TRAWL RATIONALIZATION TRAILING ACTIONS: Chafing Gear

Environmental Assessment

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November 2014

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CHAPTER 1 INTRODUCTION

1.1 How This Document is Organized

This document proposes alternatives (Chapter 2), describes the current physical, biological, and socio-economic environments (Chapter 3) relevant to the proposed action, and analyzes alternative chafing gear provisions for midwater trawl nets, used to harvest Pacific whiting and pelagic rockfish species including widow, yellowtail, and chilipepper rockfish (Chapter 4). The analyses in Chapter 4 compare the action alternatives to the No Action Alternative and provide an assessment of potential impacts relative to specified ecological, biological, and socio-economic criteria.

1.2 Proposed Action

The proposed action is modification of regulations that restrict chafing gear coverage on the codends of midwater trawl nets used in the Pacific Coast groundfish fishery. The proposed change pertains to chafing gear coverage allowance on the codends of midwater (pelagic) trawl nets. No new regulations (i.e., restrictions or limitation of target fisheries that can use midwater gear) are being considered in relation to this proposed action except as necessary to maintain the intent and purpose of other provisions of the program. The proposed action also takes into account consistency of the proposed change with the MSA, other applicable law, and the goals and objectives of the Pacific Coast Groundfish Fishery Management Plan (FMP), including Amendment 20 to that plan (the trawl rationalization program).

1.3 Purpose and Need

The purpose of the action is to consider establishing chafing gear restrictions in the Pacific Coast groundfish fishery that allow coverage of the entire length of the codend and are more compatible with those for the Gulf of Alaska (GOA) groundfish and Bering Sea and Aleutian Islands (BSAI) groundfish fisheries (Alaska Fisheries), taking into account various impact criteria, explained below.

The need for this action is two-fold. First, the current regulations have been interpreted and enforced in a manner that allowed fishermen to cover the entire length of their codends using a series of 50-mesh panels. However, it has been recently noted that the regulations could be interpreted to restrict the length of coverage to the last 50-meshes. Chafing gear can be described as any of a variety of materials, usually heavy gauge webbing, that can be attached to the underside of the fishing net to protect it from abrasion sources, either when fishing or when hauled on deck, without unduly restricting the escapement of fish through the webbing. This reinterpretation of the chafing gear regulations as applied to midwater (pelagic) trawl gear, if enforced, would have increased economic costs, in part, the result of increasing wear on the net due to abrasions.

The second need for this regulation arises out of the differences between the chafing gear restrictions for Alaska and the Pacific Coast midwater trawl fisheries. Some Pacific whiting vessel owners have reported that the nets that they use in the Alaska fishery (for pollock) do not conform to Pacific Fishery Management Council (PFMC) area midwater trawl regulations (PFMC 2011a). In large part this is because the North Pacific Fishery Management Council (NPFMC) regulations are very liberal as they apply to chafing gear placement on the net; they only prohibit "chafe protection attachment" to the footrope or fishing line (50 CFR 679.2).[1] The PFMC regulations are restrictive in comparison. For example, the regulations limit chafing gear coverage of the codend to 50 percent of the net circumference (50 CFR 660.130).[2] The NPFMC and PFMC regulations are compared in Section 3.3.5.1. While a correction to the chafing gear restrictions initiated the need for action, the trawl rationalization program objective of reducing the operational costs for vessels, created the need to also consider chafing gear relative to the operating costs for vessels that fish in both regions.

1.4 Background

There are numerous commercial gears used in the Pacific Coast groundfish fishery, among which are groundfish trawl gears. There are two primary types of groundfish trawl: bottom trawl and midwater trawl. Bottom trawl gear is divided into large footrope and small footrope gear (including selective flatfish gear). The action being considered here would affect chafing gear coverage on midwater gear.

Midwater trawls, also called pelagic or off-bottom trawls, are trawls where the doors may be in contact with the seabed (although they usually are not), while the footrope generally remains suspended above the seafloor, but may contact the bottom on occasion. Midwater trawls are generally towed above the ocean floor (pelagic), although they may be used near the bottom (off-bottom). They are also towed faster than bottom trawls to stay with the schooling fish they target and to prevent the net from touching bottom. Towing time varies from a few minutes to several hours. Trawl gear has several components that may contact or affect the seabed. Variations in the composition and design of these components influence their effects on benthic ecosystems. Of the major components, trawl doors affect the smallest area of seabed, though trawl door marks are the most recognizable and frequently observed effect of trawls on the seabed. On most trawls (bottom and midwater), the netting itself is not designed to directly contact the seabed, and anything that protrudes far enough above the seabed to contact the netting has already been contacted by the footrope. The netting may retain objects and organisms that are undercut or suspended off the seabed by the passage of the footrope. If the codend becomes

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[1]Alaska fisheries are subject to additional conservation standards not in place for the West Coast groundfish fishery, including bycatch restrictions for bottom species to keep midwater trawl gear off bottom, hard limits on the catch of specified species or species groups, measures for forage fish protection, and large habitat protection areas closed to all types of trawling (including midwater). 50 CFR 679.7(a) (14) prohibits a vessel engaged in directed fishing for pollock, when directed fishing for pollock with non-pelagic trawl gear is closed, from having 20 or more crabs of any species, with a carapace width of more than 1.5 inches (38 mm) at the widest dimension, on board at any one time. Crabs were chosen for the standard because they inhabit the seabed and, if caught with trawl gear, indicate that the trawl has been in contact with the bottom.

[2] In addition, as previously mentioned, the West Coast regulations limit chafing gear placement on the codend to the 50 most terminal meshes regardless of codend length.

loaded with dense fish, the codend may be weighed down enough to drag on the seabed. Auxiliary weights added to the lower corners of midwater trawls may contact the seabed when these are fished near or on the seabed. In some cases chains may be attached so they dangle from the doors or the footrope. The pressure that these weights exert on the seabed is the resultant of their weight in water and the upward forces exerted on them by other gear components (NMFS 2005a).

NMFS implemented the trawl rationalization program for the Pacific Coast groundfish fishery's trawl fleet effective January 11, 2011 (see 75 FR 78344; Dec. 15, 2010). The program was adopted through Amendment 20 to the FMP and consists of an individual fishery quota (IFQ) program for the shoreside trawl fleet (including whiting and non-whiting fisheries); and cooperative (coop) programs for the at-sea mothership (MS) and catcher/processor (C/P) trawl fleets (whiting only).

