foreseeable future actions other than the proposed action and alternatives (summarized above) affecting the environmental components evaluated in this EA. Table 4-22 summarizes the conclusions made above on the impacts of past, present, and reasonably foreseeable actions when combined with the impacts of the proposed actions. Based on these assessments the magnitude and significance of cumulative effects are determined.

Table 4-21. Summary effects of past, present and reasonably foreseeable future actions on the environmental components evaluated in this EA.

Environmental Component	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Groundfish Stocks	**Mixed (Low Positive and Low Negative)** Most stocks above or near target biomass; however, some stocks remain overfished	**Low to Moderate Positive** The current management framework is effective in rebuilding stocks to the target biomass and achieving optimum yield	**Low Positive** No actions are identified that would reduce the effectiveness of the management framework	**Low Positive** No actions are identified that would reduce the effectiveness of the management framework; however misspecification of catch limits and management error could occur; climate change may reduce local abundance
Socioeconomic (Human Communities)	**Mixed (Low Positive and Low Negative)** Fishery resources have supported profitable industries but management measures associated with stock rebuilding have curtailed fishing opportunities; trawl rationalization increased operational flexibility	**Mixed (Low Positive and Low Negative)** Stock status and yield have allowed fishery revenues to increase; falling participation and agglomeration may concentrate revenues in fewer communities	**Low Positive** No actions are identified that would accelerate falling participation and agglomeration	**Low to Moderate Positive** Stock status and yield have allowed fishery revenues to increase; falling participation and agglomeration may concentrate revenues in fewer communities

Environmental Component	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Essential Fish Habitat	**Low to Moderate Positive** Evidence suggests that trawl fishing effort is falling; past actions have mitigated adverse effects of fishing on EFH	**Mixed (Low Positive and Low Negative)** Trawl fishing effort stable; ongoing actions continue to mitigate adverse effects of fishing on EFH; Trawl RCA boundary change proposed	**Low Positive** Trawl fishing effort not likely to increase; future actions likely to enhance the mitigation of adverse effects of fishing on EFH	**Low to Moderate Positive** Trawl fishing effort not likely to increase; future actions likely to enhance the mitigation of adverse effects of fishing on EFH
California Current Ecosystem	**Mixed (Low Positive and Low Negative)** Based on simulations, the development of fisheries has had both positive and negative indirect effects on ecosystem attributes	**Low Positive** Ongoing prosecution of fisheries at current levels not expected to change ecosystem attributes from the baseline; other actions likely have negligible impacts	**Mixed (Low Positive and Low Negative)** Ongoing prosecution of fisheries at current levels not expected to change ecosystem attributes from the baseline; climate change likely to have moderate to substantial impacts	**Neutral** Ongoing prosecution of fisheries at current levels not expected to change ecosystem attributes from the baseline; climate change likely to have moderate to substantial impacts
Protected Species	**Mixed (Low Positive and Low Negative)** Protected species take modest in groundfish fisheries and documented through observer program; requirements of ESA, MMPA and OAL implemented	**Low Positive** Most populations increasing; ESA and MMPA mitigation addressed and ongoing	**Low Positive** Most populations increasing; future adverse effects likely to be addressed through ESA and MMPA	**Low Positive** Most populations increasing; adverse effects likely to be addressed through ESA and MMPA
Non-groundfish Species	**Neutral** Bycatch in groundfish fisheries is negligible	**Neutral** Bycatch in groundfish fisheries is negligible	**Neutral** Bycatch in groundfish fisheries is negligible	**Neutral** Bycatch in groundfish fisheries is negligible

Table 4-22. Summary of the cumulative effects of the proposed actions.

Affected Resources	Baseline*	Past, Present, and Reasonably Foreseeable Future Actions	2015-2016 Harvest Specifications and Management Measures	Amendment 24 Proposed Action	Cumulative Effects
Groundfish Stocks					
Human Communities					
Essential Fish Habitat					
California Current Ecosystem					
Protected Species					
Non-Groundfish Stocks					

* Although the temporal scope of past and present actions for the affected resources encompasses actions that occurred after FMP implementation (1982), the baseline period is 2003-2012, which is the temporal context within which affected resources are described in Chapter 3.

