# An Electronic Monitoring Program for the Bottom Trawl and Non-Whiting Midwater Trawl Fisheries Under the Shorebased IFQ Program

## Analytical Document

April 2017

This document analyzes the proposed alternatives for an electronic monitoring (EM) program for the bottom trawl and non-whiting midwater trawl groundfish fisheries. It includes an analysis of the information collected by National Marine Fisheries Service (NMFS) while using exempted fishing permits (EFPs) to test the proposed alternatives and sub-options. The EM program is expected to reduce costs and/or increase operational flexibility for groundfish vessels without adversely affecting conservation. Specifically, the proposed alternatives would allow vessels fishing with bottom trawl (bottom trawl fishery) and midwater trawl gear that are targeting groundfish other than whiting (non-whiting midwater trawl fishery) in the Shorebased Individual Fishing Quota fishery(Shorebased IFQ Fishery) to use EM in place of human observers to meet at-sea monitoring requirements.

On September 6, 2016, NMFS announced, in a proposed rule, a proposed amendment to the Pacific Coast Groundfish Fishery Management Plan (FMP) to implement an EM program to allow catcher vessels in the Pacific whiting fishery and fixed gear vessels in the Shorebased IFQ fishery to use EM in place of observers to meet the requirements of the Trawl Rationalization Program for 100-percent at-sea observer coverage (http://www.westcoast.fisheries.noaa.gov/publications/frn/2016/81fr61161.pdf). A final rule for these two fisheries is scheduled to be announced in mid-April, 2017. The final rule will include a framework for an EM program for all Shorebased IFQ fisheries. The alternatives and sub-options in this document for the bottom trawl and non-whiting midwater trawl fisheries would be added to that framework with fishery specific regulations and guidance documents (See Section 3 – Description of Alternatives and Sub-options).

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# ACRONYMS

| | |
|---|---|
| APA | Administrative Procedure Act |
| CCE | California current ecosystem |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CPS | coastal pelagic species |
| CPUE | catch per unit effort |
| CZMA | Coastal Zone Management Act |
| DPS | distinct population segment |
| EEZ | exclusive economic zone |
| EFH | essential fish habitat |
| EFHRC | Essential Fish Habitat Review Committee |
| EFP | exempted fishing permit |
| EIS | environmental impact statement |
| EM | electronic monitoring |
| ENSO | El Nino Southern Oscillation |
| ESA | Endangered Species Act |
| ESU | evolutionary significant unit |
| fm | fathom |
| FMP | fishery management plan |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| FWS | U.S. Fish and Wildlife Service |
| GIS | global information system |
| GMT | Groundfish Management Team |
| NPGO | North Pacific Gyre Oscillation |
| HAPC | habitat area of particular concern |
| HMS | highly migratory species |
| IFQ | individual fishing quota |
| IQA | Information Quality Act |
| ITS | incidental take statement |
| lb | pound |

| | |
|---|---|
| MHHW | mean higher high water level |
| MMPA | Marine Mammal Protected Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Reauthorization Act |
| mt | metric ton |
| NEPA | National Environmental Policy Act |
| nm | nautical mile |
| NMFS | National Marine Fisheries Service |
| NMSA | National Marine Sanctuaries Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NorPac | North Pacific Database Program |
| NRC | National Research Council |
| NWFSC | Northwest Fisheries Science Center |
| OY | optimum yield |
| PacFIN | Pacific Fisheries Information Network |
| PDO | Pacific Decadal Oscillation |
| PFMC | Pacific Fishery Management Council |
| POP | pacific ocean perch |
| PRA | Paperwork Reduction Act |
| PSMFC | Pacific States Marine Fisheries Commission |
| QSM | Quota Species Monitoring Database |
| RCA | rockfish conservation areas |
| RFA | Regulatory Flexibility Act |
| RIR | Regulatory Impact Review |
| SAFE | stock assessment and fishery evaluation |
| STAR | Stock Assessment Review |
| STAT | Stock Assessment Review Team |
| TAC | total allowable catch |
| U.S.C. | United States Code |
| USFWS | U.S. Fish and Wildlife Service |
| VEC | valued ecosystem component |
| VMP | vessel monitoring plan |
| WCGOP | West Coast Groundfish Observer Program |

# 1. INTRODUCTION

The Pacific Coast groundfish fishery occurs off the west coast of the United States in federal waters from 3-200 miles offshore. The fishery is managed by the Pacific Fishery Management Council under the Pacific Coast Groundfish FMP and includes over 90 species of rockfish, roundfish, sharks, skates, and other species. The fishery is composed of multiple sectors, including a limited entry trawl fishery, a limited entry fixed gear fishery, an open access fishery, a recreational fishery, and a tribal sector.

In 2010, the Council implemented the Pacific Coast Groundfish Trawl Rationalization Program through Amendments 20 and 21 to the FMP, which established a catch share program in the limited entry trawl fishery. The limited entry trawl fishery is responsible for the majority of the groundfish catch and is managed under a catch share program. The catch share program organizes the fishery into a catcher/processor sector composed of a cooperative of large vessels that both catch and process Pacific whiting at sea; a mothership sector composed of a cooperative of catcher vessels that target whiting and the mothership vessels that process their catch at sea; and the shorebased sector composed of individual midwater trawl, bottom trawl, and fixed gear vessels that target whiting and other groundfish species under individual fishing quota (IFQs). The shorebased sector of the limited entry trawl fishery are the subject of this action, specifically vessels that use midwater trawl gear to target pelagic rockfish and bottom trawl gear to target groundfish species that are mixed species groups.

As part of the catch share program, Amendment 20 also implemented requirements for 100-percent observer coverage at sea and dockside to ensure full accountability for catch of allocated species and a level playing field for all participants. Beginning in 2011, vessels are required to obtain observers for 100 percent of trips in the catch share program. Buyers of IFQ species, called "first receivers", are also required to obtain catch monitors to monitor the offload and weighing of all IFQ species.

NMFS initially subsidized 100-percent of the costs of observers for industry, but this subsidy declined over time and finally ended in September 2015 when industry took on the full costs of monitoring. Since implementation of the program, industry has been concerned about their ability to bear the full costs of monitoring and interested in electronic monitoring (EM) as a potential alternative. In response to industry's concerns, the Council initiated development of a regulatory amendment in November, 2012, to consider implementing an EM program for catcher vessel that operate in the mothership whiting fishing sector and shorebased IFQ sector. The Council initiated the regulatory amendment in 2012 and developed the alternatives for the program over the course of 2013-2015. A list of the meetings at which the Council discussed this action and other opportunities for public comment can be found on the Council's website at: http://www.pcouncil.org/groundfish/trawl-catch-share-program-em/. The Council selected preliminary preferred alternatives at its September 2014 meeting, but decided that additional research was needed before taking final action (http://www.pcouncil.org/wp-content/uploads/2017/02/blog_tables_Final_Preferred_Alts_FINALv2.pdf. The Council instead solicited EFP proposals to test the use of EM in the groundfish fishery and to develop the detailed requirements that would be necessary to complete the regulations and implement the program. The Council reviewed the proposals at their April and June 2014 meetings, and NMFS approved and

implemented the EFPs in May 2015.

NMFS issued a total of 37 EFPs in 2015 and 46 EFPs in 2016 to vessels to test EM and worked with the Pacific States Marine Fisheries Commission (PSMFC) to implement and administer the project. The EFPs were designed to test the Council's preliminary preferred alternatives and provide data to support the Council's final decision. NMFS and PSMFC collected logbook and EM data and other information to assist the Council and NMFS in evaluating the performance of EM as a tool for meeting the objectives of the catch share program. NMFS presented the results from the 2015 EFPs at Council meetings September 2015-April 2016. The EFPs provided sufficient information for the Council to take final action on measures for whiting vessels (November 2015) and fixed gear vessels (April 2016). But the 2015 EFPs had low participation by bottom trawl and non-whiting midwater trawl vessels, so the Council postponed final action for these gear types to 2017 to allow NMFS to collect more information from the 2016 EFPs.

This document includes the purpose and need for the action, the proposed alternative and sub-options to use EM, a description of the affected environment, and a preliminary impact analysis of the selected alternatives from September 2014. The Council may revise their selection of an alternative and sub-options as needed. Any changes would be reflected in future regulations to implement the program.

# 2. PURPOSE AND NEED FOR THE ACTION

There is a need to continually 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 consider EM as a viable option to monitor the catch share program for compliance with IFQs. 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 this action is to expand the range of monitoring tools for vessel operators to meet the 100 percent monitoring requirements of the Trawl Rationalization Program (catch share program). This action is needed to achieve the following objectives:

1. Reduce total fleet monitoring costs to levels sustainable for the fleet and NMFS;
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.

This action seeks to fulfill the purpose and need while continuing to meet the goals and objectives set forth by the Council in the Pacific Coast Groundfish FMP.

A comprehensive history of groundfish fishery management and the development of the current management regime is contained in Chapter 2 of the Pacific Coast Groundfish FMP, available on the Council's website: http://www.pcouncil.org/groundfish/fishery-management-plan/#gfFMPfull

The Council's groundfish harvest specifications contain additional information regarding the status of species discussed in this document and the annual catch limits that the limited entry trawl fishery operates under. Amendment 27: 2017-2018 Harvest Specifications and Management Measures: http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-27/

# 3. DESCRIPTION OF ALTERNATIVES AND SUB-OPTIONS

This section summarizes the alternative and options to implement regulations to use EM in the bottom trawl and non-whiting midwater trawl fisheries operating in the Shorebased IFQ Program. Some of the original sub-options that were selected for these fisheries in September 2014 (http://www.pcouncil.org/wp-content/uploads/2017/02/blog_tables_Final_Preferred_Alts_FINALv2.pdf) are not included in this document because they were proposed for implementation as part of the framework for an EM program while implementing regulations for the whiting midwater trawl and fixed gear fisheries (see the proposed rule: http://www.pcouncil.org/2016/09/43922/noaa-draft-ea-em-aug30-2016/.) These include: the use of a routine management measure for adjustments to the discard species list, and standards and minimum requirements for vessels and EM service providers to participate in the EM program, including eligibility criteria, equipment standards, application requirements, reporting and recordkeeping requirements, and a permitting process for EM service providers to apply to and be approved to provide EM services to the fishery. These components will be finalized in the final rule for whiting midwater trawl and fixed gear fisheries. In addition, NMFS plans to specify the requirements and components for self-enforcing agreements in the regulations through a separate proposed and final rule.

## 3.1. Alternative 1 – No Action

Under this alternative, groundfish monitoring requirements would remain as defined in Amendment 20 and subsequent rulemakings. Bottom trawl and non-whiting midwater trawl fishing vessels in the Shorebased IFQ fishery would be required to obtain 100 percent at-sea observer coverage for all trips. Vessels would continue to use observers to satisfy the 100 percent at-sea observer coverage requirement and would not be able to use electronic monitoring as an alternative to observers. Vessels sorting at sea would be able to discard IFQ and non-IFQ species provided it has been documented by an observer.

## 3.2 Alternative 2 – Electronic Monitoring (*Council Preferred*)

Under this alternative, bottom trawl vessels and non-whiting midwater trawl vessels that target rockfish within the Shorebased IFQ fishery would have the option to use electronic monitoring (EM) in place of human observers to meet the requirements of Amendment 20 for 100 percent at-sea observer coverage. Vessel owners would be able to submit an application to NMFS for an authorization to use EM in place of observers. Vessel owners authorized to use EM would be required to obtain, install, and maintain an EM system from an approved service provider, as well as services to review the video data to generate discard estimates and to submit reports to NMFS. Vessel operators would also be required to fill out a logbook to document and report discards to NMFS. Copies of the discard logbook and state logbook would be required to be submitted to NMFS within 24 hours of landing. Under this alternative, the EM service provider would review the EM data after the trip and calculate estimated discards by species/species group to report to NMFS to debit from IFQ and IBQ.

### 3.2.1 Data

There are two ways that EM data could be used under Alternative 2.

**Sub-Option A1:** EM data is used as the primary data source to debit discards from vessel accounts.

***Rationale:*** This option would use EM to quantify the discards. Logbooks would also provide a secondary data source for comparison to the EM data or as a backup data source.

**Sub-Option A2:** Logbook data is used as the primary data source to debit vessel accounts and EM data is used to audit the validity of the logbook data. **(*Council Preferred for both bottom trawl and the non-whiting midwater trawl*)**

***Rationale***: This option would use logbooks as the primary data to quantify the discards and EM would be used to audit the logbooks. EM data would also be used to augment the data if needed.

### 3.2.2 Video Review

In addition, there are two sub-options for the amount of video that would be reviewed to develop the discard estimates from the video data.

**Sub-Option B1:** 100 percent of the video is reviewed to generate discard estimates. ***Rationale:*** Reviewing 100 percent of the video from a trip would provide a census of discards and reduce the uncertainty of using discard estimates expanded from a sub-sample.

**Sub-Option B2:** Less than 100 percent of the video is reviewed. The level would initially be 100 percent, but NMFS would have the ability to modify the percentage based on performance in consultation with the Council. The review rate would not be less than 10 percent. **(*Council Preferred for both bottom trawl and the non-whiting midwater trawl*)**

***Rationale:*** Reviewing a subsample of the video to extrapolate a discard estimate for a trip would be less costly than reviewing 100 percent of the video from the trip.

### 3.2.3 Discard Accounting

The Council considered different sub-options for accounting of other discards from EM trips.

**Sub-Option C1:** All discards would be debited from IFQ. **(*Council Preferred for both bottom trawl and the non-whiting midwater trawl*)**

***Rationale:*** Debiting discards from individuals would be consistent with status quo accounting methods using observer data and would create the strongest incentive for minimizing discards. Because the review time for whiting trips is so rapid, quantifying all discards would not substantially increase program costs.

Debiting discards from individual and cooperative allocations would be consistent with status quo accounting methods using observer data and would create the strongest incentive for minimizing discards.

**Sub-Option C2:** Discards dumped off the deck or for safety reasons (e.g., pull zipper on net), and from unobserved sets/hauls would be debited from IFQ. Other discards from net bleeding, lost gear, and consumed or used as bait would be deducted preseason from the sector allocation or the ACL using historical data.

***Rationale:*** The Council considered debiting small amounts of discards or unintentional discards from sector allocations preseason to simplify and reduce the cost of video review.

**Sub-Option C3:** Discards dumped off the deck or for safety reasons (e.g., pull zipper on

net), and from unobserved sets/hauls would be debited from IFQ. Other discards from net bleeding, lost gear, and consumed or used as bait would not be accounted for under the OIFQ system.

***Rationale:*** The Council considered not accounting for some discards to reduce the burden of video review and the need to attempt weight estimations of these events.

### 3.2.4 Retention

Vessels would be required to sort and discard catch in a manner that enables the EM system to record it. Because some species can be difficult to differentiate on camera, the Council considered different sub-options for retention requirements for vessels.

**Sub-Option D1:** Maximized retention - Vessel operators would be required to retain all catch until landing, with a few exceptions for prohibited and protected species and discards for safety reasons.

***Rationale:*** Requiring the majority of catch to be retained would simplify the video review and potentially reduce review costs, and would allow more complete data collection on most catch by a shoreside catch monitor.

**Sub-Option D2:** Optimized retention - Vessel operators would be able to discard those species that can be differentiated on camera. The list of species that may be discarded may be modified through a routine action as defined in the Pacific Coast Groundfish FMP. (***Council Preferred for both bottom trawl and the non-whiting midwater trawl***)

***Rationale:*** Allowing vessel operators to discard those species that can be differentiated on camera would reduce the burden of having to store and dispose of unmarketable or otherwise undesirable fish.

### 3.2.5 Halibut

Halibut that are discarded would be debited from vessel accounts using an assumed mortality rate. This is in contrast to the status-quo for trips where a viability assessment is conducted on a subsample of discarded halibut by the observer and vessel accounts are not charged for fish that are likely to survive.

**Sub-Option E1:** The default IPHC halibut mortality rates would be applied to all halibut caught and discarded (90%). **(*Council Preferred for both bottom trawl and the non-whiting midwater trawl*)**

***Rationale:*** The 90% morality rate for both gear types is currently applied for fishing trips that do not have a viability assessment for the discarded halibut. The vessel's IBQ is then debited. This method is already approved and an accepted practice by the IPHC in order to account for total morality estimates.

**Sub-Option E2:** This option would apply a halibut mortality rate to the fleet based on WCGOP scientific observations of EM trips (25-30% coverage of EM fleet).

***Rationale:*** The WCGOP currently conducts halibut viability assessments, calculates the mortality rate, and applies it the total catch for a vessel. A fleet wide rate could be developed and applied to individual vessels on EM trips.

**Sub-Option E3:** Use vessel specific mortality rate. This option would implement use of vessel specific mortality rates from observations by the WCGOP in past years for the vessel or use a vessel specific rate for observed EM trips (for only observed EM trips or for all EM trips).

***Rationale:*** The WCGOP currently conducts halibut viability assessments, calculates the mortality rate, and applies it the total catch for a vessel.

**Sub-Option E4:** IPHC exemption to allow full retention

***Rationale:*** This option was developed if maximized retention is chosen. NMFS would need to work with the IPHC to develop exemption status as is currently done for the whiting fishery.

**Sub-Option E5:** Captain and crew provide assessment

***Rationale:*** Since viability assessments are used to create the discard mortality rate for the vessel. This option could provide that estimate for each halibut that is encountered as is done with observers.

**Sub-Option E6:** Use an appropriate EM viability assessment ***(Council Preferred for both bottom trawl and the non-whiting midwater trawl)***

**Sub-Option E7:** Initially apply a DMR of 90 percent for bottom trawl and non-whiting midwater trawl trips under EM with the intent to lower the rate at a future date. Explore sub-options E2, E3, and E6 to lower the mortality rate to better reflect the actual mortality rates of the fleets.

***Rationale:*** A DMR of 90% is applied when vessels do not have viability assessments for all halibut bycatch. Roughly 25-30% of EM trips would be observed by NMFS for scientific observations; therefore, this option would allow NMFS to develop a DMR for EM trips and apply it on a vessel specific basis or fleet wide basis.

### 3.2.6 Vessel Monitoring Plan Expiration

Vessel owners would be required to submit for review by NMFS an individual Vessel Monitoring Plan (VMP) that would document the installation of the EM system on the vessel and the vessel's specific plans and procedures for operations, catch handling, and maintenance. The Council considered two sub-options for the frequency that VMPs would expire and need to be renewed with NMFS.

**Sub-Option F1:** Vessel monitoring plans would be effective until revised.

***Rationale:*** This sub-option would reduce the administrative burden on vessel owners of having to resubmit an application and vessel monitoring plan each year.

**Sub-Option F2:** Vessel monitoring plans would expire and must be renewed annually. **(*Council Preferred for bottomtrawl and non-whiting midwater trawl)***

***Rationale:*** This option would have a greater administrative burden for vessel owners, but would ensure that vessel monitoring plans remain up to date.

### 3.2.7 Declaration of EM Use

Vessels operators would be required to declare their intent to use EM with the Office of Law Enforcement. Some vessels may desire to switch between using EM on some trips and observers on others for efficiency, cost, or other reasons. The Council considered different sub-options for the extent to which they would limit this activity to reduce potential complications for the Observer Program and observer service providers in planning the observer workforce and deployments.

**Sub-Option G1:** No limit on switching between EM and observers.

R***ationale:*** This option would provide vessel operators the most flexibility to use whatever monitoring option works best for their operations at a given time. Impacts to the Observer Program could be mitigated through communication between the vessel operators and

NMFS.

**Sub-Option G2:** There would be some limit on switching, to be determined by NMFS, with the exception that an observer could be used in the event of an EM system failure. **(*Council Preferred for bottomtrawl and non-whiting midwater trawl)***

***Rationale:*** This option would provide vessel operators some flexibility, but limit the impact of switching on Observer Program operations.

**Sub-Option G3:** The vessel operator would be required to log a plan with NMFS indicating when they plan to use EM and observers that could not be changed, with exceptions for EM system failures.

***Rationale:*** This option would also limit the impact of switching on Observer Program operations, but allow the vessel operator the flexibility to choose their own limits on switching depending on their individual operations.

**Sub-Option G4:** No switching between observers and EM would be allowed, except for instances of EM system failure.

***Rationale:*** This option would minimize the impacts of switching on Observer Program operations, but would provide the least flexibility for vessel operators.