The midwater trawl net chafing gear issue was brought to light in testimony provided by midwater trawl fishermen at PFMC's September 2011 meeting. It was reported that enforcement of the reinterpreted chafing gear regulations would be very costly to the whiting industry (PFMC 2011a). This is because the very limited chafer coverage allowed would increase wear due to abrasion and because the nets that vessels use in the Alaska pollock fishery have greater chafing gear coverage than Pacific Coast groundfish regulations allow in the midwater trawl fishery (see Section 3.3.5.1 for a comparison of the two regulation sets). The comparison shows the NPFMC regulations provide for unlimited coverage of the codend of midwater trawl nets while the PFMC regulations are much more restrictive.[3] The National Marine Fisheries Service (NMFS) provided a report on the regulatory history of chafing gear restrictions in the PFMC management area in that same meeting (PFMC 2011b).

An image of the codend of a whiting tow showing the net being brought up the vessel ramp appears in Figure 1-1.

[3]There are no codend construction or use restrictions as they apply to pelagic trawl gear in the NPFMC area except when fishing in experimental fishing areas as described under 50 CFR 679.24(d) Gear Limitations. Sarah Ellgen, NOAA Fisheries, September 19, 2012 email.

Figure 1-1: Image of codend with whiting catch being hauled up stern ramp and codend being worked on in net shed. (photos courtesy of Mr. David Jincks)

The following terms are frequently used in this Environmental Assessment and are presented here to clarify their meanings as defined in federal regulation.

Definitions, 50 CFR 660, Subpart C:

Trawl gear means a cone or funnel-shaped net that is towed through the water.

Midwater (pelagic or off-bottom) trawl means a trawl in which the otter boards and footrope of the net remain above the seabed. A midwater trawl has no rollers or bobbins on any part of the net or its component wires, ropes, and chains.

Bottom trawl means a trawl in which the otter boards or the footrope of the net are in contact with the seabed. Any trawl not meeting the requirements for a midwater trawl.

Codend means the terminal, closed end of a trawl net.

Chafing gear means webbing or other material attached to the codend of a trawl net to protect the codend from wear.

The trawl fishery chafing gear regulation changes over the years have primarily related to the use of chafing gear on the codend of the net. The codend is the terminal, closed end of a trawl net (50 CFR 600.10 Definitions). The most problematic conflict between NPFMC and PFMC area regulations pertain to restrictions on the use of chafing gear in the PFMC area (as explained in Section 3.3.5.1). The current provisions for trawl net protection in the Pacific Coast fishery are shown in Table 1-1.

Table 1-1: Current trawl net chafing gear provisions

50 CFR 660.130(b)(3) • Chafing gear may encircle no more than 50 percent of the net's circumference. • No section of chafing gear may be longer than 50 meshes of the net to which it is attached. • Chafing gear (when used on the codend) may be used only on the last 50 meshes, measured from the terminal (closed) end of the codend. • Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net (the terminal end is the end farthest from the mouth of the net). • Chafing gear must be attached outside any riblines and restraining straps. • There is no limit on the number of sections of chafing gear on a net.
50 CFR 660.130(b) (6) . . . A band of mesh may encircle the net under transfer cables, lifting or splitting straps, but must be over riblines and restraining straps and of the same mesh size and coincide knot-to-knot with the net to which it is attached.

A summary of the PFMC area chafing gear and pertinent codend regulation changes over the years follows.

1980s: Minimum mesh sizes regulations were adopted; it was clarified that the minimum mesh size of 3 inches for pelagic trawl nets applied to the codend. Federal regulations defined the codend as the terminal 50 meshes of the trawl net (49 FR 11640; March 27, 1984.) (NMFS 2012a).

Amendment 4 to the Groundfish FMP (August 1990) specified that the minimum mesh size for pelagic trawl of 3 inches applied to the last 50 meshes of the net ending at the terminal closed end of the codend (PFMC 1990). There was no limitation on chafing gear coverage on nets.

1991: For pelagic trawls, chafing gear covering the top side of the codend had a minimum mesh size restriction of 6 inches (NMFS 2012a). Chafing gear regulations requiring that chafing gear be of large mesh material were implemented in an attempt to prevent the use of chafing gear materials and fastening methods that effectively reduce the escapement of small fish through the mesh of the net.

1994: The chafing gear regulations were changed to limit chafing gear coverage on all nets to no more than 50 percent of the net circumference, with no section being longer than 50 meshes and no connection on the edge toward the terminal end of the net. There was a chafing gear exception for transfer cables and chokers on pelagic trawl nets (NMFS 2012a). The chafing gear changes were intended to ensure that the use of chafing gear did not modify the effects of the codend mesh size regulations. The purpose of chafing gear was described as protection of the underside of the net without unduly or intentionally restricting escapement of fish through the webbing. Chafing gear was allowed only on the outside of the net.

Also in 1994, a new definition for pelagic gear was adopted. The new definition included language to better ensure that pelagic trawl would not come in contact with the sea floor when being fished. Included in these restrictions for pelagic gear were provisions requiring that: midwater trawl gear have unprotected footropes at the trawl mouth, and not have rollers, bobbins, tires, wheels, rubber discs, or any similar device anywhere on any part of the net. "The footrope of midwater gear may not be enlarged by encircling it with chains or by any other means," and "for at least 20 feet (6.15 m) immediately behind the footrope or headrope, bare ropes or mesh of 16 inch (40.6 cm) minimum mesh size must completely encircle the net" (50 CFR 630.322(b)(6)). These measures were expected to make the gear impractical or ineffective for fishing on the bottom.

1996: Gear restrictions specified that the minimum mesh size restrictions for trawl gear applied throughout the net. Those regulations (61 FR 34590; July 2, 1996) also put in place the current chafing gear wording, not including the provision limiting chafing gear coverage to the last 50 meshes of the net, which was added later.

2003: Limited entry trawl gear restrictions were modified. In the emergency rule published to open the 2003 fishery, the general section on trawl gear chafing gear (50 CFR §660.322(b)(3)) was left unchanged and continued to allow coverage of the entire length of the net; the existing language on pelagic trawl gear restrictions remained unchanged (50 CFR §660.322(b)(5)); but within a new section describing small footrope trawl (50 CFR §660.322(b)(6)), regulatory language was added that limited chafing gear for small footrope trawls to the last 50 meshes, measured from the end of the codend. At this point, the general chafing gear regulations of 50 CFR §660.332(b)(3) were as they are now, but not including the provision limiting chafing gear coverage to the last 50 meshes for bottom trawl and midwater trawl gear. The provision to limit chafing gear coverage to the terminal 50 meshes of codends of small footrope bottom trawl nets was implemented to discourage trawling in rocky areas (NMFS 2012a).