Impact Definitions for Table 4-21 and Table 4-2204:

- Positive
    - Groundfish Stocks, Non-groundfish Species, Protected Species: actions that increase stock size
    - Essential Fish Habitat: actions that improve or reduce disturbance of habitat
    - California Current Ecosystem: actions that do not substantially and adversely change ecosystem indicators (see Section 3.4.3 for a description of indicators used with the Atlantis CCE Model)
    - Socioeconomic (Human Communities): actions that increase revenue and wellbeing of fishermen and/or associated businesses
- Mixed: Both positive and negative effects that are not offsetting
- Neutral: Positive and/or negative effects are negligible or positive and negative effects are offsetting
- Negative
    - Groundfish Stocks, Non-groundfish Species, Protected Species: actions that decrease stock size
    - Essential Fish Habitat: actions that degrade or increase disturbance of habitat
    - California Current Ecosystem: actions that do substantially and adversely change ecosystem indicators (see Section 3.4.3 for a description of indicators used with the Atlantis CCE Model)
    - Socioeconomic (Human Communities): actions that decrease revenue and wellbeing of fishermen and/or associated businesses

Summary of Cumulative Effects
Groundfish:
Socioeconomic Environment:
Essential Fish Habitat:
California Current Ecosystem:
Protected Species:
Non-groundfish Species:

4.4.1.1 Non-Fishing Impacts

Adverse effects from activities other than fishing are not part of the proposed action but contribute to cumulative effects (see Section 4.4). Appendix D to the Groundfish FMP incorporates a 2003 report prepared by NMFS cataloging the types of activities affecting groundfish EFH. Activities identified in the appendix include those onshore, such as non-point and point source discharge of pollutants and coastal construction, and those in the marine environment including dredging, dredge spoil disposal, and marine mining. Section 4.4 in the synthesis report (NMFS 2013b) updates information on non-fishing impacts based on spatially explicit data compiled by Halpern, et al. (2008). The main findings of the analysis are that these impacts are more intense in nearshore areas. Offshore impacts are more intense in the northern portion of the fishery management area compared to the southern area.

Indirect effects

Indirect effects from fishery management actions include changes in fishing practices that affect the biological environment, but are further away in time or location than those occurring as a direct impact. Indirect biological impacts could result if catch data were inaccurate or delayed such that fishery specifications (bycatch limits, species allocations, optimum yields, and biological opinion thresholds) could not be adequately monitored or the fishing stopped before one of the specifications were exceeded. If a fishery specification were exceeded, the magnitude of the impact would depend of the status of the stock (healthy, precautionary zone, or overfished), the proportion of allowable fishing mortality represented by fishery specification that was exceeded, and the stock's sensitivity to changes in fishing mortality. If other fisheries could not be effectively managed to stay within the same fishery specification, cumulative indirect impacts could result.

4.5 Considerations for Selecting an Alternative and Options

4.5.1 Rational for Preferred Alternative

There are a number of needs that an alternative to monitoring with observers may address. First, for vessels, the need to pay for vessel observers is one of the most expensive compliance costs associated with participation in the trawl rationalization program. For the first years of the program, NMFS has subsidized observer costs to help the fleet though the period of adjusting to the new management system. Overall fleet profits, and consequently the price of quota, will be below what they might otherwise be if less expensive monitoring is available.

Second, small vessels may be disproportionately affected by observer costs. Vessels are billed for observers on a per day basis, and because smaller vessels may have a lower total revenue per day at-sea observer costs reduce vessel net revenue disproportionately more than for larger vessels. On this basis, over time it might be expected that quota will migrate to larger vessels and there will be fewer smaller vessels in the fleet—assuming small vessels do not have other countervailing advantages.

Third, because of the overhead involved with maintain observer availability in small, somewhat isolated ports with relatively low demand for observers, at least one observer company has indicated that it may pull out of at least one of the small ports on the West Coast. In addition some observer companies may not be willing to provide observers for safety reasons. Thus, over time, smaller ports may be disadvantaged by the observer requirement, relative to larger ports.

Fourth, if overall monitoring costs can be reduced (those borne by both private parties and the public), national net economic benefits may be increased. And finally, the observer fee system puts pressure on vessels to fish in unsafe conditions. Because vessels are billed on per day both for at-sea and for standby time, vessels may incur higher costs for standing down due to marginal weather conditions.

Alternative regulations would have to be developed for unmonitored trips, adding to regulatory complexity. Those regulations would have to assume high bycatch rates for constraining species

in order to ensure that the trawl allocations not be exceeded. The assumption of such high bycatch rates would increase vessel operation costs (require the vessel to use more quota) and diminish quota potentially available for the remainder of the fleet.

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

The Council prefers Alternative 1b because it would have the least amount of risk for missing discarded fish and the most confidence in estimating total discard during the video review. Since all video would be reviewed, the risk that video reviewers would miss discard events, especially those that are greater than 10,000 pounds, is low. It's possible to miss rare events such as one yelloweye rockfish (an overfished species with relatively low quota available for fishermen); however, bycatch of overfished species is generally low compared to the volume of fish caught. Species composition rates would be applied to discard events to account for fish that are difficult to quantify. The Council also considered the cost of each alternative and selected Alternative 1a with the understanding that it may be the least costly alternative.