### 3.2.8 Data Transfer Process

Video, sensor, and other data from the EM system is recorded onto a hard drive on the vessel. The Council considered different sub-options for who would be responsible for retrieving the hard drive from the vessel and delivering it to the third party service provider for review and analysis.

**Sub-Option H1:** A representative of the vessel (vessel operator or crew) would be responsible for delivering the hard drive to the EM service provider. **(*Council Preferred for both bottom trawl and the non-whiting midwater trawl*)**

***Rationale:*** Making the vessel representative solely responsible for delivering the hard drive ensures accountability and a clear chain of custody, while still allowing flexibility for the vessel operator to delegate the responsibility to a third party. This option is also cheaper than the other sub-options.

**Sub-Option H2:** The EM service provider would be responsible for retrieving the hard drive from the vessel and delivering it for analysis.

***Rationale:*** Having an independent third party retrieve the hard drive would ensure a clear chain of custody and may reduce the likelihood of tampering.

**Sub-Option H3:** The shoreside catch monitor or other third party would be responsible for delivering the hard drive to the EM service provider for analysis. **(*Council Preferred for both bottom trawl and the non-whiting midwater trawl*)**

***Rationale:*** Allowing the catch monitor, processor, or other third party to retrieve the hard drive would offer flexibility to vessel operators and may reduce program costs by using existing resources. This option combines several sub-options from the original set of sub-options developed in September 2014. It combines sub-options of PSMFC staff, shoreside catch monitor, and 3rd party.

Vessels that do not apply to or are not authorized to use EM would continue to use observers to meet the requirements for 100 percent observer coverage. In addition, the West Coast Groundfish Observer Program would maintain some level of observer coverage for biological sampling and protected species data collection similar to levels prior to implementation of the Trawl Program (approximately 25-30 percent of landings).

## 3.3 ALTERNATIVES CONSIDERED AND REJECTED

### 3.3.1 Alternative 3 – Mandatory use of EM

This alternative would have required all shorebased vessels in the bottom trawl and non-whiting midwater trawl fisheries to use EM in place of observers. No vessels would have been able to use observers for at-sea monitoring. Making EM mandatory was considered during public scoping for the regulatory amendment, but was not pursued because some fishery participants did not want to use EM. Some fishery participants were concerned about EM system malfunctions forcing a vessel to miss valuable fishing time while waiting for repairs. The Council instead opted to make EM a voluntary program, to allow fishery participants to weigh the trade-offs between EM and at-sea observers.

### 3.3.2 Sub-Option D3 – Full retention of all catch

Under this option, vessel operators would have been required to retain all catch and no discarding would have been allowed. This option was rejected because it raised several practicality and safety issues. Full retention would require that vessels retain species protected under the ESA and MMPA, which may not be allowable without a specific permit. Retaining large organisms or large amounts of catch can be unsafe for vessel personnel, such as if the catch exceeds the vessel's hold capacity. In addition, some discards occur outside the vessel operator's control, such as fish spilling out of the gear during retrieval.

### 3.3.3 Sub-Option D4 – No limit on discards, vessels may discard all IFQ and non-IFQ species

This option would have allowed bottom trawl and non-whiting midwater trawl vessels to discard fish at will, consistent with existing regulations. This option was rejected because the Council was concerned about the ability of EM to identify species that are difficult to differentiate on camera. The Council believed some controls were needed to ensure the quality of data for catch accounting. The Council rejected this sub-option, but retained an option that would allow discards based on a species list that could be modified over time as technology and methods improve.

### 3.3.4 Sub-Option D4 – Some discards not debited

Under this option, discards dumped off the deck or for safety reasons (e.g., pull zipper on net), and from unobserved sets/hauls would be debited from IFQ. Other discards from net bleeding, lost gear, and consumed or used as bait would not be counted at all. This option was rejected because it did not meet legal requirements of the MSA to account for all mortality and to minimize bycatch to the extent practicable.

### 3.3.5 Sub-Option G5 – No declaration of EM use

This option would have allowed vessel operators to use EM in a given year without first notifying NMFS. This option was rejected, because declarations are needed by NMFS, EM providers, and

other entities for planning purposes.

# 4. AFFECTED ENVIRONMENT

## 4.1 Potentially Impacted Valued Ecosystem Components (VECs)

This analysis considers impacts to 5 VECs, which are the important environmental facets used to evaluate impacts in this document:

Physical Environment/Habitat/EFH: For the purpose of this analysis the physical environment consists of EFH in the California Current Ecosystem (CCE) including the continental shelf, slope, and abyssal plain sub-regions. The Sustainable Fisheries Act defines EFH as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Section 4.2 describes the conditions of the physical environment.

Target species: For the purpose of this analysis, the target species includes those species targeted by catcher vessels participating in the shorebased IFQ sector using bottom trawl and midwater trawl to target groundfish species other than whiting. Target stocks include multiple complexes of rockfish, flatfish and other groundfish species.

Non-target species and bycatch: Non-target species are species which vessels may not target but may catch and land. Non-target species can include a broad range of species. The term "bycatch," as defined by the MSA, means fish that are harvested in a fishery but that are not sold or kept for personal use. Bycatch includes the discard of whole fish at sea or elsewhere, including economic and regulatory discards, and fishing mortality due to an encounter with fishing gear that does not result in capture of fish (i.e., unobserved fishing mortality). Bycatch does not include fish released alive under a recreational catch-and-release fishery management program.

Protected resources: This includes species under NMFS's and the U.S. Fish and Wildlife Service's (USFWS) jurisdiction which are afforded protection under the ESA (i.e., for those designated as threatened or endangered) and/or the MMPA. Table 3 lists the 18 marine mammal, sea turtle, and fish species that are classified as endangered or threatened under the ESA. The remaining species in Table 3 are protected by the MMPA and are known to interact with the Pacific Coast groundfish fishery.

Human communities: This includes impacts to people's way of life, traditions, and communities. These social and economic impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and other factors. Impacts would most likely be experienced across communities, gear cohorts, and vessel size classes. Section 4.6 describes the current conditions in the potentially impacted communities.

This document incorporates by reference the affected environment from the Amendment 20 EIS, and provides updated information where appropriate.

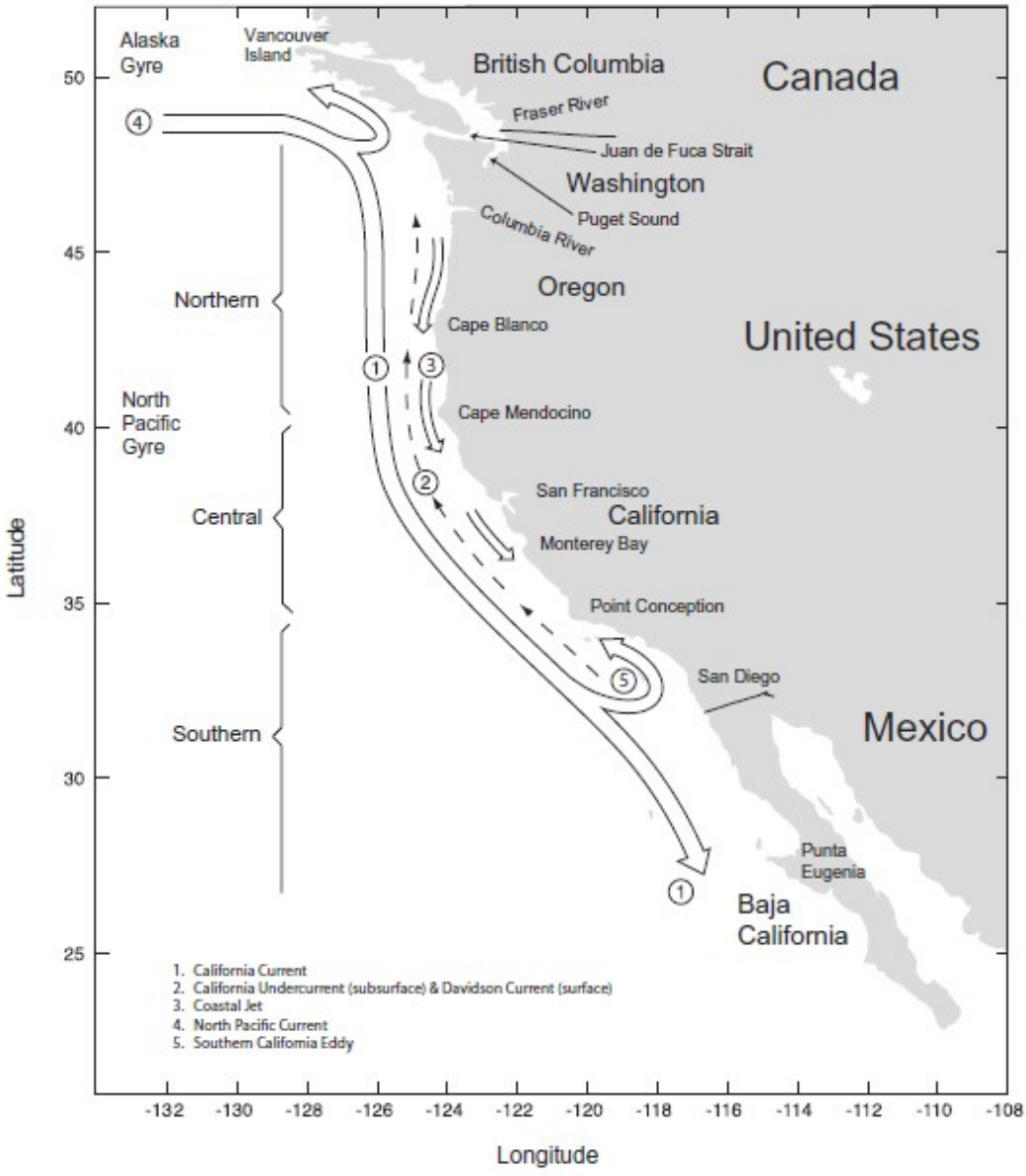
## 4.2 Physical Environment/Habitat/EFH

This document incorporates by reference the Amendment 20 EIS. Information on the physical environment is summarized below, refer to the EIS for more detailed information on the physical environment, habitat, and EFH.

### 4.2.1 Description of the Physical Environment

The U.S. West Coast Exclusive Economic Zone (EEZ) resides within the California Current Large Marine Ecosystem. The Council has designated the entire West Coast EEZ, the U.S. portion of this Large Marine Ecosystem, as the California Current Ecosystem and the subject of its Pacific Coast Fishery Ecosystem Plan. The CCE essentially begins where the west wind drift (or the North Pacific Current) reaches the North American continent. The North Pacific Current typically encounters land along the northern end of Vancouver Island, although this location varies latitudinally from year to year. This current then splits into the southward-flowing California Current heading south (Figure 1) and the northward-flowing Alaska Current. The "current" in the California Current is a massive southward flow of water ranging from 50 to 500 kilometers offshore (Mann and Lazier, 1996).

Figure 1. Dominant current systems off the U.S. West Coast



Major offshore physiographic features of Washington and Oregon include the continental shelf, slope, and Cascadia Basin. Low benches and hills characterize the upper slope. The lower slope intersects the deep sea floor of the Cascadia Basin at 2200 m depth off the north coast, and at about 3,000 m off the central and southern Oregon coast. The continental slope is characterized by a number of geological features that create bathymetric complexity and perform a variety of ecological functions. These features include: submarine canyons and fans, seamounts, ridges, banks, islands, rocky reefs, and pinnacles. Rocky habitat may be composed of bedrock, boulders, or smaller rocks, such as cobble and gravel. Hard substrates are one of the least abundant benthic habitats, yet they are among the most important habitats for groundfish.
Pinnacles can be important bathymetric features that attract fish and invertebrates.

Coastal upwelling results in well-mixed nearshore waters during spring-summer at depth up to 50-75m extending 5-20km offshore. These well-mixed waters are characterized by cold, oxygen-saturated, nutrient-rich water that is the basis for high productivity of the coastal portions of the CCE. The major phytoplankton classes within the CCE include diatoms, dinoflagellates, small (often termed "pico"-) eukaryotes, and cyanobacteria.

Vegetation forms two major classes of large-scale habitats: large macro-algal attached benthic beds, and microalgal blooms. Along the Pacific coast, there are two major canopy-forming species of kelp, the giant kelp (*Macrocystis pyrifera*) and the bull kelp (*Nereocystis leutkeana*). These species can form kelp forests which provide habitat for a diverse mix of species including fishes, invertebrates, marine mammals, and sea birds. Kelp forests provide cover or nursery grounds for many adult, young of the year, or juvenile nearshore and shelf rocky reef fishes, such as bocaccio, lingcod, flatfish, other groundfish, and state-managed species including kelp bass (*Paralabrax clathratus*), white seabass, and Pacific bonito (*Sarda chiliensis lineolata*). Kelp is considered EFH for groundfish.

The CCE is also home to a range of benthic invertebrates that may form habitat for groudfish species. The delineation of benthic structure-forming invertebrates, in particular corals and sponges, is under more thorough discussion within the Groundfish EFH Review Committee for updates to Groundfish EFH designation (EFHRC 2012). Whitmire and Clarke (2007) listed 101 species of corals identified in the U.S. West Coast EEZ, within which four species were classified as having adequate individual or colony size and morphological complexity to be considered of high structural importance: *Lophelia pertusa, Antipathes dedrochristos, Paragorgia arborea*, and *Primnoa pacifica*. Several additional classes and individual species of coral were identified as being of medium structural importance: *Dendrophyllia oldroydae*, *Bathypathes* sp., *Isidella* sp., and *Keratoisis* sp. Corals of the West Coast EEZ are distributed over a variety of bottom habitats, with higher concentrations on hard-bottom (not sand) and medium-to-high relief rocky habitat. With their morphologically complex forms, corals can enhance the relief and complexity of physical habitat (Whitmire and Clarke 2007), although the literature remains divided on whether West Coast deep sea corals serve to aggregate fish (Etnoyer and Morgan 2005, Auster 2005, Tissot et al. 2006). Marliave and co-authors (2009) found quillback rockfish (*S. maliger*) using colonies of cloud sponges (*Aphrocallistes vastus*) as a nursery habitat in southern British Columbia's coastal waters, which are within the northern extent of the CCE.

More detail on the CCE is contained in the Council's FEP, where the Council conducted an extensive review and description of the characteristics of the California Current large marine ecosystem and on the types of impacts fisheries and other anthropogenic activities and climate change have on ecosystem dynamics and marine habitat: http://www.pcouncil.org/ecosystem-based-management/fep. The FEP is incorporated by reference. The NMFS Northwest and Southwest Fisheries Science Centers also provides yearly updates on the state of the California Current Ecosystem. The 2014 update is available at: http://www.pcouncil.org/wp-content/uploads/C1a_ATT1_IEA_STATE_of_CA_ CURRENT2013b_MAR2014BB.pdf.

### 4.2.2 Essential Fish Habitat (EFH)

Habitats provide living things with the basic life requirements of nourishment and shelter. This ultimately provides for both individual and population growth. The quantity and quality of available habitat influences the fishery resources of a region. Depth, temperature, substrate, circulation, salinity, light, dissolved oxygen, and nutrient supply are important parameters of a given habitat. These parameters determine the type and level of resource population that the habitat supports. The Sustainable Fisheries Act defines EFH as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Preferred Alternative could potentially affect EFH for species that are managed under the Pacific Coast groundfish, Coastal Pelagic Species, Salmon, and Highly Migratory Species FMPs. EFH for the species managed under these FMPs includes a wide variety of benthic habitats and the water column in state and Federal waters throughout the California Current Ecosystem. Full descriptions and maps of EFH for each species and life stages are available in their respective FMPs:

- Chapter 7 in the Pacific Coast Groundfish FMP describes groundfish EFH (Section 7.2) and HAPCs (Section 7.3): http://www.pcouncil.org/groundfish/fishery-management-plan/. Amendment 19 to the FMP designated and described these EFH and HAPCs and implemented measures to mitigate the adverse effects of fishing on EFH: http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-19/.
- Appendix D to the Coastal Pelagic Species FMP describes EFH for coastal pelagic species like anchovy, squid, and sardines: http://www.pcouncil.org/coastal-pelagic-species/fishery-management-plan-and-amendments/.
- Amendment 18 to the Salmon FMP revised the description of EFH and designated HAPCs for salmon species: http://www.pcouncil.org/salmon/fishery-management-plan/adoptedapproved-amendments/.
- Chapter 7 of the Highly Migratory Species FMP describes EFH and HAPCs for highly migratory species including sharks, tuna, and marlin: http://www.pcouncil.org/salmon/fishery-management-plan/adoptedapproved-amendments/.

Figure 2 shows the current extent of designated groundfish EFH. In general, 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.

Figure 3 shows current areas designated as HAPCs for groundfish. 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," which are discrete areas that are of special interest due to their unique geological and ecological characteristics, and include:
  - All waters and sea bottom in state waters off of Washington from the three nautical mile boundary of the territorial sea shoreward to MHHW;
  - Daisy Bank/Nelson Island, Thompson Seamount, President Jackson Seamount off of Oregon; and,
  - 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; and, specific areas of the Cowcod Conservation Area, off of California.

In 2011, the Council began a 5-year review of the groundfish EFH and HAPC descriptions and designations and information on fishing and non-fishing impacts. The Council completed Phase I and II of this review were completed in 2013 with the compilation of updated ecological, habitat, and fishing effort data to support the Council's decision-making on revisions to EFH. The completed Phase II report is available at: http://www.pcouncil.org/wp-content/uploads/D2b_EFHRC_RPT_PHASE2_MAR2014BB.pdf. During Phase III of the review, now underway, the Council is considering potential modifications to EFH conservation areas, which were implemented as part of Amendment 19.