The changes first published in the emergency rule were carried forward in the final rule published March 7, 2003, with the addition of a reordering and renumbering of the paragraphs. The pelagic trawl description was moved from paragraph 50 CFR 660.322 (b)(5) to paragraph 50 CFR 660.322 (b)(6). However, a cross-reference from 50 CFR 660.322(b)(3) to 660.322(b)(5) was left unchanged so that instead of referencing an exception to allow a band of mesh to encircle pelagic trawls under transfer cables and lifting or spitting straps, 50 CFR 660.322(b)(3) referenced an exception for large and small footrope trawls. Although the cross-reference to midwater trawl was missing, the section on midwater trawl (50 CFR 660.322(b)(6)), clearly provided an exception to the chafing gear regulations, allowing a band of mesh (a skirt) encircling the net under transfer cables, lifting or splitting straps (chokers).

2005: At the start of 2005, the trawl footrope regulations were modified so that large and small footrope trawl nets were defined in separate paragraphs and the definition of selective flatfish trawl was added (69 FR 77034; December 23, 2004). The exception which restricted chafing gear to the last 50 meshes of the codend for small footrope trawl was moved from the section on small footrope trawl to the section on chafing gear. The following sentence was added to the section on chafing gear (50 CFR 660.322(b)(3)): “Chafing gear may be used only on the last 50 meshes of a small footrope trawl, measured from the terminal (closed) end of the codend.” The pelagic trawl exception for a “skirt” remained in place in paragraph (b)(6) but the cross-reference from paragraph (b)(3) to the exception remained absent.

2006: Chafing gear changes were considered with the 2007-2008 harvest specifications. In May 2006, PFMC’s Groundfish Management Team (GMT) reviewed the gear regulations and identified that “reference language regarding the chafing gear requirements for midwater trawl were inadvertently changed in the regulation.” The PFMC recommended that the regulation be revised to ensure that the chafing gear requirements were reinstated for midwater trawl gear and maintained for small footrope trawl (71 FR 57787; September 29, 2006).

In the proposed rule, NMFS reiterated that groundfish trawl nets are regulated to minimum mesh sizes to ensure that juvenile fish may escape through the trawl mesh. Depending on how chafing gear is configured on a trawl net, it can have the effect of reducing the mesh size and result in increased small fish bycatch (71 FR 57787; September 29, 2006).

2007-Present: The regulations published in response to the request for reinstatement of the cross-referencing to midwater gear inadvertently eliminated the language which applied the 50 mesh codend restriction to small footrope gear only, such that the 50 mesh limitation currently may be read to apply to all groundfish nets. Prior to the change, the regulations read:

> “Chafing gear may be used only on the last 50 meshes of a small footrope trawl, measured from the terminal (closed) end of the codend.”

After the change, the regulation read:

> “Chafing gear may be used only on the last 50 meshes, measured from the terminal (closed) end of the codend.”

Because there had been no change in policy and because regulatory language remained in place which stated, “There is no limit on the number of sections of chafing gear on a net” (50 CFR 660.322(b)(3)), enforcement continued in the fishery from 2007 through 2011 as if the regulations limiting chafing gear to the last 50 meshes of the codend continued to apply only to small footrope trawl. In 2011, an enforcement officer provided an interpretation of the regulation restricting chafing gear to the last 50 meshes of the codend. All of the current provisions of 50 CFR 660.322(b) are provided in Table 1-1 .

1.5 PFMC and Agency Scoping

Table 1-2: Chronology of meetings and actions leading to chafing gear regulation change proposal.

Date	Meeting	Action
September 14-19, 2011	PFMC meeting, San Mateo, CA	Public comment is received describing chafing gear regulation conflict; PFMC action is taken to prioritize future trailing actions including chafing gear issue; Trawl Rationalization Regulation Evaluation Committee (TRREC) is tasked with providing comments on issues identified for implementation in 2013 including chafing gear issue.
October 27, 2011	Trawl Rationalization Regulatory Evaluation Committee (TRREC) meeting, Portland, OR	TRREC made recommendation on chafing gear: Recommendation 5. At November PFMC meeting adopt a general alternative to No Action midwater gear requirements including chafing gear; PFMC staff should work with industry to develop a midwater trawl regulation for presentation at the March 2012 PFMC meeting.
November 2-7, 2011	PFMC meeting, Costa Mesa, CA	TRREC report is presented; PFMC voted to move forward with TRREC recommendations.
March 2-7, 2012	PFMC meeting, Sacramento, CA	The chafing gear regulation proposal was presented as part of a broader trawl gear regulation review; PFMC voted to move forward with the chafing gear issue ASAP using the alternative that would allow broader and longer coverage as the preliminary preferred. The other action alternative would have placed no limit on chafing gear coverage.
April 1-6, 2012	PFMC meeting, Seattle, WA	A decision document was presented with a rudimentary analyses provided for the two action alternatives addressing the chafing gear issue; the alternative that would allow broader and longer coverage was adopted as the final preferred alternative.
September 14-18, 2012	PFMC meeting, Boise, ID	NMFS asked PFMC to reconsider the range of alternatives considered in its chafing gear action and clarify if the action was specific to codends used in the Pacific whiting fishery or all midwater codends; PFMC removed the alternative that would eliminate all chafing gear restrictions and replaced it with one recommended by the Groundfish Advisory Panel (allowing longer but not broader coverage) and clarified the intent for the action to apply to all midwater gear.
November 2-7, 2012	PFMC meeting, Costa Mesa, CA	PFMC action to reconsider final preferred alternative (FPA). A decision document was presented with a developed analysis for the two action alternatives. The FPA alternative allowing longer and broader coverage was adopted as the FPA, with slight modifications from that adopted in April 2012.

CHAPTER 2 DESCRIPTION OF ALTERNATIVES

2.1 Alternatives

In addition to the No Action Alternative, there are two action alternatives (Alternative 1 and Alternative 2), one of which has two sub-alternatives (Alternative 2a and Alternative 2b). The No Action Alternative maintains current regulations on chafing gear placement on codends of midwater trawl used in Pacific Coast groundfish fisheries. The current regulations were implemented beginning with the 2007 fishing season. Up until 2011, the current regulations were interpreted and enforced in a manner that allowed fishers to cover the entire length of their codends using a series of 50-mesh panels, provided the panels did not exceed 50 percent of the codend circumference and the terminal end of each panel was unattached to allow small fish to escape. Recently, these regulations have been reinterpreted as allowing the use of only a single 50-mesh panel (see Section 1.4 for a complete history). This reinterpretation has not yet been enforced because it would entail a sudden and unexpected change in regulatory enforcement and require industry to incur expenses while deliberations are underway on whether to realign the regulations with standing policy or change the policy. Conditions under the No Action Alternative reflect the assumed state of the environment if regulatory action is not taken to reinstate the language that had been in effect in 2006 that allowed chafing gear coverage over the entire length of the net. The Status Quo Alternative (Alternative 2b) reflects the midwater chafing gear restrictions that were in effect during the 2006 season and the chafing gear coverage requirements with which current Pacific Coast midwater trawl fishery participants continue to be in compliance. The regulatory and environmental conditions which are projected under status quo (Alternative 2b) are the current conditions in the fishery and environment. The alternatives under consideration in this EA follow.