The Council also chose option A for Discard Accounting. For the shoreside whiting and MS fishery the Council chose Option A (one discard category) because it maintains the full accountability of all discards and would rely on the logbooks and 100% video review to capture to account for all discard events. It's also thought that discard events such as lost gear and fish consumed or used as bait are rare events in the whiting fishery.

The Council selected Option B, (annual expiration of a vessel's IVMP) and Option C (Declare the use of EM with Some Limit on Frequency). These options provide managers with the most up to date information about a vessel's operators, operations, EM provider, and intent to use EM each year. This can provide the flexibility a vessel may need to move in and out of the whiting fishery and assist in timely, and effective administration and enforcement. It also would allow NMFS to plan at-sea sampling for biological collections on EM vessels with more certainty.

Option C and D for Data Transfer was chosen to allow catch monitors and vessel operators to remove hard drives and ship them to the video reviewer. A chain of custody must be used to place responsibility upon those that remove and ship the data and to ensure that it is not lost, destroyed, or damaged. The Council expects these options to be the most flexible and cost effective. Option D, Third Party reviewer was chosen to provide opportunity for development of other entities to review video images rather than burden the government with the cost. This option may provide a means for vessels to pay third party reviewers directly for the cost of review and provide the flexibility to integrate the latest technologies for video review and analysis. However, until NMFS is has established a certification process for third party review, NMFS or an agent of NMFS (such as PSMFC) will conduct the video review.

The Council understands that the collection of scientific data by the WCGOP is needed to collect data to support stock assessments and estimate protected species interactions, amongst other things. This data could be lost on EM trips if observers are not deployed; however, the NMFS has not allocated funds to the WCGOP at this time since funding for observers under the catch share program comes from the industry and paid directly to third party observer providers. The catch share program was developed with the understanding that the IFQ observers were mainly deployed for compliance monitoring and estimating discarded species and weights of fish. The Council is looking to use EM to reduce costs in the catch share program by providing vessels the opportunity to use EM rather than an observer. Vessels may not participate in the program if the vessel is required to pay for EM and a scientific observer. In addition, the Council believes that the funding mechanism to support stock assessments and biological data collections is mandated by the MSA and is akin to NMFS providing observer coverage in other non-trawl, FG and open access fisheries. Therefore, the Council preferred Option A (Government) regarding who pays for the scientific data collection.

A discard monitoring method that would adequately account for discard in each fishery is necessary and likely the most critical component of an EM program. The data source to accurately account for discard is either a human observer (No Action Alternative), video data (Alternative 1a) or, a logbook (Alternative 1b). Two major decision points must be made prior to selecting each component of an EM program:

1. What is the data source for the discard information - logbooks or video; and
2. Which species may be discarded that would preserve the integrity of individual accounting in the IFQ system.

The decision may vary based on fishery, vessel operations, and the ability to accurately account for catch. For example, it may be optimal to require the midwater trawl whiting fishery to continue fishing under a maximize retention regulatory environment, use logbooks as documentation for discards, then review a fixed percentage of the video to verify the discard documented in the logbooks (i.e., maximized retention with self-reporting and audit). These potential combinations are described in more detail in Section 4.3, under subsections on costs and impacts to different segments of the fishery and communities.

The one major difference between the Alternatives 1a/2a and 1b/2b is how discard is documented and enumerated to debit a vessels QP account. Under Alternative 1a and 2a, video documentation of the discard events would be reviewed to identify and enumerate the discard either through a census of all video or through a sampling and expansion of the discard that is documented in the video. A logbook requirement under Alternative 1a can serve as a back-up data source if EM fails or could be used to verify discard events when the video image is poor or cannot be used.

Under Alternative 1b and 2b, a vessel captain “self-reports” the discard by species and provides a weight in a logbook. Video documentation of those discards are then reviewed, at a 100% sampling rate, to verify the discarded species and weight, and for events that are not recorded in the logbooks. If there are no discrepancies between the two data sources then the logbook data is

used to debit the QP account. Protocols for resolving discrepancies would be used. For example, the higher weight of the two sources would be used (see Table 4-3 and Table 4-7).

4.5.2 Census vs. Logbook Audit

The main issues that surround the choice between the alternatives is: 1) speciation/weight estimates, and 2) a trusted data source. First, if EM video data is the primary source (Alternative 1a and 2a), speciation and accurate weight estimates are needed. Alternative 1a with Option A (100% video review) would likely provide the most data for management; however, speciation and weight estimates from video is still a challenge under certain conditions (i.e., low light, water on camera lens, light glare).