Figure 2. Designated groundfish EFH

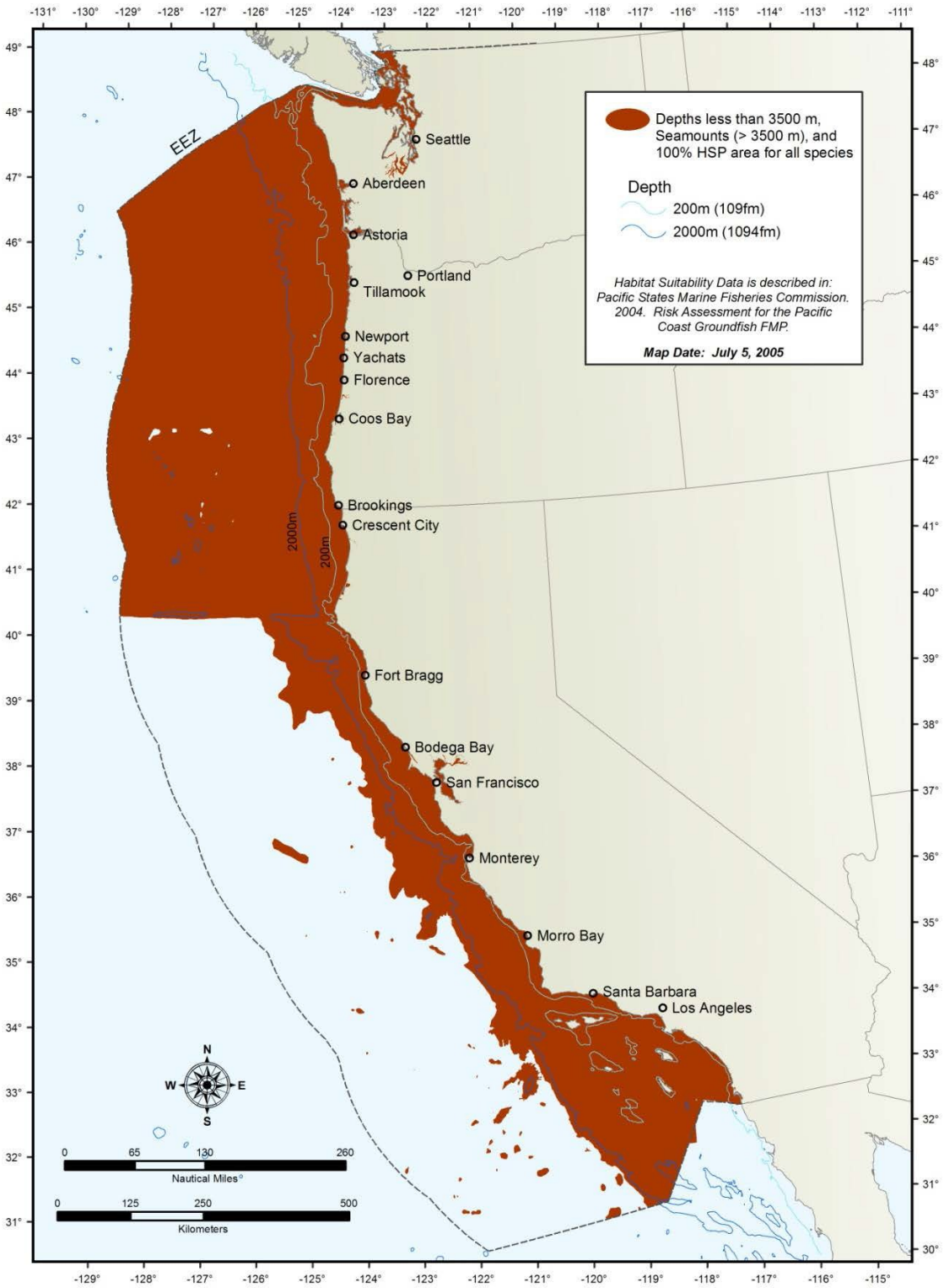
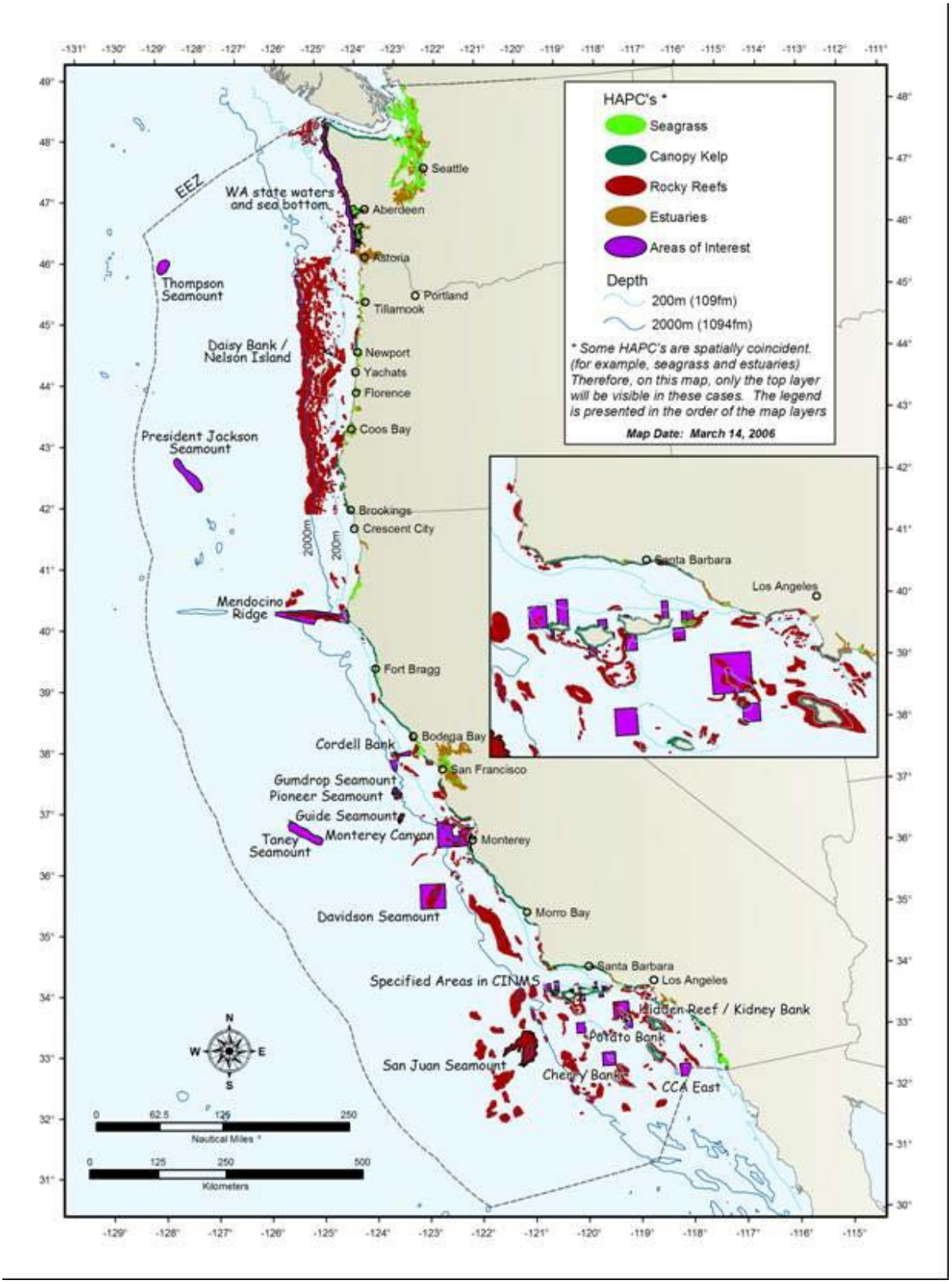


Figure 3. Groundfish HAPCs and major geological structures



### 4.2.3 Gear Types and Interactions with Habitat

Vessels in the shorebased IFQ sector each receive 30 individual allocations of species and species groups that they pursue with bottom trawl, or midwater trawl. Bottom trawl is a trawl in which the otter boards or the footrope of the net are in contact with the seabed. Midwater (pelagic or off-bottom) trawl is a trawl in which the otter boards may occasionally contact the seabed, but the footrope of the net remains above the seabed. An in-depth analysis of gear types and their interactions with habitats is available in Amendment 19 to the Pacific Coast Groundfish FMP: http://www.westcoast.fisheries.noaa.gov/publications/nepa/groundfish/final_groundfish_efh_eis.html. The FEIS for the 2017-2018 Specifications and Management Measures and Amendment 24 contained analysis of the impacts of the current operations of the groundfish fishery on habitat and is available at: http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-27/.

In general, the seafloor is the location of habitat types most susceptible to gear disturbances, so adverse effects to the physical habitat from different gear types are assessed by whether and how much the gear or harvesting technique contacts the bottom (Stevenson et al. 2004). Mobile gear types, such as dredges and trawls, generally have greater impacts on habitat than fixed gear types, like longlines and fish pots, due to the amount of the gear that contacts the bottom and how it interacts with the bottom. Bottom otter trawls are considered to have high degree impacts to habitat, because they have doors, ground cables, bridles, and sweeps that are dragged across the bottom during fishing. Some possible effects of bottom otter trawls on benthic habitats include reduction of habitat complexity, changes in benthic communities, reduction of productivity of benthic habitat (NRC 2002). Impacts from trawling are greater in gravel/rock habitats with attached epifauna, due to its greater vulnerability and lower frequency of disturbance.

The Preferred Alternative would not revise regulations in such a way that would change the current impacts that already are occurring. Bottom trawl gear may have some adverse impacts on biogenic habitats, such as corals and sponges, when the gear is dragged across the sea floor (rollers, otter boards, and the net). However, the Amendment 19 analysis indicated that recovery time for such soft sediment is generally between 1 to 2 years and for coral and sponges. Midwater trawls also have low or no impacts, because they are fished in the water column to catch pelagic species and have minimal contact with the bottom. Contact with the bottom may occasionally occur, but most likely on soft, mud bottom because fishermen generally avoid bottom contact in more complex, rocky habitats to avoid causing costly damage to the gear. The Amendment 19 analysis showed that most midwater trawl fishing effort (77 percent) occurs on soft substrate on the upper slope (shallower than 700 fm).

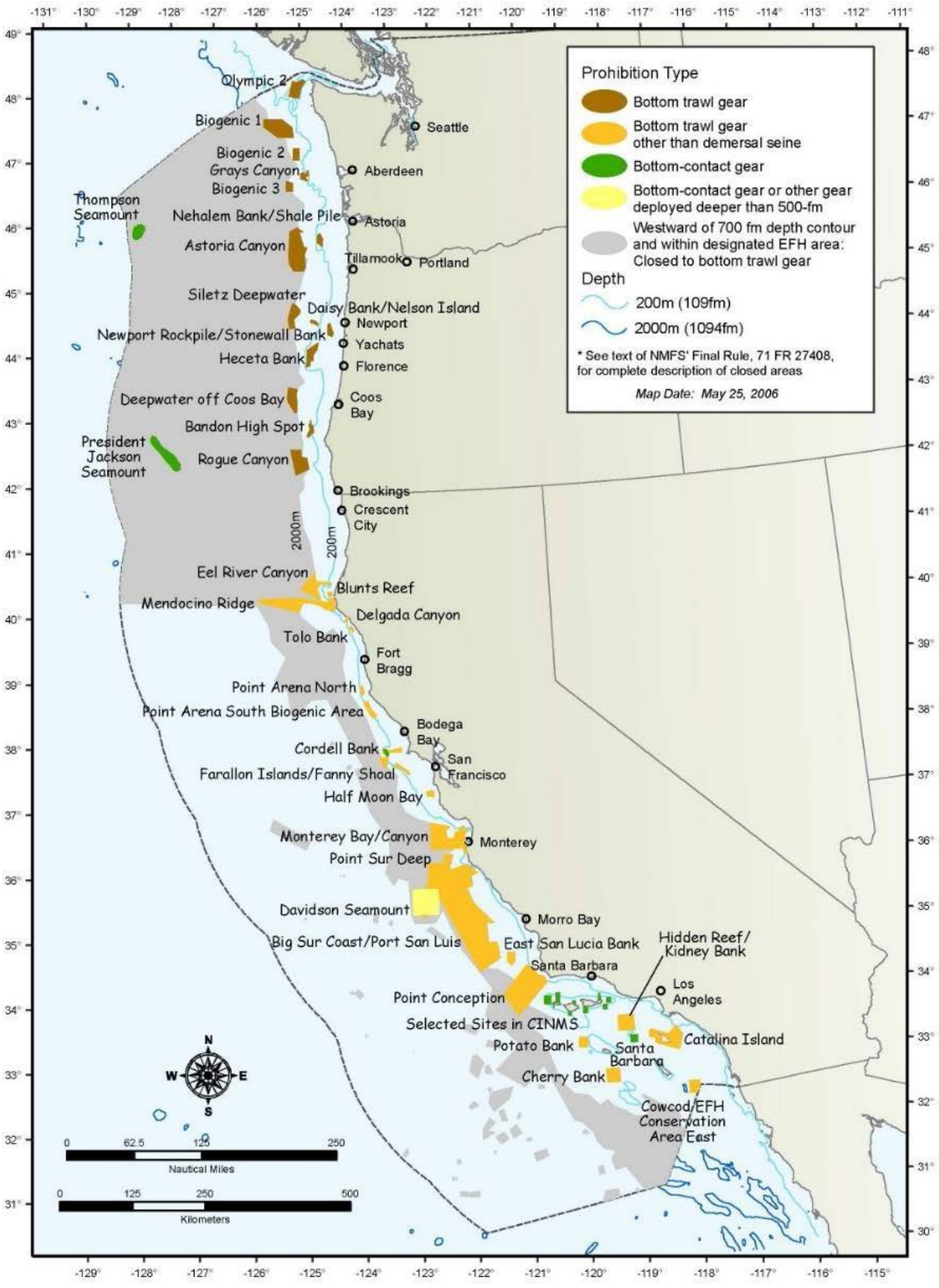
More detailed analysis of the vulnerability of different habitats to different gear types is available in the Amendment 19 FEIS and updated information is contained in the Council's Phase II report, which can be viewed on the Council's website: http://www.pcouncil.org/groundfish/groundfish-essential-fish-habitat/.

The Council established measures to mitigate the adverse impacts of fishing on groundfish EFH through Amendment 19, which are described in FMP Chapter 6 (PFMC, 2006). These mitigation measures extended a prohibition on the use of bottom trawl gear with footropes larger than 8 inches in diameter shoreward of a line approximating the 100-fathom depth contour (Section 6.6), to

discourage trawling in areas where bycatch of overfished rockfish species is higher and resulted in ancillary benefits by reducing trawling in areas of rocky habitat, as well as prohibitions on destructive gear types like dredges and beam trawls. Amendment 19 also closed 34 areas to bottom trawl gear and 16 areas to bottom contact commercial fishing gear, which includes pots and bottom longlines. Areas deeper than 700 fm were also closed to all bottom trawl gear (Section 6.8). Figure 4 shows the different closed areas. In addition, measures to control fishing capacity may have reduced impacts to EFH by limiting fishing effort (Section 6.9). Rockfish Conservation Areas (RCAs) implemented to conserve groundfish species have also reduced or eliminated fishing effort within these areas, depending on their restrictions.

The Council is currently considering changes to these closed areas in conjunction with the 5-year review of groundfish EFH and HAPC designations. More information about the changes under consideration is available on the Council's website: http://www.pcouncil.org/groundfish/groundfish-essential-fish-habitat/.

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



## 4.3 Target Species

This document incorporates by reference the Amendment 27 EIS. Information on the target species is summarized below; refer to the EIS for more detailed information on target species. This section describes the stock population status for targeted species for bottomtrawl and non-whiting midwater trawl vessels. This information is summarized from the draft 2016 SAFE Report and 2014 SAFE Report. These SAFE Reports and more detailed information about the distribution, life history, and population trends are available in stock assessments, Stock Assessment Review (STAR) Panel Reports, Stock Assessment Review Team (STAT) Reports on the Council's website: http://www.pcouncil.org/groundfish/stock-assessments/.

### 4.3.1 Target Species in the Bottom Trawl Fishery

The bottom trawl fishery targets multiple species complexes and fishes three fishing strategies. In the winter months the fishery will target petrale sole. The fishery also targets deep water fish on the continental slope (100 to 275 fathoms) such as thornyhead, sablefish, petrale, slope rockfish complex, and dover sole. It also targets species in shallow waters (30 to 60 fathoms) on the continental shelf such as longnose skate, Pacific sanddab, lingcod, Arrowtooth flounder, English sole, rex sole and other flatfish. Currently, these stocks are not overfished and overfishing is not occurring. Table 1 provides recent information of landings and effort, including the EM EFP program. Details regarding the EM EFP data can be found in Chapter 5.

### 4.3.2 Target Species in the Non-whiting Midwater Trawl Fishery

The non-whiting midwater trawl fishery target widow and yellowtail rockfish that gather just above the sea floor. Currently, these stocks are not overfished and overfishing is not occurring. Participation in this fishery is low (less than 10 vessels per year). It's expected that this fishery will increase in the future based on future management and gear changes being considered by the Council. Table 1 provides recent information of landings and effort, including the EM EFP program. Details regarding the EM EFP data can be found in Chapter 5.

Table 1. Bottom trawl and non-whiting midwater trawl (midwater rockfish trawl) discard and a landings including EM, 2015.

| | IFQ - Bottom Trawl | | | IFQ - Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate |
| **Groundfish species** | | | | | | |
| Arrowtooth flounder | 344.16 | 1,314.77 | 1,658.93 | -- | 0.01 | 0.01 |
| Black rockfish (North of 46°16' N. lat.) | 0.47 | 0.47 | 0.94 | -- | 0.01 | 0.01 |
| Black rockfish (South of 46°16' N. lat.) | -- | 0.04 | 0.04 | -- | -- | -- |
| BOCACCIO ROCKFISH (South of 40°10' N. lat.) | 0.76 | 38.88 | 39.64 | -- | -- | -- |
| Cabezon (California) | 0.00 | -- | 0.00 | -- | -- | -- |
| California scorpionfish (North of 34°27' N. lat.) | -- | 0.00 | 0.00 | -- | -- | -- |
| Canary rockfish | 0.08 | 13.51 | 13.58 | -- | 27.46 | 27.46 |
| Chilipepper rockfish (South of 40°10' N. lat.) | 18.21 | 173.80 | 192.01 | -- | -- | -- |
| COWCOD ROCKFISH (South of 40°10' N. lat.) | 0.00 | 0.39 | 0.39 | -- | -- | -- |
| DARKBLOTCHED ROCKFISH | 4.09 | 87.28 | 91.37 | -- | 0.01 | 0.01 |
| Dover sole | 39.76 | 6,185.89 | 6,225.65 | -- | -- | -- |
| Ecosystem component species | | | | | | |
| Alaska Skate | 0.02 | -- | 0.02 | -- | -- | -- |
| Aleutian Skate | 1.12 | -- | 1.12 | -- | -- | -- |
| Big Skate | 36.43 | 215.30 | 233.52 | 0.01 | 0.02 | 0.03 |
| 50% discard mortality (Trawl)‡ | 18.22 | | | | | |
| Black Skate | 14.36 | -- | 14.36 | -- | -- | -- |
| California Skate | 1.19 | 0.19 | 1.38 | -- | -- | -- |
| Deepsea Skate | 0.88 | -- | 0.88 | -- | -- | -- |
| Giant Grenadier | 36.27 | -- | 36.27 | -- | -- | -- |
| Grenadier Unid | 0.73 | 13.12 | 13.86 | -- | -- | -- |
| Pacific Electric Ray | 2.49 | -- | 2.49 | -- | -- | -- |
| Pacific Flatnose | 0.63 | -- | 0.63 | -- | -- | -- |
| Pacific Grenadier | 19.40 | 1.18 | 20.59 | -- | -- | -- |
| Sandpaper Skate | 38.88 | 0.34 | 39.22 | -- | -- | -- |
| Skate Unid | 0.75 | 77.07 | 77.82 | 0.01 | 0.01 | 0.02 |
| Soupfin Shark | 1.38 | 0.19 | 1.57 | 0.01 | 0.02 | 0.03 |
| Spotted Ratfish | 84.16 | 1.50 | 85.66 | -- | 0.00 | 0.00 |
| Starry Skate | 0.02 | -- | 0.02 | -- | -- | -- |
| White Skate | 0.02 | -- | 0.02 | -- | -- | -- |
| English sole | 85.79 | 239.54 | 325.33 | -- | 0.01 | 0.01 |
| Groundfish unid | 0.11 | -- | 0.11 | -- | 0.00 | 0.00 |
| Lingcod (North of 40°10' N. lat.) | 18.37 | 147.76 | 156.94 | 0.01 | 5.91 | 5.92 |
| 50% discard mortality (Trawl)‡ | 9.18 | | | | | |
| 7% discard mortality (Line)‡ | | | | | | |
| Lingcod (South of 40°10' N. lat.) | 6.80 | 25.62 | 29.02 | -- | -- | -- |
| 50% discard mortality (Trawl)‡ | 3.40 | | | | | |
| 7% discard mortality (Line)‡ | | | | | | |
| Longnose skate | 102.07 | 721.71 | 772.74 | -- | 0.03 | 0.03 |
| 50% discard mortality (Trawl)‡ | 51.04 | | | | | |
| 50% discard mortality (Fixed Gear)‡ | | | | | | |

‡Discard mortality rates provided by the Groundfish Management Team (GMT).