2.1.1 No Action Alternative

Current regulations affecting chafing gear coverage of the codends of trawl nets, including midwater nets, used in the are shown in Table 1-1. This regulation set has been in place since the 2007 season; prior to that season the limitation on chafing gear coverage to the last 50 meshes only applied to small footrope trawl nets (NMFS 2012a).

> Definition at 50 CFR §660: <u>Chafing gear</u> means webbing or other material attached to the codend of a trawl net to protect the codend from wear.
>
> (The definition of codend at 50 CFR **§**600.10 would remain unchanged - Codend means the terminal, closed end of a trawl net.)
>
> 50 CFR 660.130 Trawl fishery—management measures.
> (b) Trawl gear requirements and restrictions.....
> (3) Chafing gear. Chafing gear may encircle no more than 50 percent of the net's circumference. No section of chafing gear may be longer than 50 meshes of the net to which it is attached. Chafing gear may be used only on the last 50 meshes, measured

from the terminal (closed) end of the codend. Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net. (The terminal end is the end farthest from the mouth of the net.) Chafing gear must be attached outside any riblines and restraining straps. There is no limit on the number of sections of chafing gear on a net.[4]

. . . .

(6) Midwater (or pelagic) trawl gear. Midwater trawl gear must have unprotected footropes at the trawl mouth, and must not have rollers, bobbins, tires, wheels, rubber discs, or any similar device anywhere on any part of the net. The footrope of midwater gear may not be enlarged by encircling it with chains or by any other means. Ropes or lines running parallel to the footrope of midwater trawl gear must be bare and may not be suspended with chains or any other materials. Sweep lines, including the bottom leg of the bridle, must be bare. For at least 20 feet (6.15 m) immediately behind the footrope or headrope, bare ropes or mesh of 16 inch (40.6 cm) minimum mesh size must completely encircle the net. A band of mesh (a “skirt”) may encircle the net under transfer cables, lifting or splitting straps (chokers), but must be: over riblines and restraining straps; the same mesh size and coincide knot-to-knot with the net to which it is attached; and no wider than 16 meshes.

2.1.2 Action Alternatives

The action alternatives described below are proposed to apply to midwater trawl net codends used in the PFMC management area. Current regulations (50 CFR § 660.130 (c)(3)) restrict the use of midwater trawl nets, by area, as follows:

- Midwater trawl nets may be used in the Exclusive Economic Zone (EEZ) north of 40˚ 10° N. lat., from 3-200 nm, but only by vessels participating in the primary Pacific whiting fishery[5].
- South of 40˚ 10° N. lat., non-whiting midwater trawl nets may be used year-round, but only seaward of the Rockfish Conservation Area. Vessels target fishing for Pacific whiting with midwater trawl gear may fish seaward of the shoreward boundary of the Rockfish Conservation Areas (RCAs) during the Pacific whiting primary whiting season.

Modifications to midwater gear will affect the use of that gear not only when targeting whiting but when targeting other species as well. Prior to 2002, there was an active midwater trawl fishery for widow rockfish, yellowtail rockfish, and, to a lesser extent, chilipepper rockfish (hereafter referred to as pelagic rockfish species complex because of their off bottom schooling behavior). When widow rockfish became overfished, the use of midwater gear in northern waters was effectively restricted to whiting targeting through fishery management policies that were developed to rebuild widow by restricting widow harvest to bycatch levels only.

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[4] This latter provision has caused some confusion within the fishing industry as it appears to conflict with the provision that limits chafing gear coverage to the 50 terminal codend meshes. Taken together they could mean that chafing gear coverage is limited to the 50 terminal codend meshes and that within that same area of the net there is no limitation on the number of chafer panels that may be used.

[5] Subsequent to Amendment 20, the regulations that apply to participants in the primary Pacific whiting fishery also apply to vessels targeting non-whiting during the primary whiting season.

Targeting opportunities for widow and yellowtail rockfish with midwater gear were eliminated in 2002, and retention was restricted to the whiting fishery (trip > 10,000 lb of whiting). Trip limits for widow and yellowtail rockfish (which are often caught jointly with widow) were reduced to accommodate incidental catch and prevent targeting on widow during whiting fishing opportunities. Targeting opportunities for chilipepper rockfish with midwater gear were eliminated in 2003, but larger limits (large enough to allow targeting) were reinstated seaward of the RCAs in 2005. The trawl IFQ program created the opportunity for individual vessels to be fully responsible for their groundfish catch, including discards. With implementation of the IFQ program, the restrictive trip limits that allowed widow and yellowtail retention only by vessels harvesting Pacific whiting during the primary fishery was eliminated. In order to target any species with midwater gear, a vessel currently only needs to acquire sufficient quota pounds (QP) to cover its catch (including bycatch in whiting targeted tows), and fishing may only occur during the dates of the primary whiting season. This presence of non-whiting midwater fishing opportunity was identified in PFMC discussions during deliberations on the 2011-2012 biennial specifications, and there was a brief discussion of potential impacts this fishing opportunity might have on overfished species in the 2011-2012 Environmental Impact Statement (EIS). Given the current regulatory structure, change in the regulations affecting midwater trawl will affect the use of that gear in targeting any species of groundfish during the whiting season (as limited by the availability of QP to cover catch).[6] Set-a-sides were established for the at-sea whiting fisheries to cover catches of overfished groundfish and Pacific halibut in order to prosecute the full whiting allocations set for those fisheries. These set-aside amounts needed to be set high enough to accommodate the historical maximum or any increased catch that was anticipated. The at-sea sector initial set-asides were based on 2009-2010 catch evaluations.

Alternative 1 (Preferred Alternative): Allow for broader and longer chafing gear coverage on the codend

Alternative 1 reads as follows:

> Chafer may cover the bottom and sides of the codend in either one or more sections. Chafers can only be attached at the open end of the codend (end closest to trawl mouth) and sides. The terminal end (end closest to terminal end of codend), or the end of each chafer section if using multiple chafers, must be left unattached. The only chafer allowed on the top codend panel would be reinforced netting panels under or over [7]lifting, and constraining straps. All chafers will conform to codend mesh size regulations.