Alternative 1b and 2b uses logbooks as the primary data source. Under these alternative management must trust the data reported by the fishermen and provide incentives for fishermen to accurately report the catch. Generally fishermen can speciate and provide an estimate of weight for a discard but an analysis of this information has not been conducted. No confidence intervals have been developed to gauge the accuracy or error made by fishermen as it compares to video imagery or observer's estimates. However, Stanley et al. (2001) showed that fishermen in the hook-and-line fishery in British Columbia (B.C.), after a period of 4 years, increased their accuracy and logbooks were the trusted data source.

If managers want to audit the fishermen's logbook to verify the accuracy of the report or look for discards not recorded, then the critical questions to ask is "what are the incentives to accurately record the catch." Mangers could lower the risk of non-reporting by implementing strict penalties when it occurs. An appropriate level of review (ex. 10, 25, or 50%) may then be driven by cost of review (assuming a higher level of review costs more) rather than implementing a higher review to gain more compliance. The B.C. hook-and-line fishery logbooks are sampled at a rate of 10% to validate entries and this level of review was also found to be efficient and cost effective. Strict rules apply in that fishery for compliance therefore the fishery has a high compliance rate. Test scores of whether logbooks match the EM imagery are high for greater than 80% of the logbooks collected.

Stanley wrote that in the B.C. hook-and-line fishery, harvesters believe that catch estimation process is:

> "…intuitive, transparent, and immediate, because it is based on their own records, unless the audit fails. With the census approach, estimates of the discarded catch proportion would come from a delayed and outsourced process, conducted in a remote location, by persons unknown to the harvester. One could anticipate a never-ending stream of appeals from harvesters questioning the different estimates from the black-box approach compared with their logbook records. This lack of confidence at a trip level would also affect the fleet-wide catch estimates to the extent of it being unclear whether the quotas were actually being filled. In addition, it was suggested by some participants that using the harvesters' own records instead of 100% EM video review fostered a greater sense of ownership in the overall programmme and a greater willingness to work through the practical problems of implementing the new procedures."

4.5.3 **Video Sampling with Discard Expansion Issues**

Under Alternative 1a with Option B (2B) and Alternative 1a with Option C (2C), subsampling the video and expanding the weight to the whole trip may be a challenge if discard events are rare or are a mixture of species. For example, getting an accurate weight of a large discard event can be difficult if multiple specie are discarded at one time. Anything less than 100% video review will result in missing some species for expansion and creates more risk than the No Action, 2B and 2C. Sampling and expansion generally works for a whole fishery sector and not for an individual vessel (Stanley et al. 2011). There is risk of subsampling the video and expanding it to the trip level since expansion may not be representative of the whole trip. For example, expansion of a discard for small amounts of canary rockfish could cause an individual vessel to exceed their IFQ for that species even though the fishermen may never encounter another fish the rest of the trip or entire year. Also if the encounter is a rare event and a large amount, expansion could be unrealistic. Even if a logbook is required for verification to reduce uncertainty in the primary source, protocols on how to deal with rare events would need to be implemented and statistically appropriate. If video is the primary data source, it may be most appropriate to require a census of the video *and* a logbook for a verification of the video image.

CHAPTER 5 NEPA, INCLUDING THE FINDING OF NO SIGNIFICANT IMPACTS

5.1 National Environmental Policy Act

The CEQ has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), and NOAA's agency policy and procedures for NEPA can be found in NOAA Administrative Order 216-6 (NAO 216-6). The purpose of the environmental review process is to determine the range of issues that the NEPA document needs to address. The environmental review process is intended to ensure that problems are identified early and properly reviewed; issues of little significance do not consume time and effort; and that the draft NEPA document is thorough and balanced. The environmental review process should: identify the public and agency concerns; clearly define the environmental issues and alternatives to be examined in the NEPA document; eliminate non-significant issues; identify related issues; and identify state and local agency requirements that must be addressed. The following public review and scoping presented in this document is in reference to the development of an EM program for the Shorebased catch share program and initially included the limited entry fisheries under the program: midwater trawl (whiting and non-whiting), bottom trawl, and FG (longline and pot).

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

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

- Chapter One describes the purpose and need of the proposed action.

- Chapter Two describes a reasonable range of alternative management actions that may be taken to meet the proposed need.
- Chapter Three contains a description of the socioeconomic, biological, and physical characteristics of the affected environment.
- Chapter Four examines changes in the socioeconomic, biological, and physical environments resulting from the alternative management actions.
- Chapter Five addresses consistency with the FMP and other applicable laws.
- Chapter Six is the regulatory impact review and regulatory flexibility analysis.
- Chapter Seven is a list of individuals who helped prepare this document.
- Chapter Eight provides a list of references for this document.

[CHAPTERS TO BE COMPLETED AFTER FINAL ACTION]