| | IFQ - Bottom Trawl | | | IFQ - Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate |
| Longspine Thornyhead (North of 34°27' N. lat.) | 22.44 | 733.89 | 756.33 | -- | -- | -- |
| Longspine Thornyhead (South of 34°27' N. lat.) | -- | -- | -- | -- | -- | -- |
| Minor nearshore rockfish (North of 40°10' N. lat.) | | | | | | |
| Blue Rockfish | 0.00 | 0.00 | 0.00 | -- | -- | -- |
| Brown Rockfish | -- | 0.00 | 0.00 | -- | -- | -- |
| Quillback Rockfish | -- | 0.03 | 0.03 | -- | -- | -- |
| Minor nearshore rockfish (South of 40°10' N. lat.) | | | | | | |
| Brown Rockfish | 0.00 | -- | 0.00 | -- | -- | -- |
| Olive Rockfish | -- | 0.00 | 0.00 | -- | -- | -- |
| Minor shelf rockfish (North of 40°10' N. lat.) | | | | | | |
| Bocaccio Rockfish | 0.04 | 1.22 | 1.26 | -- | 0.06 | 0.06 |
| Chilipepper Rockfish | 0.68 | 2.74 | 3.42 | -- | 0.85 | 0.85 |
| Cowcod Rockfish | 0.00 | 0.03 | 0.03 | -- | -- | -- |
| Flag Rockfish | 0.00 | -- | 0.00 | -- | -- | -- |
| Greenspotted Rockfish | 0.00 | 0.03 | 0.03 | -- | -- | -- |
| Greenstriped Rockfish | 2.46 | 8.01 | 10.47 | -- | -- | -- |
| Redstripe Rockfish | 0.05 | 2.72 | 2.77 | 0.45 | 1.18 | 1.63 |
| Rockfish Unid | 0.30 | -- | 0.30 | -- | -- | -- |
| Rosethorn Rockfish | 0.14 | 0.77 | 0.90 | -- | 0.03 | 0.03 |
| Rosy Rockfish | -- | -- | -- | -- | -- | -- |
| Shelf Rockfish Unid | 0.00 | 0.21 | 0.21 | -- | 0.00 | 0.00 |
| Silvergray Rockfish | 0.00 | 0.15 | 0.15 | -- | 0.02 | 0.02 |
| Starry Rockfish | -- | -- | -- | -- | -- | -- |
| Stripetail Rockfish | 8.29 | 0.19 | 8.48 | -- | 0.00 | 0.00 |
| Tiger Rockfish | -- | 0.00 | 0.00 | -- | -- | -- |
| Minor shelf rockfish (South of 40°10' N. lat.) | | | | | | |
| Bronzespotted Rockfish | 0.00 | 0.01 | 0.01 | -- | -- | -- |
| Greenblotched Rockfish | 0.01 | 0.02 | 0.03 | -- | -- | -- |
| Greenspotted Rockfish | 0.06 | 0.24 | 0.30 | -- | -- | -- |
| Greenstriped Rockfish | 0.57 | 0.47 | 1.05 | -- | -- | -- |
| Halfbanded Rockfish | 0.02 | -- | 0.02 | -- | -- | -- |
| Mexican Rockfish | 0.00 | 0.01 | 0.01 | -- | -- | -- |
| Pink Rockfish | 0.00 | 0.03 | 0.03 | -- | -- | -- |
| Pygmy Rockfish | 0.00 | -- | 0.00 | -- | -- | -- |
| Redstripe Rockfish | -- | -- | -- | -- | -- | -- |
| Rockfish Unid | 0.01 | -- | 0.01 | -- | -- | -- |
| Rosethorn Rockfish | 0.07 | 0.01 | 0.08 | -- | -- | -- |
| Shelf Rockfish Unid | 0.00 | 0.00 | 0.00 | -- | -- | -- |
| Speckled Rockfish | -- | 0.00 | 0.00 | -- | -- | -- |
| Stripetail Rockfish | 7.14 | 0.15 | 7.29 | -- | -- | -- |
| Vermilion Rockfish | 0.02 | 0.41 | 0.43 | -- | -- | -- |
| Yellowtail Rockfish | 0.00 | 0.11 | 0.11 | -- | -- | -- |

| | IFQ - Bottom Trawl | | | IFQ - Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|
| Weight (mt) | Discard | Landed | Estimate | Discard | Landed | Estimate |
| Minor slope rockfish (North of 40°10' N. lat.) | | | | | | |
| Aurora Rockfish | 2.91 | 14.79 | 17.70 | -- | 0.00 | 0.00 |
| Bank Rockfish | 0.00 | 0.83 | 0.83 | -- | 0.00 | 0.00 |
| Blackgill Rockfish | 0.01 | 5.38 | 5.39 | -- | 0.00 | 0.00 |
| Redbanded Rockfish | 0.14 | 3.90 | 4.04 | -- | -- | -- |
| Rockfish Unid | 0.06 | -- | 0.06 | -- | -- | -- |
| Rougheye/Blackspotted Rockfish | 0.01 | 30.25 | 30.26 | -- | 0.01 | 0.01 |
| Rougheye Rockfish | 0.00 | -- | 0.00 | -- | -- | -- |
| Sharpchin Rockfish | 0.02 | 0.77 | 0.78 | -- | 0.00 | 0.00 |
| Shortraker Rockfish | 0.00 | 9.61 | 9.61 | -- | -- | -- |
| Shortraker/Rougheye Rockfish | -- | -- | -- | -- | -- | -- |
| Slope Rockfish Unid | 0.00 | 1.16 | 1.16 | -- | 0.01 | 0.01 |
| Splitnose Rockfish | 9.38 | 21.04 | 30.43 | -- | 0.28 | 0.28 |
| Yellowmouth Rockfish | 0.00 | 0.55 | 0.55 | -- | 0.00 | 0.00 |
| Minor slope rockfish (South of 40°10' N. lat.) | | | | | | |
| Aurora Rockfish | 1.39 | 1.87 | 3.26 | -- | -- | -- |
| Bank Rockfish | 0.09 | 45.46 | 45.55 | -- | -- | -- |
| Blackgill Rockfish | 1.10 | 17.20 | 18.31 | -- | -- | -- |
| Pacific Ocean Perch | 0.00 | 0.00 | 0.00 | -- | -- | -- |
| Redbanded Rockfish | 0.05 | 0.74 | 0.78 | -- | -- | -- |
| Rockfish Unid | 0.00 | -- | 0.00 | -- | -- | -- |
| Rougheye/Blackspotted Rockfish | 0.00 | 0.09 | 0.09 | -- | -- | -- |
| Sharpchin Rockfish | 0.03 | -- | 0.03 | -- | -- | -- |
| Shortraker Rockfish | -- | -- | -- | -- | -- | -- |
| Slope Rockfish Unid | 0.00 | 0.00 | 0.00 | -- | -- | -- |
| Mixed thornyheads | | | | | | |
| Shortspine/Longspine Thornyhead | 0.76 | -- | 0.76 | -- | -- | -- |
| Other flatfish | | | | | | |
| Butter Sole | 0.13 | 0.09 | 0.22 | -- | -- | -- |
| Curlfin Turbot | 0.58 | 2.22 | 2.79 | -- | -- | -- |
| Flatfish Unid | 0.03 | 0.08 | 0.11 | -- | -- | -- |
| Flathead Sole | 22.98 | 14.54 | 37.52 | -- | 0.00 | 0.00 |
| Pacific Sanddab | 120.76 | 155.35 | 276.11 | -- | 0.01 | 0.01 |
| Rex Sole | 38.37 | 455.74 | 494.11 | -- | 0.00 | 0.00 |
| Rock Sole | 0.04 | 0.95 | 0.99 | -- | -- | -- |
| Sanddab Unid | 0.04 | -- | 0.04 | -- | -- | -- |
| Sand Sole | 0.12 | 13.60 | 13.72 | -- | -- | -- |

| Weight (mt) | IFQ - Bottom Trawl | | | IFQ - Midwater Rockfish Trawl | | |
|---|---|---|---|---|---|---|
| | Discard | Landed | Estimate | Discard | Landed | Estimate |
| Other groundfish | | | | | | |
| Kelp Greenling | 0.08 | 0.00 | 0.08 | -- | -- | -- |
| Leopard Shark | -- | -- | -- | -- | -- | -- |
| Other rockfish | | | | | | |
| Rockfish Unid | 0.02 | 0.12 | 0.14 | -- | -- | -- |
| Pacific cod | 0.48 | 376.50 | 376.99 | -- | 0.01 | 0.01 |
| Pacific hake | 222.31 | 56.03 | 278.35 | 3.20 | 53.79 | 56.99 |
| PACIFIC OCEAN PERCH (North of 40°10' N. lat.) | 0.12 | 29.33 | 29.45 | -- | 0.02 | 0.02 |
| Petrale sole | 14.35 | 2,483.17 | 2,497.52 | -- | 0.00 | 0.00 |
| Roundfish unid | 0.00 | -- | 0.00 | -- | -- | -- |
| Sablefish (North of 36° N. lat.) | 9.73 | 1,452.21 | 1,457.08 | -- | 0.00 | 0.00 |
| 50% discard mortality (Trawl)‡ | 4.86 | | | | | |
| 20% discard mortality (Fixed Gear)‡ | | | | | | |
| Sablefish (South of 36° N. lat.) | 1.54 | 5.04 | 5.81 | -- | -- | -- |
| 50% discard mortality (Trawl)‡ | 0.77 | | | | | |
| 20% discard mortality (Fixed Gear)‡ | | | | | | |
| Shortbelly rockfish | 4.43 | 0.06 | 4.49 | -- | 0.01 | 0.01 |
| Shortspine Thornyhead (North of 34°27' N. lat.) | 6.30 | 691.41 | 697.71 | -- | 0.00 | 0.00 |
| Shortspine Thornyhead (South of 34°27' N. lat.) | -- | -- | -- | -- | -- | -- |
| Spiny dogfish | 187.66 | 4.49 | 192.15 | 0.13 | 54.11 | 54.24 |
| 50% discard mortality (Line)‡ | | | | | | |
| Splitnose rockfish (South of 40°10' N. lat.) | 22.12 | 6.69 | 28.81 | -- | -- | -- |
| Starry flounder | 0.12 | 6.28 | 6.41 | -- | -- | -- |
| Widow rockfish | 0.07 | 11.60 | 11.66 | -- | 479.18 | 479.18 |
| YELLOWEYE ROCKFISH | 0.00 | 0.03 | 0.03 | -- | -- | -- |
| Yellowtail rockfish (North of 40°10' N. lat.) | 0.01 | 125.05 | 125.06 | 0.12 | 1,193.71 | 1,193.84 |
| **Non-groundfish species** | | | | | | |
| California halibut | 0.03 | 0.79 | 0.83 | -- | -- | -- |
| Dungeness crab | 95.56 | 0.03 | 95.59 | -- | -- | -- |
| Non-FMP flatfish | | | | | | |
| Deepsea Sole | 9.84 | 0.00 | 9.84 | -- | -- | -- |
| Diamond Turbot | 0.01 | -- | 0.01 | -- | -- | -- |
| Hornyhead Turbot | 0.00 | -- | 0.00 | -- | -- | -- |
| Slender Sole | 29.88 | 0.29 | 30.17 | -- | -- | -- |
| Other nongroundfish | | | | | | |
| Sculpin Unid | 0.74 | -- | 0.74 | -- | -- | -- |

Source: Table 3a, 2016 WCGOP total mortality estimates.

## 4.4 Non-Target Species and Bycatch

This document incorporates by reference the Amendment 20 EIS; refer to the EIS for more detailed information on non-target species and bycatch. The 2015-2016 SAFE Reports provide detailed information about the distribution, life history, and population trends that are available in stock assessments, STAR Panel Reports, STAT Reports on the Council's website: http://www.pcouncil.org/groundfish/stock-assessments/.

### 4.4.1 Overfished Groundfish Species

Overfished and rebuilding stocks include Bocaccio rockfish (*Sebastes paucispinis*) South of

40.10'N , Cowcod (*Sebastes levis*) South of 40.10'N, Darkblotched rockfish (*Sebastes crameri*), Yelloweye rockfish (*Sebastes ruberrimus*), and Pacific Ocean Perch (POP, *Sebastes alutus*) North of 40.10'N. Rockfish are generally long-lived and slow-growing, which make them vulnerable to overfishing and slow to recover from depletion. Darkblotched, POP, and yelloweye rockfish are among the longer living rockfish, with Darkblotched and POP individuals that have been aged to 98 years old (Gertseva, et al. 2015; Heifetz, et al. 2000) and yelloweye rockfish as old as 118 years old. Bocaccio rockfish, cowcod, and POP are managed as separate stocks north and south of 40.10'N latitude. North of 40.10' N Bocaccio and cowcod are managed as part of an assemblage of shelf rockfish species called Minor Shelf North of 40.10'N. South of 40.10N they are managed separately. POP is managed separately north of 40.10'N and as part of the Minor Slope South of 40.10'N assemblage. Darkblotched and yelloweye rockfish are managed as a single stock throughout the West Coast region. The current status of these species is summarized in Table 2.

Table 2. Status of overfished groundfish species.

| **Stock** | **Overfishing?** | **Overfished?** | **Management Action Required** | **Rebuilding Program Progress** | **B/Bmsy or B/Bmsy proxy** |
|---|---|---|---|---|---|
| Bocaccio – South | No | No – rebuilding | Continue rebuilding | Year 17 of 22-year plan | 0.79 |
| Cowcod – South | No | No – rebuilding | Continue rebuilding | Year 16 of 67-year plan | 0.85 |
| Darkblotched rockfish | No | No – rebuilding | Continue rebuilding | Year 15 of 23-year plan | 0.98 |
| Pacific ocean perch – North | No | Yes – rebuilding | Continue rebuilding | Year 17 of 51-year plan | 0.48 |
| Yelloweye rockfish | No | Yes | Continue rebuilding | Year 14 of 71-year plan | 0.53 |

## 4.5 Protected Resources

This document incorporates by reference the Amendment 20 EIS. Information on the protected resources is summarized below; refer to the EIS for more detailed information on protected resources. Numerous protected species inhabit the environment within the Pacific Coast Groundfish FMP management unit. Therefore, many protected species potentially occur in the operations area of the fishery. These species are under NMFS's and FWS's jurisdiction and are afforded protection under the Endangered Species Act of 1973 (ESA) and/or the Marine Mammal Protection Act of 1972 (MMPA). As listed in Table 3, 23 marine mammal, sea turtle, fish species, and invertebrate species are classified as endangered or threatened under the ESA. Humpback whales are currently listed globally as endangered. NMFS published a proposed rule to identify 14 distinct population segments (DPS) of humpback whales and list two as threatened and two as endangered (80 FR 22304; April 21, 2015). Three proposed DPSs occur in the action area, the Mexico DPS and Hawaii DPS (not proposed to be listed under the ESA) and the Central America DPS (proposed to be listed as threatened under the ESA). A final decision is expected in 2016. The remaining species in Table 3 are protected by the MMPA and are known to interact

with the Pacific Coast groundfish fishery. Non ESA-listed species protected by the MMPA that utilize this environment and have no documented interaction with the Pacific Coast groundfish fishery will not be discussed in this document.

### 4.5.1 Species Present in the Area

Table 3 and 4 lists the species and critical habitat, protected by the ESA, the MMPA, or both, that may be found in the environment utilized by the groundfish fishery. Note that all marine mammals are protected under the MMPA. Table 3 also includes proposed DPS for humpback whales. This list does not include ESA-listed species only listed in the Puget Sound, because the action area does not include Puget Sound.

Table 3. Species present in the action area.

| **Species** | **Status under ESA and/or MMPA** |
|---|---|
| **Marine Mammals** | |
| Blue whale (*Balaenoptera musculus*) | Endangered |
| Fin whale (*Balaenoptera physalus*) | Endangered |
| Humpback whale (*Megaptera novaeangliae*)** | Endangered |
| Proposed Mexico DPS, Hawaii DPS, and Central America DPS (proposed threatened) of humpback whale | Proposed April 21, 2015 (80 FR 22304) |
| Sei whale (*Balaenoptera borealis*) | Endangered |
| North Pacific right whale (*Eubalaena japonica*) | Endangered |
| Gray whale (*Eschrichtius robustus*) western North Pacific population | Endangered |
| Sperm whale (*Physeter macrocephalus*) | Endangered |
| Killer whales (*Orcinus orca*) southern resident distinct population segment (DPS) | Endangered |
| Steller sea lion (*Eumetopias jubatus*) eastern DPS* | Removed from list as of Dec 4, 2013 (78 FR 66140) |
| Guadalupe fur seal (*Arctocephalus townsendi*) | Threatened |
| Dall's porpoise (*Phocoenoides dalli*) – CA/OR/WA stock | Non-strategic stock |
| Harbor porpoise (*Phocoena phocoena*) - Morro Bay stock, Monterey Bay stock, San Francisco-Russian River stock, Northern CA/Southern OR stock, OR/WA stock. | Non-strategic stock |
| Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) – CA/OR/WA stock, northern and southern stocks | Non-strategic stock |
| Risso's dolphin (*Grampus griseus*) – CA/OR/WA stock | Non-strategic stock |
| Common Bottlenose dolphin (*Tursiops truncatus*) – CA/OR/WA offshore stock, CA coastal stock | Non-strategic stock |
| Common dolphin, Short-beaked (*Delphinus delphis)* – CA/OR/WA stock | Non-strategic stock |

| | |
|---|---|
| Common dolphin, Long-beaked (*Delphinus capensis*) – CA stock | Non-strategic stock |
| Northern right whale dolphin (*Lissodelphis borealis*) – CA/OR/WA stock | Non-strategic stock |
| Striped dolphin (*Stenella coeruleoalba*) – CA/OR/WA stock | Non-strategic stock |
| Short-finned pilot whale (*Globicephala macrorhynchus*) – CA/OR/WA stock | Non-strategic stock |
| Sperm whale (*Physeter macrocephalus*) – CA/OR/WA stock | Strategic stock |
| Dwarf sperm whale (*Kogia sima*) - CA/OR/WA stock | Non-strategic stock |
| Pygmy sperm whale (*Kogia breviceps*) - CA/OR/WA stock | Non-strategic stock |
| Killer whale (*Orcinus orca*) – Eastern north Pacific offshore stock, West Coast transient stock | Non-strategic stock |
| Mesoplodont beaked whales (Mesoplodon spp.) - CA/OR/WA stock<br>Hubbs' beaked whales<br>Gingko-toothed whale<br>Stejneger's beaked whales<br>Blainville's beaked whales<br>Pygmy beaked whale or lesser beaked whale<br>Perrin's beaked whale<br>*Due to the difficulties involved with identifying different species, as well as the rarity of these species, the SAR for these species designated all Mesoplodont beaked whales as one stock in the EEZ waters off the coasts of CA/OR/WA* | Non-strategic stock |
| Cuvier's beaked whale (*Ziphius cavirostris*) - CA/OR/WA stock | Non-strategic stock |
| Baird's beaked whale (*Berardius bairdii*) – CA/OR/WA stock | Non-strategic stock |
| Blue whale (*Balaenoptera musculus)* – Eastern North Pacific stock | Strategic stock |
| Fin whale (*Balaenoptera physalus*) - CA/OR/WA stock | Strategic stock |
| Gray whale (*Eschrichtius robustus*) - Eastern North Pacific stock and Western North Pacific stocks | Non-strategic stock (Eastern)/Strategic stock (Western) |
| Humpback whale (*Megaptera novaeangliae*) – CA/OR/WA stock | Strategic stock |
| Minke whale (*Balaenoptera acutorostrata*) - CA/OR/WA stock | Non-strategic stock |
| Right whale, North Pacific (*Eubalaena glacialis*) - Eastern North Pacific stock | Non-strategic stock |
| Sei whale (*Balaenoptera borealis)* - Eastern North Pacific stock | Strategic stock |
| Steller sea lions (*Eumetopias jubatus)* – Eastern U.S. stock | Non-strategic stock |
| California sea lion (*Zalophus californianus*) – U.S. stock | Non-strategic stock |
| Guadalupe fur seal (*Arctocephalus townsendi*) – Mexico to California | Strategic stock |
| Harbor seal (*Phoca vitulina richardsi*) – CA stock; OR/WA stock | Non-strategic stocks |
| Northern elephant seal (*Mirounga angustirostris*) – California breeding stock | Non-strategic stock |
| Northern fur seal: (*Callorhinus ursinus*) – California stock | Non-strategic stock |
| **Sea turtles** | |
| Leatherback turtle (*Dermochelys coriacea*)* | Endangered |

| | |
|---|---|
| Loggerhead turtle (*Caretta caretta*) North Pacific Ocean DPS | Endangered |
| Olive ridley (*Lepidochelys olivacea*) | Endangered/Threatened |
| Green turtle (*Chelonia mydas*), East Pacific DPS | Threatened |
| **Marine invertebrates** | |
| White abalone (*Haliotis sorenseni*) | Endangered |
| Black abalone (*Haliotis cracherodii*)* | Endangered |
| **Marine and anadromous fish** | |
| Green sturgeon (*Acipenser medirostris*) southern DPS* | Threatened |
| Pacific eulachon (*Thaleichthys pacificus*) southern DPS | Threatened |
| Chinook (*Oncorhynchus tshawytscha*)<br>Sacramento River winter, evolutionarily significant unit (ESU) | Endangered |
| Chinook, Central Valley Spring ESU | Threatened |
| Chinook, California Coastal ESU | Threatened |
| Chinook, Puget Sound | Threatened |
| Chinook, Snake River Fall Run | Threatened |
| Chinook, Snake River Spring/Summer Run | Threatened |
| Chinook, Lower Columbia River | Threatened |
| Chinook, Upper Willamette River | Threatened |
| Chinook, Upper Columbia River Spring Run | Endangered |
| Coho (*Oncorhynchus kistuch*)<br>Central California Coastal ESU | Endangered |
| Coho, S. Oregon/N. CA Coastal ESU | Threatened |
| Coho, Lower Columbia River | Threatened |
| Coho, Oregon Coast | Threatened |
| Chum, (*Oncorhynchus keta*)<br>Columbia River ESU | Threatened |
| Chum, Hood Canal summer run ESU | Threatened |
| Steelhead, *(Oncorhynchus mykiss*), Central California Coast DPS | Threatened |
| Steelhead, Snake River Basin DPS | Threatened |
| Steelhead, Upper Columbia River DPS | Endangered |
| Steelhead, Southern California DPS | Endangered |
| Steelhead, Middle Columbia River DPS | Threatened |
| Steelhead, Lower Columbia River DPS | Threatened |
| Steelhead, Upper Willamette River DPS | Threatened |
| Steelhead, Northern California DPS | Threatened |
| Steelhead, South-Central California DPS | Threatened |
| Steelhead, California Central Valley DPS | Threatened |
| Sockeye (*Oncorhynchus nerka*), Snake River ESU | Endangered |
| Scalloped hammerhead (*Sphyrna lewini*) eastern Pacific DPS | Endangered |

*Species with designated critical habitat within the marine waters.