The purpose of the chafer panels is to minimize damage to the codend netting from wear against the stern ramp and trawl alley during net retrieval as well as from occasional contact with the ocean floor. This alternative would allow for chafing gear coverage on the entire length of the codend in addition to coverage of the bottom and sides of the codend. Current restrictions limit the coverage to 50 percent of the net circumference; the proposed change would allow for 75 percent coverage of the codend circumference assuming each of the four codend panels is equal

[6] Over the last year, there have been discussions (TRREC and September 2012 Gear Workshop) of the possibility of changing regulations to allow the use of midwater gear outside the whiting season.

[7] This added verbiage was approved by the Council at its November 2012 meeting with the aim of clarifying that net construction additions at lifting and constraining straps can be applied over or under such components.

in size. Current regulations limit chafer gear coverage to the last 50 meshes of the codend; the proposed change would allow chafer coverage of the entire length of the codend, which for large whiting nets could be 130 feet (>500 meshes for a 3-inch stretch mesh net) or longer.[8] Under this alternative there would be no limitation on length of chafer panel that can be used on the codend; a single panel or multiple panels could be used to cover the entire length of codend. As reported above, there are no codend construction or use restrictions in the Alaska (NPFMC area) regulations as they apply to pelagic trawl gear except when trawling is conducted in experimental fishing areas as described under §679.24(d) Gear Limitations. This alternative would have more restrictive chafing gear requirements than the Alaskan regulations but would be sufficiently flexible to allow Alaskan gear to be used in both regions (Note: while the Alaska regulations as they apply to the codend of pelagic trawl gear are less restrictive than PFMC midwater trawl regulations, the Alaska regulations have catch limits for prohibited species (PSCs) such as king and tanner crab that can lead to total fishery closure if reached (§679.21 Prohibited species bycatch management).

PFMC first recommended this alternative at its April 2012 meeting (PFMC 2012b). It reaffirmed that decision at its November 2012 meeting after consideration of the alternatives presented in this document accompanied by an EA (PFMC 2012c). PFMC made no change in the proposed regulatory wording, presented above, except to clarify, based on Groundfish Advisory Subpanel input, that the provision for codend protection at riblines and restraining straps allow for the use of mesh material (skirts) both over and under such components while retaining the restrictions pertaining to mesh application at those locations. The current provision for skirts around codend cables and straps is as follows:

> (6) A band of mesh (a ”skirt”) may encircle the net under transfer cables, lifting or splitting straps (chokers), but must be: over riblines and restraining straps; the same mesh size and coincide knot-to-knot with the net to which it is attached; and no wider than 16 meshes (50 CFR §660.130(b)(6)).

The regulations specify that skirt applications must be made on the outside of riblines and restraining straps. Those same regulations specify that skirts may be applied under transfer cables, lifting or splitting straps.   The clarifying language would provide for the use of skirts under *or over* all codend lifting, splitting, and transfer cables and ropes.

[8] Information on length of nets from personal communications with Sara Skamser, Foulweather Trawl, Newport OR; David Jincks, GAP, September, 2012.

Alternative 2: Allow for longer chafing gear coverage and flexibility in chafer panel size and application on the codend

Alternative 2 reads as follows:

> Eliminate the restriction which limits the application of chafing gear to the last 50 meshes of the codend (maintain restriction limiting chafing gear coverage to no more than 50 percent of the net circumference (circle)).
>
> Option a) Eliminate the restriction on the length of a single chafer panel, and provide for the use of skirts under or over all codend lifting, splitting and transfer cables and ropes.
>
> Option b) Status Quo: Maintain the requirement that any single panel of chafing gear not exceed 50 meshes in length of the codend.

This alternative was offered for consideration at the November 2012 PFMC meeting in place of original: "No Chafing Gear Restrictions" alternative (PFMC 2012c). This alternative was a modification of the No Action Alternative that would specifically change the component of the chafing gear regulations that industry members believed was in error and needed to be corrected.

The provision to allow for chafer coverage on the entire length of the codend is the same as provided in Alternative 1 and differs from current regulations, which limit the coverage to the terminal 50 meshes. Current regulations limit chafer panel size to no more 50 codend meshes. Under Alternative 2a there would no restriction on length of chafer panel but the terminal end of each panel would still be required to be open for small fish to escape; Alternative 2a would allow for a single chafer panel on the codend, in addition to the use of skirts under (and over) all codend transfer, splitting or lifting cables and ropes. Current regulations restrict the use of skirts to the outside of codend riblines and under codend lifting, splitting and transfer cables or ropes. Under Alternatives 2a and 2b, there would continue to be no limitation on number of chafer panels. A comparison of current net protection provisions and the action alternatives is provided in

Table 2-1. As reported above, the Alaska regulations for pelagic trawl gear only apply to the main fishing net and not the codend, which has no construction or use restrictions. This alternative would be more restrictive than the Alaskan regulations and would not allow all gear configured for the Alaskan fishery to be used on the Pacific Coast. This is because the Alaska restrictions do not constrain the amount of net protective gear that can be applied to the codend. Alternative 2a or 2b may be adequate to provide for most of the desired amount of codend coverage.

Table 2-1: Comparison of chafing gear alternatives relative elements of current codend regulations and Alaska regulations.

	Element							
	Net circle limitation	Limitation on single panels	Net coverage limitation	Attachment procedure	Lift strap limitation (chafe gear)	Minimum mesh size	Panel attachment procedure	No. panels
No action	50%	50 net meshes	50 end meshes	Outside riblines; under lifting straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alternative 1(FPA)	Side and bottom of codend (75% if sections equal size)	no limit	codend	Outside riblines and over or under lifting straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alternative 2	50%	a) 50 meshes b) no limit	codend	a) Outside riblines and over or under lifting straps b) outside riblines and under lifting straps	16 meshes, same mesh size, knot to knot	3 in.	End open	no limit
Alaska	none	none	none	none	none	none	none	none

2.1.3 Alternatives Considered But Rejected From Further Analysis

One alternative rejected from further consideration would have been the same as Final Preferred Alternative (Alternative 1), but would have specified an allowance for 75 percent chafing gear coverage of the codend. This alternative is virtually the same as the preferred alternative which allows bottom and side panels to be covered, assuming that the cross section of the mesh is square. Alternative 1 provides more flexibility to optimally protect the portions of the codend most likely to be subject to wear in situations where a cross section of the net is not perfectly square.

An alternative was considered to eliminate all chafing gear restrictions as they apply to midwater trawl gear (PFMC 2012b). This alternative is comparable to the chafing gear regulations in place in the NPFMC area (see page 83 of this document). The NPFMC regulations are very liberal as they apply to chafing gear placement on the net; they only prohibit "chafe protection attachment" to the footrope or fishing line (50 CFR 679.2). There is no restriction on the placement of chafing gear on the codend. This alternative was rejected from further consideration because it could have allowed for up to 100 percent chafing gear coverage of the net, including the main body and the codend, which could be damaging to biota escaping the net and would likely be in conflict with the PFMC's bycatch mitigation program (Amendment 18).