** Species with proposed DPS designations. On April 21, 2015, NMFS proposed to remove the current range-wide listing of humpback whales and identified 14 DPSs and list two as threatened and two as endangered (80 FR 22304). A final listing decision is expected in 2016.

Table 4. Critical habitats

| | | |
|---|---|---|
| Steller sea lion (58 FR 45269) | Año Nuevo Island<br>Southeast Farrallon Island<br>Sugarloaf Island and Cape Mendocino | Associated aquatic zones 3,000 feet seaward in State and Federally managed waters from the baseline of each rookery and the air zone 3,000 feet above each rookery measured vertically from sea level. |
| Southern Resident Killer Whales (71 FR 69054) | The critical habitat is made of three areas: U.S. waters south of the Washington/Canada border to the Strait of Juan de Fuca; the U.S. waters of the Strait of Juan de Fuca; Puget Sound (Hood Canal not included) | See 50 CFR 226.206 for details of critical habitat areas and specific sites not included in critical habitat designation. |
| Green sturgeon, southern DPS (74 FR 52300) | US coastal marine waters within 60 fathoms from Monterey Bay, CA, to Cape Flattery, WA. Numerous rivers and estuaries adjacent to marine waters are also listed. See Federal Register notice for complete list. | |
| Black abalone (76 FR 66806) | Rocky intertidal and subtidal habitats to the 6 meter depth bathymetry line (relative to MLLW) around specific offshore island (the Farallon Islands, Año Nuevo Island, the Channel Islands) and along the coast in specific areas between Del Mar Landing Ecological Reserve in Sonoma County and just south of Government Point in Santa Barbara County as well as along the Palos Verde Peninsula. | |
| Leatherback sea turtle (77 FR 4170) | Marine waters from Point Arena, CA to Point Arguello, CA from the nearshore to the 3,000 meter isobath. | |
| Marine and anadromous fish have designated critical habitat in rivers, streams and estuaries adjacent to marine waters. Additional information is available through NMFS and at http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm. | | |

Information on endangered and threatened marine species under NMFS's jurisdiction, including species information, status and designated critical habitat, can be found at http://www.nmfs.noaa.gov/pr/species/esa/listed.htm#fish. Information on marine mammals protected under the MMPA can be found at: http://www.nmfs.noaa.gov/pr/sars/pdf/pacific2015_final.pdf.

### 4.5.2 Species Potentially Affected

The Pacific coast groundfish fishery has suspected and documented interactions with several ESA listed species that are potentially affected by this action: Chinook salmon, eulachon, green sturgeon, humpback whales, leatherback sea turtles, and short-tailed albatross. Chinook salmon are primarily caught as bycatch by bottom trawl and midwater trawl vessels. The trawl fishery at large, including bottom trawl and midwater trawl, is responsible for interactions with Stellar sea lions. The effects of the Pacific Coast Groundfish FMP on species listed as threatened or endangered under the ESA have been considered in two section 7 consultations.
The conclusions and current status of the most recent consultations are summarized below.

*Listed Salmonids*

Analysis of available data for previous consultations indicates that steelhead, sockeye, and cutthroat trout are rarely, if ever, encountered in the groundfish fishery. Coho and chum are caught in relatively low numbers in the whiting fishery with average catch per year coastwide on the order of tens to a few hundred fish (NMFS 1999), and in the bottom trawl fishery on the order of tens of fish per year (NMFS 1992). NMFS concluded in the 1999 biological opinion that there is little or no effect to the steelhead, sockeye, cutthroat trout, coho, or chum salmon ESUs as a result of the groundfish FMP. Relevant information supporting this conclusion is reviewed briefly in section IV of the 1999 Biological Opinion, but is not further discussed in this assessment.

Substantial numbers of chinook salmon are caught in some of the midwater and bottom trawl fisheries and have been the subject of previous biological opinions, most recently in the 1999 biological opinion and 2006 supplemental biological opinion. NMFS has reinitiated formal consultation under section 7 of the ESA for the Pacific Coast Groundfish FMP in order to evaluate the effects of the ongoing operation of this fishery on listed salmonids. A December 15, 1999, biological opinion considered the effects of the fishery on listed salmonid species and concluded that it would not be likely to jeopardize the continued existence of these species nor result in the destruction or adverse modification of their designated critical habitat. In 2013, NMFS noted the increased use of midwater trawl gear to target non-whiting groundfish species, which was not considered under previous consultations. NMFS reinitiated consultation on the FMP to address the effects of this emerging fishery on Chinook salmon. This consultation is ongoing, but in the interim, NMFS has analyzed the ongoing operation of the fishery through the 2017-2018 specifications cycle and under Amendment 24 to the FMP. Amendment 27 and its implementing regulations established specifications, catch limits, and management measures governing the fishery for the 2017-2018 fishing years.

In a December 2014 memorandum, NMFS analyzed the expected catch of Chinook salmon and other salmonid species commensurate with the level of fishing activity expected under the 2017-2018 specifications and determined that the expected catch of salmon species would be within the level considered by the 1999 biological opinion. The fishery under Amendment 27 would also continue to be in compliance with the terms and conditions of the August 28, 1992 biological opinion, as amended by the September 27, 1993 and May 14, 1996 biological opinions and continued by the December 15, 1999 biological opinion. Therefore, NMFS concluded that continuation of the fishery and approval of Amendment 74 would not be likely to jeopardize the

continued existence of listed salmonid species and that incidental take of salmonid species remains in compliance with the prohibitions of section 9 of the ESA.

NMFS also determined under section 7(d) of the ESA that the continued operation of the fishery would not represent an irreversible or irretrievable commitment of resources that would have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures in the eventual biological opinion. This section 7(a)(2) analysis is only applicable to the proposed action during the reinitiation period and does not address the agency's obligation to ensure that the action over the longer term is not likely to jeopardize listed salmonids. A jeopardy determination commensurate with the temporal scope of the action is appropriately made only in a biological opinion.

*Other Species*

NMFS and the U.S. Fish and Wildlife Service completed biological opinions in 2012 assessing the impacts of the Pacific Coast Groundfish FMP. The consultation with NMFS included eulachon, green sturgeon, Stellar sea lions, humpback whales, and leatherback sea turtles; the consultation with USFWS included short-tailed albatross. All other ESA listed species that may be affected by the groundfish fishery were evaluated and it as determined that they were not likely to be adversely effected by the fishery. The biological opinions concluded that the ongoing operation of the fishery would not be likely to jeopardize the continued existence of eulachon, green sturgeon, Stellar sea lions, humpback whale, leatherback sea turtles, or short tailed albatross and issued an incidental take statements with reasonable and prudent measure and terms and conditions to monitor and minimize mortality of incidental takes. The biological opinions also charged the Council with creating an Endangered Species Workgroup to compile information about and monitor compliance with the incidental take statements (ITSs) in the groundfish fishery. The most recent report of the Workgroup in 2015 concluded that the groundfish fishery was in compliance with its ITS for Stellar sea lions, humpback whales, green sturgeon, and leatherback sea turtles, but had exceeded the ITSs for eulachon and short-tailed albatross. Stellar sea lions were removed from the ESA on December 4, 2013 (78 FR 66140).

NMFS also reinitiated consultation on the take of short-tailed albatross in April 2016. Bycatch of short-tailed albatrosses in commercial fisheries continues to be a major conservation concern. From 1983 to 2009, eleven short-tailed albatross mortalities were documented in North Pacific groundfish fisheries. From 2010-2014, eight short-tailed albatross mortalities have been observed during commercial fishing activities, six in Alaska, one off Oregon, and one off Japan. On April 11, 2011, a short-tailed albatross mortality was documented in the limited entry sablefish fishery using fixed gear off Oregon. Because extremely low numbers of short-tailed albatross make observation data too low to use, black-footed albatross observations are used as a proxy. The 2012-2013 two-year average, using expanded annual estimates of black-footed albatross as a proxy (as required in the USFWS Biological Opinion) ranged from 1.35 to 2.0 for the lower short-tailed albatross population estimate to 1.45 to 2.15 for the higher population estimates, which exceeds the 2 per 2-year period specified in the ITS in the biological opinion. This led to the reinitiation of ESA Section 7 consultation on take of this species in the Pacific Coast Groundfish Fishery in April, 2016. Consultation is ongoing and in the interim NMFS conducted an analysis to determine the impact of the ongoing operation of the fishery from the 2016 specifications and Amendment 24 management measures.

This action affects trawl, longline and fixed gear fisheries. Short-tailed albatross have the greatest potential overlap with fisheries that occur along continental shelf break and slope regions, e.g., longlining for sablefish where albatross occurred most often. Initial tracking data suggest that juvenile birds have greater exposure to fisheries in shelf waters, including off the west coasts of Canada and the United States. In fact, two of only five hatch-year short-tailed albatrosses tagged in Alaska traveled to the west coasts of Canada and the United States coast of North America (Suryan and Balogh 2005, Suryan et al. 2007, unpubl. Data, as cited in USFWS 2008).

Short-tailed albatross may also potentially interact with trawl fisheries. Seabirds, including other albatrosses, fly behind vessels or float in offal plumes that trail beyond vessels, where they can strike the trawl cables (warps) or the sonar cable (third wire) attached to the net (NOAA 2006) or become entangled on the outside of nets towed at or near the surface; those birds striking cables are very unlikely to show up on the vessels deck to be sampled (USFWS 2008). To date, no short-tailed albatross have been observed to be taken in trawl fisheries, but they have been observed near trawl vessels. The implementation of this action is not expected to substantially alter the effects on short-tailed albatross considered in the 2012 biological opinion.

Considering NMFS' intent to continue following the terms and condition in the existing incidental take statement pending completion of the reinitiated consultation, NMFS concludes that this action is not likely to jeopardize the continued existence of listed short-tailed albatross while the consultation is ongoing.

In the event the reinitiated consultations described above identify either: reasonable and prudent alternatives to address jeopardy concerns, or reasonable and prudent measures to minimize incidental take, NMFS would coordinate with the Council to put additional alternatives or measures into place, as required. Therefore, NMFS also determined under section 7(d) of the ESA that the continued operation of the fishery would not represent an irreversible or irretrievable commitment of resources that would have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures in the eventual biological opinion. This section 7(a)(2) analysis is only applicable to the proposed action during the reinitiation period and does not address the agency's obligation to ensure that the action over the longer term is not likely to jeopardize eulachon. A jeopardy determination commensurate with the temporal scope of the action is appropriately made only in a biological opinion.

### 4.5.3 ESA Listed Species and Habitats Not Likely to Be Affected

The following ESA listed species occur in the action area, but NMFS has determined that the fishery is not likely to adversely affect these species 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*); and 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.

### 4.5.4 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's Office of Protected Resources publishes an updated List of Fisheries with these categorizations. NMFS published the final 2016 List of Fisheries on April 8, 2016 (81 FR 20550). The WA/OR/CA sablefish pot is a Category II fishery; all other groundfish fisheries are Category III.

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 reported in stock assessment reports, and the most recent estimates of PBR can be found in Carretta et al. 2016. The current stock definitions and stock status are summarized in Table 3. Observed interactions reported in Jannot et al. 2016 break down by fishery sector/gear type as follows:

- Stellar sea lion: At-sea hake, bottom trawl, hook and line, shoreside hake, California halibut trawl, non-nearshore sablefish,
- California sea lion: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake.
- Harbor seal: California halibut trawl, non-nearshore fixed gear sablefish, nearshore fixed gear, at-sea hake.
- Northern elephant seal: Shoreside groundfish trawl, California halibut trawl, non-nearshore fixed gear sablefish, at-sea hake.
- Harbor porpoise: California halibut trawl, shoreside bottom trawl.
- Dall's porpoise: At-sea hake, shoreside groundfish trawl,
- Pacific white-sided dolphin: Shoreside groundfish trawl, at-sea hake.
- Risso's dolphin: Shoreside groundfish trawl.
- Common bottlenose dolphin: Non-nearshore fixed gear.
- Sperm whale: shoreside hook and line, non-nearshore fixed gear.

Animals may interact with the gear or the vessel in a variety of ways. Interactions are a function of gear type and co-occurrence of fisheries and species. Marine mammals may be hooked externally by hook gear, in the mouth region, or ingest the hook (Anderson et al. 2008). 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 cetaceans documented in the 1997 paper. Cetaceans are more often caught in midwater gear compared to bottom trawl gear, because this gear type more often targets pelagic species of interested to cetaceans, are towed at high speeds, and are large.

The 2017-2018 harvest specifications FEIS analyzed the mortality of non-ESA listed marine mammal stocks occurring in the fishery management area caused by the groundfish fishery and concluded that the operation of the fishery would not prevent these stocks from reaching their optimum sustainable population level.

## 4.6 Human Communities/Social-Economic Environment

This document incorporates by reference the Amendment 20 EIS. Information on the social-economic environment is summarized below; refer to the EIS for more detailed information on the social- economic environment.

### 4.6.1 Description of the Fisheries

This document considers the proposed action and alternatives and evaluates the effect they may have on people's income, employment, way of life, traditions, and community. These economic and social impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While it is possible that such impacts could be solely experienced by individual fishery participants, it is more likely that impacts would be experienced across communities, gear types, and/or vessel size classes.

The remainder of this section reviews the Pacific Coast Groundfish fishery and describes the human communities potentially impacted by the Proposed Action. This includes a brief description of the fishery participants as well as their homeports. The information contained in this section provides background information and highlights some of the current industry trends. For a more detailed information about the groundfish fishery see Section 3.2 in the harvest specifications and management measures for the 2017-2018 Pacific Coast Groundfish Fishery FEIS (Council 2017a), which describes commercial fisheries targeting groundfish. Associated with that description are tables summarizing landings and ex-vessel revenues in the groundfish fisheries, landings, and revenue by port, as well as indicators of fishery participation. The FEIS, associated tables, and data developed by Council staff using Pacific Fisheries Information Network (PacFIN) and North Pacific Database Program (NorPac) data are sources of information for this section. The document also provides information on tribal and recreational groundfish fisheries and fishing communities.

In January 2011, NMFS implemented a trawl rationalization program, which is a catch share

program, for the Pacific coast groundfish limited entry trawl fishery. The program was implemented through Amendments 20 and 21 to the Pacific Coast FMP and the corresponding implementing regulations at 50 CFR part 660. Amendment 20 established the trawl rationalization program that consists of: an IFQ program for the shorebased trawl fleet (including whiting and non-whiting sectors), and cooperative programs for the at-sea mothership and catcher/processor trawl fleets (whiting only). Amendment 21 set long-term allocations for the limited entry trawl sectors of certain groundfish species. In the shorebased fishery, a vessel with a limited entry trawl permit may use any legal groundfish gear to catch groundfish species.
Some vessels use midwater trawl gear to target whiting or rockfish, others use bottom trawl gear to target a mix of species, and some vessels use fixed gear (pots and longlines) to target sablefish. Vessels using bottom trawl and midwater trawl gear to target groundfish species other than whiting in the shorebased sector are the subject of this action. The catch share program also established licenses for processors receiving landings of IFQ species, called "first receivers" as the first point of receipt for IFQ landings.

The Proposed Action potentially affects a number of participants in the bottom trawl and non-whiting midwater trawl fisheries, directly or indirectly. Participants in these fisheries include the following:

- Harvesters – Vessel owners, captains, and crew that harvest and land groundfish.
- Permit Holders – The owner of a vessel and holder of a limited entry permit may not always be the same entity. Permit holders may be affected by this action indirectly through impacts to harvesters who may lease or buy their permits. Permit holders in the groundfish fishery are also called quota shareholders.
- First Receivers (Processors) – First receivers/processors are the businesses that purchase and process groundfish landed by harvesters and may be indirectly affected by the proposed action through impacts to the harvesters that deliver fish to them.
- Communities – Fishing communities include the home ports of harvesters and ports in which the harvesters deliver. Fishing communities may be impacted indirectly by this action through the economic and social well-being of harvesters. Fishing communities also include secondary and tertiary businesses that may be involved in the supply chain, such as ice, transport, distribution, and other facilities and services.
- Monitoring Providers – Monitoring service providers include companies that provide monitoring services to the fishery at-sea or shoreside, which may include individual observers and catch monitors and the companies that employ them, as well as the companies deploying EM systems.

Tables 5-8 provide summaries of recent groundfish vessel participation, landings and revenue, and proportion of groundfish dependence by port. Table 8 shows measures of port engagement and dependence on groundfish fisheries based on inflation adjusted ex-vessel revenue from 2010 to 2014. Engagement measures the proportion of coastwide revenue flowing to a port while dependence measures how much of total ex-vessel revenue in each port comes from the groundfish fishery. As reflected in the landings data reported above, the most engaged port groups are South and Central Washington Coast, Astoria, and Newport. The ports most dependent on groundfish are Morro Bay, the North Washington Coast, and Astoria.

Table 5. Summary of bottom trawl and non-whiting midwater trawl groundfish participation and hauls sampled by observers, 2015. (Number of trawl permits is175; Number of licensed first receivers is 40)

| | | | Depth (fm) | **No. of vessels** | **No. of trips** | **No. of sampled hauls** |
|---|---|---|---|---|---|---|
| **Trawl - Bottom** | North of 40°10' N | Winter | 0-125 | 11 | 44 | 311 |
| | | | 126-250 | 43 | 344 | 1287 |
| | | | > 250 | 42 | 337 | 1654 |
| | | Summer | 0-125 | 14 | 207 | 1978 |
| | | | 126-250 | 23 | 109 | 404 |
| | | | > 250 | 25 | 113 | 475 |
| | South of 40°10' N | Winter | 0-125 | 4 | 21 | 108 |
| | | | 126-250 | 9 | 40 | 114 |
| | | | > 250 | 10 | 58 | 225 |
| | | Summer | 0-125 | 7 | 68 | 369 |
| | | | 126-250 | 6 | 53 | 183 |
| | | | > 250 | 7 | 71 | 316 |
| **Trawl - Midwater Rockfish** | North of 40°10' N | Winter | All depths | 5 | 35 | 115 |
| | | Summer | All depths | 4 | 8 | 25 |

Table 6. Shoreside IFQ trawl landings by grounfish species or species group (mt).

| Fishery | P. Whiting | Sablefish | Lingcod | P. Cod | Other Roundfish | Rockfish | Thornyheads | Arrowtooth Flounder | Dover Sole | English Sole | Petrale Sole | Other Flatfish | Other Groundfish |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nonwhiting Total** | **237** | **20,525** | **1,824** | **1,913** | **0** | **10,943** | **18,134** | **22,338** | **82,745** | **3,091** | **18,139** | **7,511** | **12,242** |
| 2010 | 9 | 2,511 | 73 | 100 | | 826 | 2,428 | 3,211 | 10,326 | 158 | 770 | 685 | 1,307 |
| 2011 | 26 | 1,666 | 240 | 252 | | 930 | 1,588 | 2,177 | 7,615 | 108 | 797 | 585 | 1,180 |
| 2012 | 19 | 1,443 | 342 | 396 | | 1,410 | 1,553 | 2,252 | 7,170 | 115 | 1,037 | 591 | 1,222 |
| 2013 | 60 | 1,397 | 317 | 152 | 0.03 | 1,163 | 1,857 | 1,961 | 7,827 | 195 | 2,100 | 697 | 1,053 |
| 2014 | 41 | 1,278 | 225 | 165 | | 1,825 | 1,522 | 1,225 | 6,305 | 192 | 2,295 | 687 | 1,231 |
| 2015 | 80 | 1,455 | 179 | 377 | | 2,338 | 1,424 | 1,315 | 6,228 | 242 | 2,481 | 651 | 1,091 |
| **Grand Total** | **732,940** | **20,705** | **1,869** | **1,921** | **3** | **14,691** | **18,185** | **22,415** | **82,748** | **3,092** | **18,140** | **7,533** | **13,259** |

Confidential data (less than 3 vessels or dealers) are suppressed and highlighted yellow.
Revenue and weight rounded to nearest whole unit. If revenue or weight was 1 it was rounded to nearest 0.01 of a unit.
Blank cells indicate a null value (no data exist for that stratum).

Table 7. Shoreside IFQ trawl ex-vessel revenue by groundfish species or species group in current dollars, $1,000s.

| Fishery | P. Whiting | Sablefish | Lingcod | P. Cod | Other Roundfish | Rockfish | Thornyheads | Arrowtooth Flounder | Dover Sole | English Sole | Petrale Sole | Other Flatfish | Other Groundfish |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nonwhiting Total** | **64** | **94,206** | **3,547** | **2,673** | **0** | **14,887** | **26,622** | **5,861** | **80,982** | **2,501** | **51,713** | **7,705** | **9,033** |
| 2010 | 3 | 11,628 | 144 | 106 | | 1,071 | 2,751 | 743 | 7,489 | 115 | 2,086 | 633 | 719 |
| 2011 | 9 | 9,763 | 420 | 336 | | 1,204 | 2,016 | 499 | 7,273 | 79 | 2,665 | 630 | 865 |
| 2012 | 8 | 5,882 | 588 | 543 | | 1,777 | 2,179 | 644 | 6,869 | 89 | 3,505 | 634 | 1,081 |
| 2013 | 17 | 5,021 | 529 | 191 | $0.00 | 1,468 | 2,578 | 493 | 7,832 | 141 | 5,904 | 658 | 870 |
| 2014 | 7 | 5,647 | 381 | 192 | | 2,185 | 2,180 | 263 | 6,304 | 135 | 5,753 | 668 | 1,078 |
| 2015 | 12 | 6,487 | 374 | 480 | | 2,500 | 2,015 | 279 | 6,134 | 161 | 6,621 | 581 | 977 |
| **Grand Total** | **176,111** | **94,824** | **3,595** | **2,675** | **1** | **18,591** | **26,656** | **5,873** | **80,982** | **2,501** | **51,714** | **7,712** | **9,250** |

Confidential data (less than 3 vessels or dealers) are suppressed and highlighted yellow.
Revenue and weight rounded to nearest whole unit. If revenue or weight was 1 it was rounded to nearest 0.01 of a unit.
Blank cells indicate a null value (no data exist for that stratum).

Table 8. Engagement (groundfish ex-vessel revenue in port as percent of coastwide ex-vessel groundfish revenue) and dependence (groundfish ex-vessel revenue in port as percent of total ex-vessel revenue in port), using current (2015) dollars.

| | Engagement | Dependence |
|---|---|---|
| Puget Sound | 2% | 23% |
| North Wa Coast | 5% | 36% |
| South And Central Wa Coast | 12% | 9% |
| **Washington** | **20%** | **13%** |
| Astoria | 24% | 41% |
| Tillamook | 0% | 6% |
| Newport | 19% | 30% |
| Coos Bay | 5% | 10% |
| Brookings | 5% | 24% |
| **Oregon** | **54%** | **27%** |
| Crescent City | 1% | 3% |
| Eureka | 6% | 22% |
| Fort Bragg | 5% | 27% |
| Bodega Bay | 1% | 5% |
| San Francisco | 2% | 4% |
| Monterey | 2% | 6% |
| Morro | 6% | 41% |
| Santa Barbara | 3% | 5% |
| Los Angeles | 1% | 3% |
| San Diego | 1% | 9% |
| **California** | **26%** | **9%** |
| **Coastwide** | | **16%** |

# 5. IMPACTS OF THE ALTERNATIVES

## 5.1 Impact Assessment

Section 5.1 reviews the alternatives that are the subject of this evaluation, establishes criteria for evaluating the impact of each alternative on the VECs identified in Section 4.1, and discusses impacts. This section identifies impacts associated with the EM program requirements for the Pacific whiting fishery and fixed gear vessels, as well as the No Action Alternative. The conclusions of those previous analyses may be viewed in the Amendment 20 and 21 FEISs, available on the Council's website, and are not re-analyzed in this document. This document focuses on determining whether the proposed action and alternatives would be expected to change the impacts of the current fishery on the biological and human environments.

Participation in the EFP program from 2015-2016 was low; Table 9 shows the number of vessels and trips that were conducted each year. In the first year maximized retention was required for both gear types. In 2016, some species were allowed to be discarded in the bottom trawl fishery (optimized retention). Since maximized retention was required in both years of the non-whiting midwater fishery there is limited data to compare agreement between EM and logbooks or EM with observers. This limited our ability to evaluate an allowable discard species list for optimized retention requirements in the non-whiting midwater fishery.

Table 9. EFP participation, 2015-2016.

| Delivery Year | Fishery | Vessels | Trips |
|---|---|---|---|
| 2015 | BottomTrawl | 5 | 23 |
| 2015 | NonWhitingMidwater | 8 | 26 |
| 2016 | BottomTrawl | 9 | 109 |
| 2016 | NonWhitingMidwater | 6 | 33 |

### 5.1.2 Impacts to the Physical and Biological Environments

#### *5.1.2.1 Impacts of Alternative 1: No Action Alternative*

Under this alternative, groundfish monitoring requirements would remain as defined in Amendment 20 and subsequent rulemakings. Catcher vessels in the non-whiting midwater trawl and bottom trawl fisheries in the Shorebased IFQ fishery would be required to obtain 100 percent observer coverage for all trips. Vessels would continue to use observers to satisfy the 100 percent observer coverage requirement and would not be able to use electronic monitoring as an alternative to observers. Vessels sorting at sea would be able to discard IFQ and non-IFQ species provided it has been documented by an observer. Catch share observers would continue to collect a suite of information on target and non-target species and protected resources on 100 percent of trips, including weight by species, length frequencies, tissue samples, gear and effort information, fishing location, and protected species interaction information. This information would continue to be used to estimate mortality and bycatch estimates and to manage target and non-target species and protected resources.

Impacts to the physical environment/EFH/habitat from fishery management actions generally result from a change to the location of fishing (i.e., to more or less sensitive habitats) or the amount of effort (i.e., amount of time gear is in contact with the seafloor). The no action alternative would not be expected to result in any increased effort, or change to the time or location of fishing, or gear types used, as a result of vessels continuing to use observers. Fishing by vessels would be expected to continue along trends being observed and would continue to be capped by IFQs, cooperative allocations, and ACLs. Non-target species catch would continue to be limited by management measures for those species, specifically cumulative limits and ACLs. Take of protected resources would be limited by ITSs for those species. Vessels would continue to be required to comply with gear modifications and other requirements of ITSs and the groundfish FMP. Therefore, the No Action Alternative would be expected to have negligible insignificant impacts to the biological environment, including the physical environment, target and non-target species, and protected resources, relative to the baseline conditions.

*5.1.2.2 Impacts of Alternative 2: Electronic Monitoring (Council Preferred)*

Under this alternative, catcher vessels in the non-whiting midwater trawl and bottom trawl fisheries in the Shorebased IFQ fishery would have the option to use electronic monitoring in place of observers to meet the requirements of Amendment 20 for 100 percent at-sea observer coverage. Vessel owners authorized to use EM would be required to obtain, install, and maintain an EM system from an approved service provider, as well as services to review the video data to generate discard estimates and to submit reports to NMFS. Vessel operators would also be required to fill out a logbook to document and report discards to NMFS. NMFS would maintain some level of observer coverage through the WCGOP on EM trips for biological sampling and other purposes.

*Impacts from Changes to Fishing Location, Time, or Gear*

This action would not change gear or area restrictions or catch limits and, therefore, would not be expected to change the location or amount of fishing effort. Existing gear and area restrictions would remain in place and overall effort would be limited by IFQs, cooperative allocations, and ACLs. Theoretically, some bottom trawl vessels could be incentivized to switch to midwater trawl or fixed gear to use EM, which would have less impacts to habitat. However, this is highly unlikely as bottom trawl vessels target different species from midwater trawl and fixed gear vessels and switching gear types would require a different IFQ portfolio, business model, and costly changes to the vessel and gear. Therefore, impacts from Alternative 2 to the physical environment/EFH/habitat would be expected to be negligible and insignificant relative to the No Action Alternative and the baseline conditions.

Changes to the time and area of fishing and the gear types used can also impact target and non-target species and protected resources. For example, if vessels began fishing in areas or at times where overfished species or protected resources are more prevalent, it could increase bycatch of these species. However, because this action would not change gear or area restrictions or area-specific catch limits, vessels would be expected to continue to fish under Alternative 2 as they would under the status quo and not be significant, relative to the No Action Alternative and baseline conditions. Sub-Options A-H would not be expected to change the way vessels fish under Alternative 2, relative to the No Action Alternative.

*Impacts from Changes to Retention Requirements*

Target and non-target species, and protected resources could see impacts from increased mortality as a result of maximized retention requirements. Sub-Option D1 would require all vessels to retain most catch until landing, with a few exceptions, which could increase mortality of fish that would otherwise have been discarded as is the common practice under the No Action Alternative. The Council's preferred alternative for both the bottom trawl and the non-whiting midwater trawl is Sub-Option D2, which would allow vessels to discard species that can be differentiated on camera.

Because this list may be modified over time, it would be appropriate to consider the range of retention possibilities and potential impacts to target and non-target species caught. The worst-case scenario in terms of mortality would be if vessels were required to retain most catch until landing, Sub-Option D1. Those fish that are bycaught would continue to be accounted for under IFQs and ACLs, which would limit fishing mortality overall. And in most cases, discard mortality is already assumed to be 100 percent, unless the best available scientific information indicates that discard mortality is less than 100 percent and a lower discard mortality rate may be used (i.e., for Pacific halibut). Thus, neither Sub-Option D1 nor D2 would be expected to increase mortality of target or non-target species above mortality limits.

*Impacts from Changes to Data Collection Methods*

This action could also have indirect impacts to target and non-target species and protected resources through changes to the quantity and quality of information collected by the monitoring program, which could impact management of those species. Currently, observers collect a suite of information on 100 percent of whiting and fixed gear trips, including estimates of weight of all species, length frequencies, tissue samples, otoliths, catch disposition, and gear and effort information (see the Catch Share Observer Manual for a full description of data collection duties and protocols: https://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_collection/manuals/2016%20CS%20Training%20Manual.pdf). Under Alternative 2, EM would collect some of this information on all EM trips and WCGOP observers would continue to collect the full suite of information on some trips, but it would not be the near-census collected under the No Action Alternative. In addition, methods to estimate the weight of discards are different under an EM program from an observer program, which could affect data quality. The potential impacts of these changes from Alternative 2 on target species, non-target species, and protected resources are discussed below.

Under the status quo, observers generally subsample catch to be discarded in order to extrapolate a species composition for discards from each haul. This method provides observed species composition and catch rates at the haul level, which is useful for understanding the location of bycatch hotspots and developing fine-scale management measures. This method also provides biological samples, length frequencies, and other information about target, non-target, and protected species at the haul level. In the EM EFP Program, video reviewers estimate the total weight of discards visually using frames of reference, such as deck dimensions or codend capacity. A species composition is then extrapolated from the fish ticket or observer data and applied to the

weight estimate to determine discarded weight by species to be debited from IFQ accounts. The EM EFP Program generally does not estimate discards of non-IFQ species, because that is not the objective of the program, but video reviewers do collect counts of protected species discards where possible, which would typically consist of large items like sturgeon and marine mammals that would be sorted and discarded by the crew. These species are identifiable on camera and rarely caught in the bottom trawl and non-whiting midwater trawl fishery. For larger discard events, such as spillage from venting of catch from an overfull codend, or loss of an entire codend, observers and video reviewers use similar methods to account for the discards in the water by making a visual estimate of the amount of discards.

Trips with EM would result in trip-level species compositions and catch rates and would represent a loss of haul-specific information. EM also does not collect biological samples and other such information from discards. Discards of IFQ species would continue to be counted against IFQs and cooperative allocations, and the WCGOP would continue to develop estimates of mortality of non-IFQ species for use in management and stock assessments. For larger discard events observers and video reviewers use similar methods to account for the discards in the water, so Alternative 2 and the No Action Alternative would likely result in similar quality information about such events. A 2013 PSMFC study compared discard estimates by observers and EM on the same trips and found that observers captured some discard events that EM did and others that EM did not, and vice versa. Results also showed that EM tended to report higher amounts of discards from in-the-water events (twice as much in 2012, and three times as much in 2013), likely because the cameras installed on gantries high above the deck have a better view of the codend than the observer (PSMFC, 2013). These results suggest that discard estimates based on EM would not be likely to result in underestimates of fishing mortality. In addition, NMFS would maintain the ability to deploy WCGOP observers on catcher vessels should it be determined that additional data collection is needed.

On trips that would sort discard, video reviewers use more precise methods for estimating the weight of discards of IFQ species. Methods used include taking length measurements and using a length-weight relationship to estimate weight (mainly halibut), making volumetric estimates from containers of a known volume, and extrapolating an average weight using a piece count. If most IFQ species are retained, Alternative 2 would likely have little impact on data quality for catch accounting because most catch would be weighed at the dock. However, because the list of allowable discards can change, for the purpose of this analysis it is assumed that vessels would be able to discard all species (Sub-Option D2) and that NMFS would have to rely on EM to account for discards of all IFQ species.

A discard species list would be required for both Sub-options D1 and D2. Consideration was given to what those lists would include for each fishery because each fishery discards different species. The current set of allowable discards under the EFP for bottom trawl and non-whiting midwater trawl are shown below.

Current set of species required to be retained and discarded, and those allowed for discard by bottom trawl fishery participant are:

**Must Retain**
All other IFQ species
Salmon
Greenland turbot
Slender sole
Hybrid sole
C-O (C-O Turbot) sole
Bigmouth sole
Fantail sole
Hornyhead turbot
Spotted turbot
California turbot
California halibut
Northern rockfish
Black rockfish
Blue rockfish
Shortbelly rockfish
Olive rockfish
Puget Sound rockfish
Semaphore rockfish
Walleye Pollock
Slender codling
Pacific tom cod

**Must Discard**
Pacific halibut
Marine mammals
Seabirds
Sea turtles
Eulachon
Dungeness crab (seaward of WA/OR)
Green sturgeon

**May Discard**
Arrowtooth flounder
English sole
Dover sole
Deep sea sole (will be counted as dover sole)
Pacific whiting
Lingcod
Sanddabs (will be counted as Pacific sanddab)
Debris
Mutilated fish

Current set of species required to be retained and discarded, and those allowed for discard by non-whiting midwater trawl fishery participants:

**Must Retain**

All other IFQ species
All other non-IFQ species
Salmon

**Must Discard**
Green sturgeon Pacific halibut
Marine mammals
Seabirds
Sea turtles
Eulachon
Dungeness crab (seaward of WA/OR)

The results of the 2015/2016 EFPs can provide some indication of the quality of data that would be produced by an EM program under Alternative 2. Table 10 shows the estimated pounds discarded by species reported by the observer and EM for trips. The results show overall close

alignment between observer and EM estimates for bottom trawl, suggesting that data quality of IFQ discard estimates would not be reduced under Alternative 2 relative to the No Action Alternative or baseline conditions.

Table 10. Comparison of 2016 EM and observer estimates for bottom trawl vessels.

| **Species** | **EM Discard Estimate (lbs)** | **Observer Discard Estimate (lbs)** | **Percent Difference** |
|---|---|---|---|
| Flatfish Unid | 26 | - | 100 |
| Pacific Halibut | 1,962 | 1,283 | 35 |
| Rock Sole | - | 1 | 100 |
| Rex Sole | 3 | 6 | 40 |
| Dover Sole | 172 | 214 | 19 |
| English Sole | 3,756 | 3,945 | 5 |
| Petrale Sole | 26 | 41 | 37 |
| Curlfin Turbot | 2 | 4 | 49 |
| Pacific Sanddab | 2,460 | 3,002 | 18 |
| Arrowtooth Flounder | 2,458 | 1,863 | 24 |
| Sablefish | 105 | 364 | 71 |
| Pacific Hake | 3,972 | 4,273 | 7 |
| Widow Rockfish | - | 2 | 100 |
| Widow Rockfish | - | 3 | 100 |
| Redbanded Rockfish | - | 0 | 100 |
| Rosethorn Rockfish | - | 2 | 100 |
| Darkblotched Rockfish | - | 16 | 100 |
| Splitnose Rockfish | - | 336 | 100 |
| Aurora Rockfish | - | 7 | 100 |
| Shortspine/ Longspine Thornyhead | 108 | - | 100 |
| Shortspine Thornyhead | - | 100 | 100 |
| Longspine Thornyhead | - | 62 | 100 |
| Lingcod | 904 | 1,416 | 36 |
| Fish Unidentified | 81 | - | 100 |
| Decomposed Fish | 3 | - | 100 |
| Minor Slope Rockfish | 326 | - | 100 |
| Dark Rockfish | 1 | - | 100 |
| Dark Rockfish | 4 | - | 100 |
| Red Rockfish | 116 | - | 100 |
| Fish Unidentified(IFQ) | 107 | - | 100 |
| Flatfish Unid(IFQ) | 2 | - | 100 |

Table 11 provides the raw data collected in both years. Non-whiting midwater trawl vessels in the 2015/2016 EFP were fishing under maximized retention rules, meaning all catch was required to be retained with a few exceptions for mutilated and depredated fish, prohibited and protected species, large fish, and invertebrates. As a result, there was only a small amount of discard data available for comparison between logbook and EM estimates. Some operational discard events were observed and much of the observed discard that occurred was whiting.

Table 11. Comparison of EM and logbook data collected under the EFP program for bottom trawl and non-whiting midwater trawl vessels, 2015-2016.