Another alternative might be to consider the development of performance standards that might set limits on bottom contact and small fish retention, providing the fishermen with considerably more flexibility in configuring their gear. Performance standards require careful development and, if not properly specified, can lead to unexpected adverse consequences (Coglianese et. al., 2003). The development of fair and effective performance standards, along with the thresholds for action and consequences for exceeding those thresholds, would take a substantial amount of time and effort and not address the immediacy of the first need identified in the purpose and need statement.

2.2 Rationale for PFMC Final Preferred Alternative

The Final Preferred Alternative described in the previous section was initially presented as part of a broader trawl gear regulation review at PFMC's March 2012 meeting. The chronology of this issue is described in Section 1.4 and Table 1-2. The Groundfish Advisory Subpanel (GAP) recommended that the chafing gear issue be given high priority in order to bring the whiting fishery vessels into compliance with the law in time for the 2013 whiting season opening date (http://www.pcouncil.org/wp-content/uploads/F8b_SUP_GAP_MAR2012BB.pdf). PFMC voted to move forward with Alternative 1 as its preliminary preferred alternative, to allow broader coverage than Alternative 2a and 2b and longer coverage than the No Action Alternative. A Final Preferred Alternative (FPA) was adopted at its April 2012 meeting based on a rudimentary analysis. The FPA was reconsidered at its November 2012 meeting after review of revised chafing gear alternatives contained in a draft EA and with additional GAP input. The GAP reported that the FPA comports with the chafing gear currently used by the majority of the fleet in both Pacific Coast and Alaska fisheries, and provides the best protection for expensive codends.

The two primary potential environmental impacts of increased chafing gear coverage are damage to the benthic environment and increased mortality of smaller-sized fish and species due to blockage of codend meshes by chafing gear panels. With respect to damage to the benthic environment, interaction of midwater gear with hard bottom habitat is minimal to nonexistent because the footrope of midwater trawl nets must be bare; i.e., may not be wrapped with chain or have rollers or bobbins (50 CFR §660.130(b)(6)). Interaction with soft bottom is discouraged by the requirement for bare ropes or 16 inch minimum mesh for 20 feet around the outside of the front of the net (50 CFR §660.130(b)(6)). Despite these provisions, some incidental soft bottom contact occurs, but at low rates, probably less than 10 percent of tows (see Section 4.4.3.1). The incentives to avoid bottom contact are already strong (see Section 4.3.1.2) and it is not expected that increasing the chafing gear coverage, relative to No Action, will result in increased occurrence of those interactions.

The PFMC's FPA could potentially result in a higher bycatch rate of unmarketable fish and other small animals when compared to the other action alternatives or the No Action Alternative. The FPA creates a situation where greater potential bycatch could occur because (1) it allows 50 percent greater chafer coverage than the other alternatives (75 percent allowable coverage compared to 50 percent coverage) and longer coverage compared to the No Action Alternative, depending on codend size used for comparison, and (2) it does not require a chafing panel opening for small animals to escape every 50 codend meshes. The new catch share regime holds individuals accountable for their total catch of groundfish (not just landed catch), thus it is expected that individuals will adjust their chafing gear configurations to minimize bycatch of unwanted groundfish within the constraints of the FPA. One of the purposes of the new management regime was to reduce the need for regulatory constraints by creating an incentive system to restrict catch to target species and minimize catch of unwanted or non-target species. While there is no incentive for fishermen to minimize their harvest of small fish not covered by the program, gear configurations which allow the escapement of small quota fish might also be expected to allow escapement of other species of small animals as well. The FPA specifies the outside bounds for what is allowed for chafing gear coverage in order to maximize flexibility. Fishermen may or may not decide to cover 75 percent of their codends with chafing gear and may or may not decide to break their chafing gear into panels depending what they determine is the best method for both protecting their gear from onboard abrasion sources and allowing escapement of small animals from codend meshes. The regulations which would implement the FPA would provide fishermen with a substantially greater opportunity to find innovative ways to configure chafing gear on their codends compared to the No Action Alternative, which limits coverage to 50 percent of the terminal 50 codend meshes. Continuation of 100 percent accountability for catch, whether through observers or other methods, will provide managers with information regarding the performance of this new regulation approach and an opportunity to make adaptive adjustments in the future if it turns out that fishermen are configuring their nets in a manner that escalates bycatch rates or seabed habitat encounters.

The PFMC choice of Alternative 1 as the FPA provides a regulatory adjustment which allows the vessels to continue to use chafing gear per the regulations that were in place through 2007 and as they were interpreted through 2011 (as would Alternatives 2a or 2b as well). The FPA provides additional flexibility in chafing gear configuration –sufficient to allow the use of nets with chafing gear configured for the higher levels of chafing gear coverage allowed in Alaskan fisheries (a flexibility not offered by Alternatives 2a and 2b). No difference is expected among the action alternatives in terms of habitat impacts. There may be some difference among the action alternatives in terms of retention of small-sized fish (with more retention expected under Alternative 1). However, retention of small fish is a disadvantage for fishermen, particularly under the IFQ program, as described in the preceding paragraph. As a consequence, fishermen tend to use larger than the minimum mesh size allowed for their chafing gear and might not utilize the maximum coverage allowed but will have the flexibility to do so depending on their own assessment of tradeoffs (see Section 4.3.1.1). The fishery is heavily monitored and adjustments may be made in the future if catch information indicates unexpected and problematic high levels of retention of small fish.

CHAPTER 3 **AFFECTED ENVIRONMENT**

The discussion below is taken in large part from: Final EA on Trailing Actions for the Pacific Coast Groundfish Trawl Rationalization Program (PFMC 2011c), from the EFH 2005 FEIS (NMFS 2005a) and the proposed harvest specifications and management measures for the 2013-2014 Pacific Coast groundfish fishery (PFMC 2012d). Other important documents are cited below as appropriate.

3.1 Physical Environment, including Essential Fish Habitat and Ecosystem

3.1.1 Physical Oceanography

A divergence in prevailing wind patterns causes the west wind drift (North Pacific Current), when it reaches the North American Continent, to split into two broad coastal currents: the California Current to the south and the Alaska Current to the north. As there are really several dominant currents in the California Current region, all of which vary in geographical location, intensity, and direction with the seasons, this region is often referred to as the California Current System. A more detailed description of the physical and biological oceanography of Pacific Coast marine ecosystems can be found in PFMC 2008. An analysis is provided in Chapter 4 of the potential for impact of the action alternatives on the Physical Oceanography of the action area.