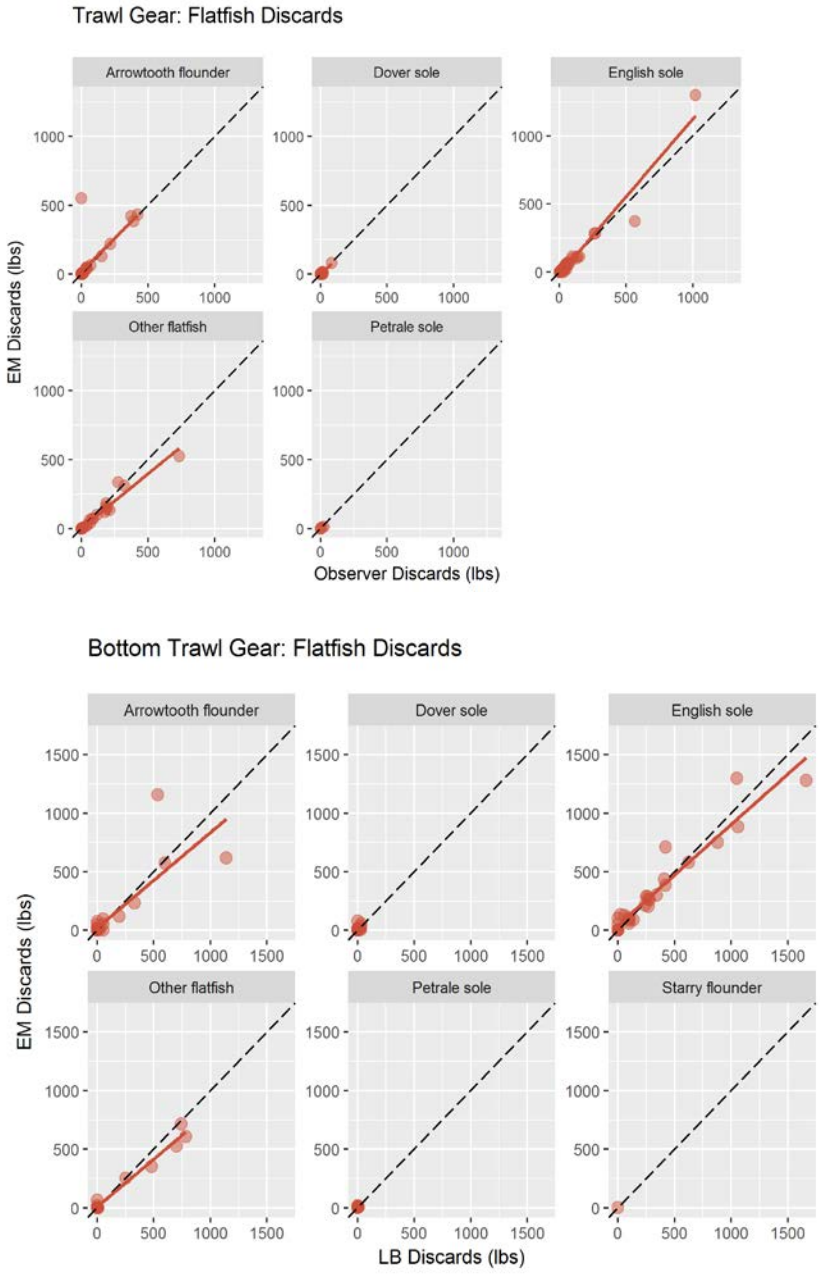
| | | 2015 | | | | 2016 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Fishery** | **Common Name** | **EM** | **Log book** | **% Difference** | **Retained Catch** | **EM** | **Logbook** | **% Difference** | **Retained Catch** |
| BottomTrawl | Arrowtooth Flounder | 269 | 265 | 1.49 | 13,148 | 2,834 | 2,748 | 3.03 | 71,655 |
| | Bocaccio Rockfish | 8 | - | 100.00 | 6,349 | - | - | | 17,095 |
| | Chilipepper Rockfish | 26 | - | 100.00 | 11,332 | - | - | | 9,181 |
| | Dover Sole | 34 | 25 | 26.47 | 349,165 | 416 | 150 | 63.94 | 2,012,401 |
| | English Sole | 2,533 | 2,317 | 8.53 | 3,491 | 6,480 | 6,749 | 3.99 | 19,176 |
| | Minor Slope Rockfish | - | - | - | 190 | 329 | - | 100.00 | 3,675 |
| | Splitnose Rockfish | - | - | - | - | 2 | 240 | 99.17 | 522 |
| | Aurora Rockfish | - | - | - | 18 | - | 8 | - | - |
| | Minor Slope Rockfish | - | - | - | 62 | - | - | - | 604 |
| | Aurora Rockfish | 45 | 40 | 11.11 | 10 | - | - | - | 780 |
| | Rex Sole | 23 | - | 100.00 | 4,566 | 23 | 6 | 73.91 | 32,530 |
| | Curlfin Turbot | 20 | - | 100.00 | 165 | 5 | - | 100.00 | 140 |
| | Pacific Sanddab | 28 | - | 100.00 | 7,674 | 2,460 | 2,008 | 18.37 | 14,284 |
| | Pacific Halibut | | | | | | 4,465 | | |

| | | 2015 | | | | 2016 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Fishery** | **Common Name** | **EM** | **Log book** | **% Difference** | **Retained Catch** | **EM** | **Logbook** | **% Difference** | **Retained Catch** |
| | | 395 | 375 | 5.06 | - | 5,087 | | 12.23 | 10 |
| | Pacific Hake | 1,865 | 1,935 | 3.62 | 1,831 | 8,442 | 10,296 | 18.01 | 7,174 |
| | Petrale Sole | 24 | - | 100.00 | 124,735 | 53 | 10 | 81.13 | 309,692 |
| | Sablefish | 218 | 12 | 94.50 | 121,619 | 249 | 77 | 69.08 | 558,046 |
| | Shortspine Thornyhead | 3 | - | 100.00 | 53,833 | 8 | 99 | 91.92 | 201,154 |
| | Starry Flounder | - | - | - | - | 4 | - | 100.00 | 76 |
| | Lingcod | 11 | 4 | 63.64 | 4,821 | 1,580 | 1,846 | 14.41 | 14,448 |
| | Flatfish Unid | 65 | - | 100.00 | - | 94 | - | 100.00 | 8 |
| | Pacific Halibut | 12 | - | 100.00 | - | 1,841 | 2,020 | 8.86 | - |
| | Sanddab Unid | - | - | - | - | - | - | - | - |
| | Roundfish Unid | 37 | - | 100.00 | - | 12 | - | 100.00 | - |
| | Rockfish Unid | 1 | - | 100.00 | - | - | - | - | - |
| | Shortspine/ Longspine Thornyhead | 41 | - | 100.00 | - | 193 | - | 100.00 | - |
| | Fish Unidentified | 49 | - | 100.00 | - | 389 | - | 100.00 | - |
| | Decomposed Fish | 15 | 16 | 6.25 | - | 6 | - | 100.00 | - |
| | Nonselective | | | | | | 150 | | |

| | | 2015 | | | | 2016 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Fishery** | **Common Name** | **EM** | **Log book** | **% Difference** | **Retained Catch** | **EM** | **Logbook** | **% Difference** | **Retained Catch** |
| | Discards (Unknown) | - | - | - | - | - | | 100.00 | - |
| | Dark Rockfish | - | - | - | - | 1 | - | 100.00 | - |
| | Red Rockfish | 38 | - | 100.00 | - | 277 | - | 100.00 | - |
| | Mixed Fish | 9 | - | 100.00 | - | - | - | - | - |
| | Fish Unidentified(IFQ) | - | - | - | - | 107 | - | 100.00 | - |
| | Flatfish Unid(IFQ) | - | - | - | - | 22 | - | 100.00 | - |
| NonWhiting Midwater | Pacific Hake | - | - | - | 85,184 | 120 | - | 100.00 | 107,906 |
| | Nonselective Discards (Unknown) | 2,968 | 100 | 2,868 | - | 877 | 4,035 | 78.27 | - |
| | Dark Rockfish | - | - | - | - | 4 | - | 100.00 | - |

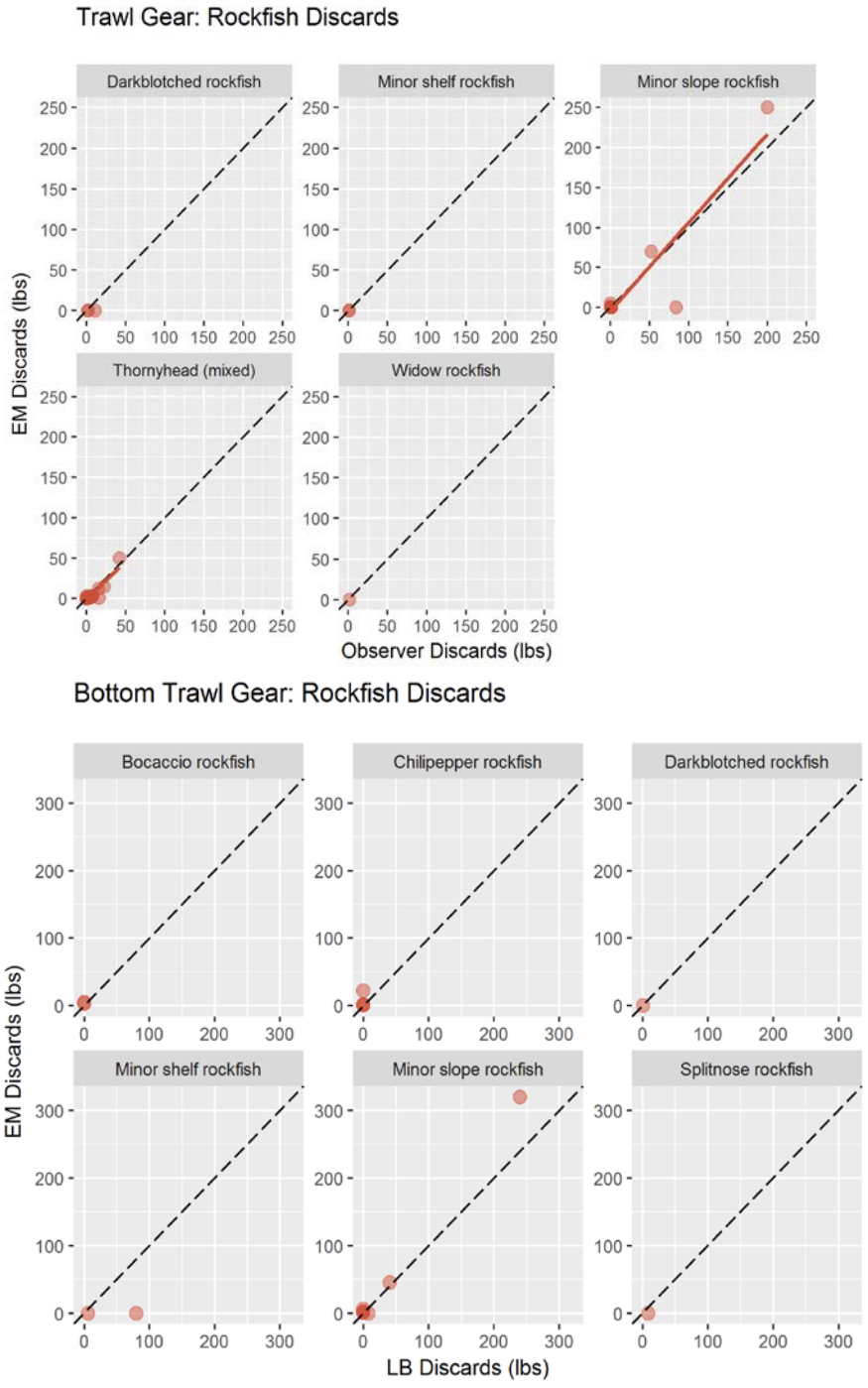
As shown in Figures 5 and 6, there is close agreement between EM and observer discard estimates, and EM vs. logbook discard estimates on the majority of bottom trawl trips.

Figure 5. Bottom trawl flatfish EM discard vs. observer discard estimates (upper panel); EM vs. logbook discard estimates (lower panel), 2015-2016[1].



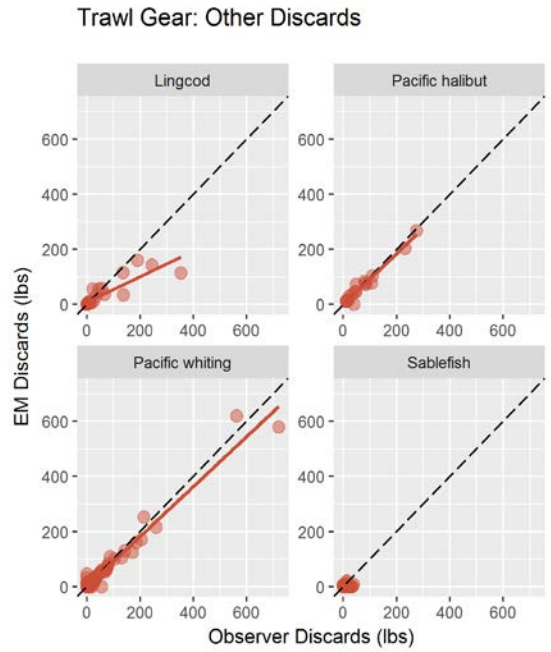

[1] The dashed line shows a 1:1 ratio for reference; only IFQ species are shown; Thornyheads were groups since they cannot generally be identified to species by EM reviewers; these graphs are based on raw data from EM; fish identified only to a group level by an EM reviewer (e.g. red rockfish) are not included. Upper panel note: Each point on the graph represents one trip; A line of best fit (red line) is included if the species was caught on at least 10 trips. Lower panel note: Based on 36 trips on 9 vessels; each point on the graph represents one haul; a line of best fit (red line) is included if the species was caught on at least 10 hauls.

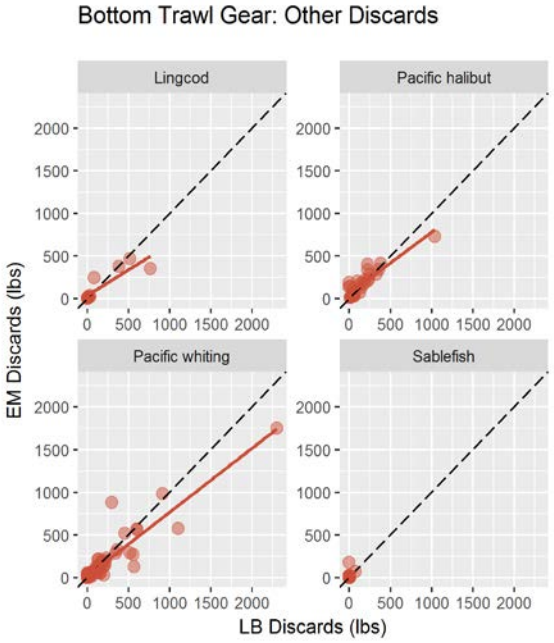
Figure 6. Bottom trawl rockfish EM discard vs. observer discard estimates (upper panel); EM vs. logbook discard estimates (lower panel), 2015-2016[2].




[2] The dashed line shows a 1:1 ratio for reference; only IFQ species are shown; Thornyheads were groups since they cannot generally be identified to species by EM reviewers; these graphs are based on raw data from EM; fish identified only to a group level by an EM reviewer (e.g. red rockfish) are not included. Upper panel note: Each point on the graph represents one trip; A line of best fit (red line) is included if the species was caught on at least 10 trips. Lower panel note: Based on 36 trips on 9 vessels; each point on the graph represents one haul; a line of best fit (red line) is included if the species was caught on at least 10 hauls.

Figure 7. Bottom trawl other EM discard vs. observer discard estimates (upper panel); EM vs. logbook discard estimates (lower panel), 2015-2016[3].




[3] The dashed line shows a 1:1 ratio for reference; only IFQ species are shown; Thornyheads were groups since they cannot generally be identified to species by EM reviewers; these graphs are based on raw data from EM; fish identified only to a group level by an EM reviewer (e.g. red rockfish) are not included. Upper panel note: Each point on the graph represents one trip; A line of best fit (red line) is included if the species was caught on at least 10 trips. Lower panel note: Based on 36 trips on 9 vessels; each point on the graph represents one haul; a line of best fit (red line) is included if the species was caught on at least 10 hauls.

The close alignment between logbook and EM data bottom trawl gear trips suggests that data quality under Sub-Option A2 would not be substantially different from Sub-Option A1 and neither would result in significant adverse impacts.

Sub-Option B1 would require 100 percent of video to be reviewed and Sub-Option B2 would allow a sub-sample of the video to be reviewed. The level of review would be established by NMFS and must be sufficient for NMFS determine that the EM program is providing the best available scientific information for catch accounting. Reviewing less than 100 percent of video could increase uncertainty in catch information if rare events or non-compliance are missed in the portion of the video that was not reviewed. However, NMFS would have to assess these trade-offs when determining a sub-sampling method and ensure that the method selected provides sufficient information to meet the program's objectives of individual accountability. Therefore, impacts from Sub-Option B2 would be expected to be negligible relative to Sub-Option B1 and considered insignificant.

The EM program relies on proper catch handling to enable video reviewers to see the fate of each fish and estimate a weight for discards. Updated information for 2016 activity is not included but the information presented for all shorebased IFQ fisheries that used EM under the EFPs provides the context for the magnitude of missing fish out of view of the camera and missing data form trips and hauls. There were also some instances where fish were removed from camera view and the video reviewer could not determine whether they were retained or discarded (Table 12). NMFS provides feedback to vessel captains after each hard drive review to adjust their catch handling, so the number of such incidents would likely decline over time.

Table 12. Summary of instances of fish removed from camera view from all trips in 2015.

| | **# Trips with at least 1 Instance** | **Total # Instances on All Trips** |
|---|---|---|
| Bottom trawl | 0 | 0 |
| Fixed gear | 9 | 23 |
| Shoreside whiting | 0 | 0 |
| MS/CV | 1 | 1 |

Uncertainty in discard estimates can also arise from data gaps resulting from system malfunctions, non-compliance, or other issues. In 2015, there were 37 out of 584 total EFP trips (approximately 6 percent) that had gaps in video imagery (Table 13). The majority of these were small interruptions of a few minutes caused by short power interruptions and generally did not disrupt monitoring of catch sorting. A total of 5 trips (less than 1 percent of all trips) were missing video imagery from a complete haul and 1 shorebased whiting trip had no imagery at all.

Table 13. Summary of gaps in video footage in 2015.

| | **Total # Vessels** | **Total # Trips** | **# Trips with Video Gaps** | **# Trips with Missing Haul** | **# Trips with No Video** |
|---|---|---|---|---|---|
| Bottom trawl | 4 | 19 | 6 | 0 | 0 |
| Fixed gear | 7 | 57 | 8 | 0 | 0 |
| Shoreside whiting | 17 | 483 | 14 | 3 | 1 |
| MS/CV | 9 | 25 | 3 | 2 | 1 |

Video gaps could affect NMFS's ability to account for discards, particularly if it occurred during a "lightning-strike", a rare bycatch event of a large volume of an overfished species. Although data gaps are rare, lightning strikes are also rare, so if they coincided as a result of a system malfunction or an attempt to hide the bycatch event, NMFS may not be able to detect and account for the lightning strike if it was not otherwise reported. In the 2015-2016 EFPs two lightning strike events occurred, the first since implementation of the IFQ program, and both vessels were using EM without an observer onboard. Both events were reported by the captains in their logbooks, recorded by the cameras, and delivered to a plant/mothership for accounting. In the first instance, the catch event exceeded the vessel's IFQ for the species and required the vessel to forfeit the catch, face a potential violation for the overage, and exit the fishery for the remainder of 2015 and all of 2016. These two incidents occurred in the whiting fishery and presented a strong economic incentive to attempt to hide the bycatch event in order to avoid the high costs of reporting it. However, the captains did not attempt to hide the bycatch events. This suggests that the regulations and monitoring and enforcement programs in the fishery provide sufficient protections and counter- incentives to discourage misreporting of catch. As such bycatch events are rare, and misreporting of them even rarer, it appears that data gaps would not be likely to substantially affect NMFS's ability to hold vessels accountable for discards of IFQ species in the EM program.

EM would not collect much information on catch and bycatch of non-target species and protected resources. Video reviewers would not collect counts or weight estimates of non-target species, but would collect counts of discards of protected species where possible. This would likely be of large animals that can be identified on camera, such as marine mammals, turtles, seabirds, and sturgeon. Fixed gear has been known to interact with large whales and short-tailed albatross. Large whale interactions typically occur when the whale becomes entangled in the buoy or lead line. EM may be able to capture some of these events, depending on the configuration of the cameras, but would likely miss most events because the animals are not brought on the vessel and into camera view. In addition, EM would likely miss opportunistic data collection of protected species encounters where an observer would record seeing an animal around the vessel or in the general area.

EM also would not be able to collect disposition information (e.g., injured, dead, alive), otoliths, tissue samples, and other biological information for discarded target, non-target, and protected species. Therefore, the amount of biological information available from discards would be reduced relative to the No Action Alternative and baseline conditions. To address the loss of this type of information from EM trips, NMFS would maintain some level of WCGOP observer coverage on EM trips to continue collection of the full suite of observer information.

The WCGOP is one of several components of the groundfish fishery's standardized bycatch reporting methodology program. Amendment 18 established a standardized total reporting methodology for the Pacific Coast Groundfish FMP, which encompasses reporting of the amount and type of bycatch occurring in the fishery, as required by the MSA, as well as total catch (landed catch plus bycatch mortality) in the fishery. This total catch reporting methodology uses various state, Federal, and tribal catch monitoring systems, which are coordinated through PSMFC, to estimate sector- and specific-specific total catch for use in management. The program components for commercial fisheries include:

- Observer and EM programs – At-sea observer programs are used to estimate bycatch. Observer coverage rates vary by fishery, with whiting catcher-processors and motherships being required to carry one or two observers depending on the size of the vessel. Other vessels are required to carry observers in accordance with the NMFS observer coverage plan, typically on a subsample of trips. Statistical methods are used to expand observer observations to estimate total catch across a sector. For some fishery sectors, there may not be any direct observation or reporting of bycatch, so standard bycatch rates are developed from the best available scientific information to estimate bycatch.
- Catch reports – Vessel owners and operators are required to submit logbooks to report fishing locations and effort information, and catch of species subject to trip limits and ACLs/OY. Processors are required to complete fish landing tickets from Washington, Oregon, or California, to report landed catch, gear type, fishing area, and other trip information.
- Port sampling – Landings are sampled by state personnel to collect species composition data, otoliths, lengths, and other biological data. Much of the biological data collection for the shorebased whiting fishery comes from port sampling, because this fishery practices maximized retention.
- Quota Species Monitoring (QSM) Database – The Council's Groundfish Management Team (GMT) and PSMFC manage a QSM database that is used to track all landings of target, overfished, and rebuilding species. The GMT uses the QSM to make catch forecasts and adjust landing limits inseason to control fishing mortality.
- Vessel compliance monitoring and reporting – Vessels may be required to comply with a range of reporting requirements to assist managers in monitoring total catch, including declarations, VMS, logbooks, pre-landing notifications, and other information deemed necessary for management.

A complete description of the groundfish total catch reporting methodology is contained in the Pacific Coast Groundfish FMP available on the Council's website: http://www.pcouncil.org/wp-content/uploads/2016/03/GF_FMP_FINAL_Mar2016_Mar282016.pdf.

The NWFSC WCGOP program was established in 2001 by NMFS (66 FR 20609). WCGOP's goal is to improve total catch estimates by collecting information on west coast groundfish species discarded at-sea. Detailed information on data collection methods employed in each observed fishery can be found in WCGOP manuals (NWFSC 2015a, 2015b). Estimates of observer coverage, observed catch, and a summary of observed fishing depths for each sector can be found at:
http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm. The level of observer coverage can fluctuate over time depending on program objectives and funding, but levels of observer coverage in the groundfish fishery prior to implementation of the IFQ program may be an indication of likely coverage levels (25-30 percent of landings observed). This observer information would continue to be used for purposes of developing estimates of protected species bycatch and target and non-target species mortality, and collecting length, age, and other information for use in stock assessments and management actions.
Therefore, the change to data collection methods from EM is not expected to be a significant adverse impact.

Alternative 2 includes several sub-options for different components of the program. Sub- Options E-H were designed to allow consideration of different program costs and would not be expected to change the impacts of Alternative 2 to the physical and biological environments relative to the current conditions or the No Action Alternative. However, three sets of sub-options, Sub-Options A, B, and D, could change the effects of Alternative 2 and are discussed further in the following paragraphs.

Sub-Option A1 would use EM data as the primary data source to debit discards from vessel accounts and Sub-Option A2 would use the logbook as the primary data source, but use EM to audit the validity of the logbook data. For the most part, whether EM data is the primary data source or not is not likely to change the impacts of Alternative 2, relative to the No Action Alternative, because the EM discard estimates are the validation source in either case. The impacts of Alternative 2 result rather from the methods that would be used to estimate the discards from the video, including protocols for species identification and weight estimation and any sub-sampling methods if less than 100 percent of the video is reviewed (see discussion of Sub-Option B2 below), which would likely be similar under both sub-options. However, Sub- Option A2 would require NMFS to decide when logbook data and EM data should be used for debiting IFQ, which could introduce an additional source of uncertainty. NMFS tested Sub- Option A2 in the 2015 EFPs and presented the results to the Council at their November, 2015 and March, 2016 meetings.In summary, impacts from Alternative 2 and the various sub-options to target, non-target, and protected species would be expected to be negligible and insignificant relative to the No Action Alternative and baseline conditions. Although Alternative 2 would reduce the amount of information collected on discarded target, non-target, and protected species on EM trips, NMFS would continue to receive estimates of IFQ discards and maintain collection of detailed catch information using the total catch reporting methodology, including first receivers, catch monitors, port samplers, and mothership observers. In addition, NMFS would maintain some level of WCGOP coverage on EM trips in order to collect information sufficient to provide the best scientific information available for management of target and non-target species, and protected resources bycatch. The fishery would continue to comply with the terms and conditions of current ITSs and vessels would continue to be held accountable for all catch of target and non-target species. Alternative 2 would not change the location or time of fishing or gear type used, and therefore impacts to the physical environment would be expected to be negligible and insignificant.

### 5.1.2 Impacts to the Human Environment

#### *5.1.3.1 Impacts of Alternative 1: No Action Alternative*

Under this alternative, groundfish monitoring requirements would remain as defined in Amendment 20 and subsequent rulemakings. Catcher vessels in the Pacific whiting fishery and fixed gear vessels in the Shorebased IFQ fishery would be required to obtain 100 percent observer coverage for all trips. Vessels would continue to use observers to satisfy the 100 percent observer coverage requirement and would not be able to use electronic monitoring as an alternative to observers. Vessels sorting at sea would be able to discard IFQ and non-IFQ species provided it has been documented by an observer. Catch share observers would continue to collect a suite of information on target and non-target species and protected resources on 100 percent of trips, including weight by species, length frequencies, tissue samples, gear and effort information,

fishing location, and protected species interaction information. The WCGOP would continue to apply a 50% mortality rate to discarded sablefish and lingcod weight caught by IFQ bottom trawl. This information would continue to be used to estimate mortality and bycatch and to manage target and non-target species and protected resources.

Under the No Action Alternative, harvesters would not have the flexibility to use EM and would continue to bear the cost of observers. Information from the WCGOP indicates that observers cost approximately $450-500/seaday. Vessel owners may be separately charged by the service provider for travel and lodging of the observer, so some vessels in remote ports have higher total observer costs. The total annual cost for an observer depends on the number of seadays fished, but the Economic Data Collection program estimates that average annual vessel cost for observers in 2012 was $5,000, which translates into an average variable cost net revenue of $240,000 (NOAA, 2015).[4] There has been some speculation that if some vessels switch to EM, observer seaday rates will increase because the fixed costs of the observer providers will be spread across fewer vessels. If this occurs, the No Action Alternative may have low positive impacts by maintaining observer seaday rates at current levels for those vessels that would continue to use observers under Alternative 2.

Some first receivers benefit from harvesters using observers, because the observer can also monitor the offload of the vessel when it reaches the dock, negating the need for the first receiver to get a separate catch monitor. According to anecdotal reports, service providers generally split the cost of the observer that day between the harvester and first receiver. EDC data from 2012 estimates annual average monitoring costs for first receivers to be $7,000. The No Action Alternative would have low positive impacts for first receivers relative to electronic monitoring, because of these efficiencies.

Under the No Action Alternative, observer service providers and observers would continue to be used by harvesters to meet monitoring requirements. NMFS does not have any information on the revenues of observer providers, as this information is confidential business information and is not collected by the agency, but it is likely that observer service providers would see more business under the No Action Alternative and observers would have more employment opportunities, compared to Alternative 2. Therefore, for observer providers and observers, the No Action Alternative would have low positive impacts relative to the baseline. The No Action Alternative would have negative impacts to EM providers relative to Alternative 2, because it would not authorize an EM program.

The No Action Alternative may have some indirect impacts to permit and quota shareholders, first receivers, motherships, and fishing communities, to the extent that they are affected by the economic and social well-being of harvesters. These secondary effects would likely be quite small. Therefore, the No Action Alternative would be expected to have low negative to negligible insignificant impacts to harvesters, low positive to negligible insignificant impacts to first receivers, and negligible impacts to other secondary businesses and fishing communities, relative to baseline conditions.

[4] Variable cost net revenue is revenue minus variable costs (e.g., wages, fuel, observer, food, ice, and bait).

*5.1.3.2 Impacts of Alternative 2: Electronic Monitoring (Council Preferred)*

Under this alternative, catcher vessels in the Pacific whiting fishery and fixed gear vessels in the Shorebased IFQ fishery would have the option to use electronic monitoring in place of observers to meet the requirements of Amendment 20 for 100 percent at-sea observer coverage. Vessel owners authorized to use EM would be required to obtain, install, and maintain an EM system from an approved service provider, as well as services to review the video data to generate discard estimates and to submit reports to NMFS. Vessel operators would also be required to fill out a logbook to document and report discards to NMFS. NMFS would maintain some level of observer coverage through the WCGOP on EM trips for biological sampling and other purposes. Under Alternative 2, harvesters would have the flexibility to use EM in place of observers to meet monitoring requirements. Harvesters using EM would be responsible for the costs of the EM system, and procuring installation and maintenance services from an EM service provider. Harvesters would also be responsible for having the video reviewed and stored for a period of time, and catch data reported to NMFS.

Vessels that participated in the 2015 EFPs already received equipment and would not need to purchase equipment. The estimated cost of an EM system is $10,000 to purchase, and $2,000-3,000 per year to lease. Leasing cost would be an ongoing annual cost. The purchase cost would be a recurring periodic cost, to upgrade or replace an aging or broken system. EM service providers estimate an EM system to last 3-5 years.

Some vessels in remote ports that have higher observer costs for travel and housing, may experience even greater cost savings from EM. Reducing monitoring costs would increase variable cost net revenue for vessels using EM. Alternative 2 would also provide greater operational flexibility to some vessels using EM, because they would not have to plan fishing activities to accommodate observer availability or scheduling. On the other hand, vessels using EM would have to accommodate service visits to maintain or repair equipment, which could disrupt fishing operations. Vessels continuing to use observers may see an increase in observer costs, as the fixed costs of the observer services are spread over fewer vessels, reducing variable cost net revenue. However, Alternative 2 would provide harvesters the flexibility to weigh these trade-offs of cost and convenience and choose the monitoring option that works best for their individual operation. Impacts to their operations are considered insignificant.

If EM reduces the quality or quantity of data used for management, it may result in increased costs for harvesters through less effective or less-specific management measures. For example, if lower quality data resulted in ineffective controls on fishing mortality, which resulted in reduced yield from the fishery, harvesters and their fishing communities would suffer from reduced revenues. However, as discussed in Section 5.1.2, Alternative 2 would not be likely to affect NMFS's ability to manage the fishery to mortality limits and, therefore, would not be likely to bring such negative impacts to fishing communities.

As was also discussed in Section 5.1.2, EM would result in the loss of some haul-specific catch information from shorebased whiting trips, which could have negative impacts to harvesters and their communities. For example, bycatch of chinook salmon is a concern in the fisheries and the are subject to an incidental take statement for this species. If in some future action, managers wanted to implement gear or area-based restrictions to reduce bycatch of salmon, they would use

observer data and EM data to determine what areas and what gears had the highest bycatch of salmon. Observer data would provide them this information at the haul-level for trips, which would allow managers to design measures to be specific to smaller areas or only certain gear types or mesh sizes. But under EM, catch composition would be available at the trip level, which may mean that catch rates have to be an average over larger areas or multiple gear types/mesh sizes, leading to broader management measures. In this way, moving to EM data could have negative impacts to harvesters and their communities in the way of lost fishing opportunities resulting from broader management measures. However, these impacts are not considered significant.

First receivers accepting landings from EM vessels would no longer be able to use an observer on the vessel to monitor offloads and would have to obtain a catch monitor for these offloads. This may result in increased monitoring costs for first receivers under Alternative 2. First receivers would be required to sort and dispose of any prohibited or protected species retained by EM vessels. First receivers already have such disposition requirements for landings from Pacific whiting maximized retention trips, but this action would expand the existing whiting sorting and disposition requirements to landings from all EM trips. First Receivers may have already adjusted to the effects of these provisions under the EM EFP program that has been in effect 2015-2016. To the extent that permit and quota share holders, first receivers, and fishing communities benefit from the economic well-being of harvesters, there may be some small indirect insignificant positive effects on these entities from Alternative 2.

Under Alternative 2, there would be EM service providers that would compete for monitoring business with observer providers. This is likely to reduce revenue for observer providers and employment opportunities for observers relative to the No Action Alternative and baseline conditions. However, Alternative 2 would provide new opportunities for and increase revenue for EM service providers and employment opportunities for their staff. Service providers that provide both EM and observer services may not see much change in revenue compared to the No Action Alternative and baseline conditions.

Alternative 2 includes several sub-options for different components of the program. Most of these sub-options were designed to allow consideration of different program costs. Sub-Option A1 would use EM data as the primary data source to debit discards from vessel accounts and Sub-Option A2 would use the logbook as the primary data source, but use EM to audit the validity of the logbook data. For the most part, whether EM data is the primary data source or not is not likely to change the impacts of Alternative 2, because the EM discard estimates are the validation source in either case. Sub-Option A1 would not require the vessel operator to complete a discard logbook, which may be more convenient for vessel operators than Sub- Option A2. Therefore, impacts under these sub-options are considered negligible and insignificant.

Sub-Option B1 would require 100 percent of video to be reviewed and Sub-Option B2 would allow a subsample of the video to be reviewed. The level of review would be established by NMFS and must be sufficient for NMFS determine that the EM program is providing the best available scientific information for catch accounting. Reviewing less than 100 percent of video would reduce costs for fixed gear vessels resulting in low positive impacts for vessel owners relative to Sub-Option B1, but not appreciably for whiting vessels for which video can be reviewed very quickly. Therefore, impacts under these sub-options are considered insignificant.

Sub-Option C1 would require that all discards be debited from IFQ, consistent with the status quo. Two other sub-options were also considered by the Council (C2 and C3) that would have allowed some unintentional and minor amounts of IFQ discards to be either debited preseason from a sector allocations or ACLs (C2) or not accounted for in the IFQ system (C3). Sub-Options C2 and C3 were developed by the Council because they were thought to reduce review costs relative to Sub-Option C1, by allowing reviewers to ignore most discard events. Review of hauls is can be rapid and inexpensive under maximized retention since minimal discard occurs, therefore, Sub-Options C2, and C3 would be expected to have negligible impacts relative to Sub-Option C1. If vessels are allowed to discard then video review time and costs increase under all sub-options equally because similar video review time would be needed to enumerate the discard events.

Sub-Option D1 would require vessel operators to retain all catch until landing and Sub-Option D2 would all vessel operators to discard those species that can be identified on camera. As discussed in more detail in Section 5.1.2, Sub-Option D1 is status quo for whiting vessels and therefore would be expected to have negligible insignificant impacts to harvesters compared to the No Action Alternative. Under Sub-Option D2 the list of allowable discard species can change over time, so this analysis considers a range of impacts from maximized retention (Sub- Option D1) to discarding all species. If vessels were required to retain most catch until landing, they may be inconvenienced having to accommodate this additional catch on the vessel and finding a way to dispose of it. They may also see increased costs from having to dispose of unmarketable fish. The first receiver receiving these unmarketable fish may also see costs from disposing of this catch.

Allowing vessels to discard species selectively would negate the inconvenience and cost for harvesters and first receivers to deal and dispose of unmarketable fish. However, vessel operators may have the inconvenience of sorting and displaying all these fish to the cameras to allow them to be identified and accounted for before discarding. This may also increase sorting time and thereby increase operational costs. Vessel operators would have the option to retain these species, even if they were allowed to be discarded, to avoid having to sort and present all of them to the camera, which could negate any operational costs of dealing with unmarketable fish. The vessel would also have the option to carry an observer to avoid onerous catch handling requirements and to weigh these trade-offs. Therefore, impacts under these sub-options are considered negligible and insignificant.

Halibut discard mortality rates that are applied under EM are currently 90% (E1). This is likely an over estimate based on the WCGOP Pacific Halibut Bycatch report 2016, where the mortality rates for the bottomtrawl fleet range from 35 to 60%. Under the 90% rate, fishermen may have difficulty catching their IFQ quotas. E1 would impact fisherman than under the No Action if additional mortality is added for halibut or prohibit participation in the EM program. The Council considered other options that may better reflect the industry DMRs. Vessel specific (E2) or fleetwide average DMRs (E3) for each trip could provide similar fishing opportunities as under the No Action. E4 (exemption to allow full retention) would be used under a maximized retention requirement; however, the mortality rate would be the same as E1 (90%) and may truncate fisherman's ability to fully utilize their IFQ. E5 would require the captain and crew to provide the viability assessment and place the burden on fishermen. This sub-option may incentivize expedient handling of halibut if it resulted in a lower DMR than 90%. This option may be similar to the No Action since crew typically handle and discard all halibut along with all other species. Creating a viability assessment

of DMR using EM (E6) may provide a lower DMR rate (less than 90%) and increase the benefits for fishermen; however, at this time there is not enough data to definitively create a DMR that could be applied. This will take several years of data to develop.

Consideration was given to adding an option that would implement a step-wise approach to adjust the DMRs in the future after implementation of the EM program (E7). For example, the Council could select an option that would initially apply a DMR of 90 percent for bottom trawl and midwater trawl trips under EM with the intent to lower the rate at a future date. Under this option, Council staff, the Council's Advisory Bodies, NMFS, and the IPHC would explore sub-options E2, E3, and E6 to lower the mortality rate to better reflect the actual mortality rates of the fleets.

The intent of the new sub-option E7 is not to change the scientific methods the IPHC used to develop the 90 percent mortality rate. Rather a new method would be developed for trips under EM and be reviewed by the Council's Scientific and Statistical Committee for a recommendation to NMFS. Any new rates would then be applied in the IFQ fishery and for NMFS Pacific halibut total mortality estimates that are provided to the IPHC.

Sub-Option F1 would reduce the administrative burden on vessel owners relative to Sub-Option F2, because it would not requiring resubmission of an application package each year. Sub-Option F2 would require resubmission of an application package each year. Therefore, Sub-Option F1 would be expected to have low positive, insignificant impacts to vessel owners relative to Sub-Option F2.

Sub-Option G1 would allow vessel owners to freely switch between EM and observers, providing the most flexibility and efficiency for their operations. Sub-Options G2 and G3 would set some limit on switching and would be more restrictive on vessel owners than Sub-Option G, potentially resulting in some loss of efficiency, or increased costs if it affects their ability to maximize their fishing opportunities in different fisheries. Sub-Option G4 would be the most restrictive and have low negative impacts on vessel owners relative to the other sub-options.
However, industry representatives indicated during regulatory development that they would not be likely to switch between observers and EM, except in the case of malfunctions. Therefore, none of these sub-options is likely to have significant impacts to vessel owners.

Sub-Option H1 would allow a representative of the vessel to submit the hard drive to the EM service provider, while Sub-Option H2 would require the EM service provider to retrieve it, and Sub-Option H3 would require the catch monitor or some other third party to retrieve it. In terms of costs, the Sub-Option H1 would likely have lower costs, and low positive impacts, for harvesters relative to Sub-Option H2 or H3, because the harvester would be able to deliver the hard drives themselves. Sub-Option H2 would require the EM service provider to deploy a technician to the vessel to retrieve the hard drive, and the harvester would likely bare the service and travel costs that would entail. Under Sub-Option H3, a catch monitor would be responsible for retrieving the hard drive and delivering it to the service provider. This would likely be less costly than Sub-Option H2, because a catch monitor would already be present and would not have to incur additional travel costs to retrieve the hard drive. However, it may require that catch monitors be trained by EM service providers on how to retrieve the hard drives, costs for which would likely be passed on to the first receivers or harvesters. Therefore, impacts under these sub-options are considered insignificant.

In summary, Alternative 2 and the various sub-options would be expected to have negligible to low positive impacts to harvesters relative to the No Action Alternative and baseline conditions, because it would increase operational flexibility and potentially reduce monitoring costs for vessels using EM, but could increase monitoring costs for those vessels continuing to use observers.

Alternative 2 would be expected to have low negative impacts to first receivers, because it would likely increase their monitoring costs relative to the No Action Alternative and baseline conditions, due to the need to obtain catch monitors for offloads of EM vessels. Alternative 2 would have low negative impacts to observer providers and observers and low positive impacts to EM providers and their employees. Alternative 2 would have neutral impacts to fishing communities, as a result of improved economic well-being for vessels using EM, but increased costs for first receivers and vessels using observers. Overall, Alternative 2 would be expected to have neutral to low positive impacts to the human environment relative to the No Action Alternative and baseline conditions.

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