3.1.2 Pacific Coast Marine Ecosystem

Consideration is given in this EA to the potential impact of the action alternatives on the Pacific Coast Ecosystem. Along the U.S. Pacific Coast within the California Current system, spatial patterns of biological distribution (Biogeography) have been observed to be influenced by various factors including depth, ocean conditions, and latitude. Cape Mendocino (Mendocino Escapement) is one of the most noteworthy influences to the latitudinal distribution of rockfish species diversity in the action area. Most stock assessments for groundfish tend to be either coastwide assessments, or are relative to the stocks north or south of Cape Mendocino (occasionally Cape Blanco). Both Cape Mendocino and Point Conception are key management boundaries for PFMC. The biogeography of the action area is discussed in detail in PFMC 2008, and is hereby incorporated by reference.

The California Current Ecosystem (CCE) is loosely defined as encompassing most of the U.S. and Canada west coasts, from the northern end of Vancouver Island, British Columbia, to Point Conception, California. The trophic interactions in the CCE are extremely complex, with large fluctuations over years and decades (PFMC 2008).

To some degree, food webs are structured around coastal pelagic species (CPS) that exhibit boom-bust cycles over decadal time scales in response to low frequency climate variability, although this is a broad generalization of the trophic dynamics. Similarly, the top trophic levels of such ecosystems are often dominated by highly migratory species such as salmon, albacore tuna, sooty shearwaters, fur seals, and baleen whales, whose dynamics may be partially or wholly driven by processes in entirely different ecosystems, even different hemispheres. For this description of the affected environment, the ecosystem is considered in terms of physical and biological oceanography, climate, biogeography, and essential fish habitat (EFH). A more detailed description of this ecosystem is found in PFMC 2008. The species of fish described in the following sections are integral components of the Pacific Coast Marine Ecosystem.

3.1.3 Essential Fish Habitat

The most common and direct effect of fishing on groundfish habitat results from fishing gear coming in contact with bottom habitats. Fishing gears can cause physical harm to corals, sponges, rocky reefs, sandy ocean floor, eelgrass beds, and other components of seafloor habitats. Indirect effects to habitats include physical contact of the vessel with habitat while underway or if sunk or abandoned, and chemical effects derived from paints or oils used on the vessel and bilge waste release. Bilge waste release can also introduce invasive species, which can introduce a wide range of biological and environmental impacts. The action alternatives under consideration in this EA have the potential to impact important groundfish habitats. This is because a change in chafing gear allowance on the codend of midwater nets could affect how fishermen use their trawl gear when fishing in the close proximity of seafloor habitats, particularly rocky or hard surface habitats where pelagic rockfish are commonly found. The primary groundfish habitats of concern in this EA include areas designated as EFH including Habitat Areas of Particular Concern (HAPCs), and RCAs.

EFH is defined by the Magnuson-Stevens Act as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802(10)). Groundfish EFH has been deemed through the PFMC process to include 1) all ocean and estuarine waters and substrates in depths less than or equal to 3,500 m, to the upriver extent of saltwater intrusion, which is defined based on ocean salt content during low runoff periods, and 2) areas associated with seamounts in depths greater than 3,500 m. The groundfish EFH designation describes 59.2 percent of the EEZ, which equates to 48,719,109 ha (142,042 square miles) in addition to state waters such as bays and estuaries (Figure 3-1) (NMFS 2005a).

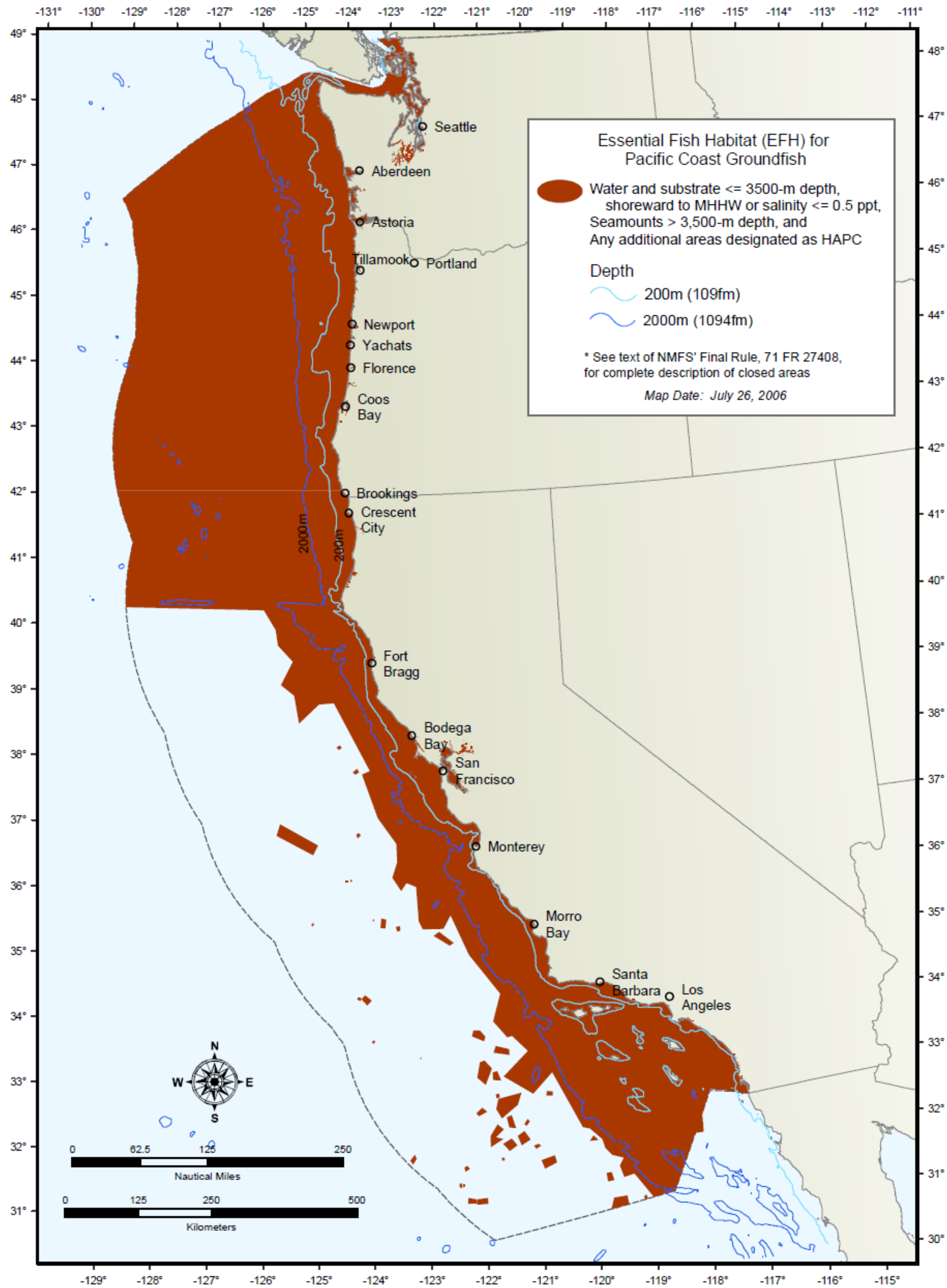

Figure 3-1: Map of EFH boundaries (NMFS 2005a)

The ocean area constituting 100 percent habitat suitability probability (HSP) for all species and life stages of FMP groundfish was used to define the extent of EFH designation. This was a precautionary approach because it is based on the currently known maximum depth distribution of all life stages of fishery management unit species. There is a lack of information on the value of seamounts to groundfish in depths greater than 3,500 m. Designating seamounts as EFH is precautionary because they may prove to be essential to certain life stages of fish in the groundfish fishery.

3.1.3.1 Benthic Habitat Types

Within the area designated EFH, there are distinct large-scale patterns of biological distribution along the Pacific Coast that provide for a first-order characterization of habitat into large zoogeographic provinces: the Oregonian and San Diego. The Oregonian Province extends from the Strait of Juan de Fuca in the North to Point Conception in the South. The San Diego Province begins at Point Conception in the north and runs south past the terminus of the EEZ (NMFS 2004 OLO). The Pacific Coast habitat types that occur within these two provinces and have been grouped in the EFH final EIS (FEIS) under two major headings: Nearshore, Estuarine and Intertidal Habitats, and Offshore Habitats. While the target species of the whiting and pelagic rockfish fisheries may inhabit nearshore and estuarine waters to a small degree, the fisheries for marketable-sized fish occur in offshore waters. The focus of potential gear contacts with benthic habitats in this EA focuses on the primary offshore benthic habitat types, which are briefly described below.

Offshore Biogenic Habitats (Corals, Sponges, etc.)

Groundfish species associated with structure-forming invertebrates (such as corals, basketstars, brittlestars, demosponges, gooseneck barnacles, sea anemones, sea lilies, sea urchins, sea whips, tube worms, and vase sponges) as biogenic habitat include arrowtooth flounder, big skate, bocaccio rockfish, California skate, cowcod, Dover sole, flag rockfish, greenspotted rockfish, lingcod, longspine thornyhead, Pacific ocean perch, quillback rockfish, rosethorn rockfish, sablefish, sharpchin rockfish, shortspine thornyhead, spotted ratfish, starry rockfish, tiger rockfish, vermilion rockfish, yelloweye rockfish, and yellowtail rockfish (NMFS 2005a).

Information on the location and abundance of these organisms comes primarily from trawl surveys, with additional data available from manned submersible and remotely-operated vehicle (ROV) work. Corals, anemones, sponges, sea pens, and sea whips grow up from the ocean floor and increase the complexity of the benthic environment, a possibly unique ecological function. There is little data to support conclusions about the role of these organisms on the Pacific Coast ; however, studies from other areas of the world demonstrate that corals in particular support complex ecological communities and increased biodiversity in comparison with areas without corals (citation in NMFS 2005a). Many of the locations of observations are included in a national database prepared under the auspices of National Oceanic and Atmospheric Administration’s (NOAA’s) Deep-Sea Coral Research and Technology Program (PFMC 2012g). Although there are a number of records of additional observations recorded at various research institutes, this database is currently the most comprehensive source of electronically available records of coral and, to a lesser extent, sponge observations in the region (PFMC 2012g).

Offshore Unconsolidated Bottom (silt, mud, sand, gravel or mixed)

Offshore, unconsolidated bottom habitats are composed of small particles (i.e., gravel, sand, mud, silt, and various mixtures of these particles) and contain little to no vegetative growth due to the lack of stable surfaces for attachment. Benthic fauna often consist of infaunal organisms. Because offshore unconsolidated bottom habitats are subject to lower levels of natural and anthropogenic disturbance than their inshore counterparts, they generally take longer to recover when they are disturbed. A large number of managed groundfish species utilize offshore unconsolidated bottom habitat during at least part of their life cycle including arrowtooth flounder, aurora rockfish, bank rockfish, big skate, blackgill rockfish, bocaccio rockfish, butter sole, calico rockfish, California scorpionfish, California skate, chilipepper, cowcod, curlfin sole, darkblotched rockfish, Dover sole, English sole, flathead sole, gopher rockfish, greenspotted rockfish, greenstriped rockfish, honeycomb rockfish, leopard shark, lingcod, longnose skate, longspine thornyhead, Pacific cod, Pacific ocean perch, Pacific rattail (grenadier), Pacific sanddab, petrale sole, pink rockfish, quillback rockfish, redbanded rockfish, rex sole, rock sole, rosethorn rockfish, rougheye rockfish, sablefish, sand sole, sharpchin rockfish, shortbelly rockfish, shortraker rockfish, shortspine thornyhead, soupfin shark, speckled rockfish, spiny dogfish, splitnose rockfish, spotted ratfish, starry flounder, stripetail rockfish, vermilion rockfish, widow rockfish, yelloweye rockfish, and yellowtail rockfish (NMFS 2005a).

Offshore Hard Bottom

Hard bottom habitats in the offshore zone may be composed of bedrock, boulders, cobble, or gravel/cobble. Hard bottom habitat is associated with a variety of Continental mega habitat types including: Rise, Basin, Slope, Ridge, and Shelf (Appendix C to NMFS 2005a). Many managed species are dependent on hard bottom habitat during some portion of their life cycle. Typically, deeper water hard bottom habitats are inhabited by large, mobile, nektobenthic fishes such as rockfish, sablefish, Pacific hake, spotted ratfish, and spiny dogfish (NMFS 2005a). NMFS 2005a, based on published studies, estimates that about 30 percent of the fish species and 40 percent of fish families occur over hard substrates.

Many managed groundfish species use hard bottom habitats during one or more life stages including aurora rockfish, bank rockfish, black rockfish, black-and-yellow rockfish, blackgill rockfish, blue rockfish, Boccaccio, bronzespotted rockfish, brown rockfish, cabezon, calico rockfish, California scorpionfish, canary rockfish, chilipepper, China rockfish, copper rockfish, cowcod, dusky rockfish, flag rockfish, gopher rockfish, grass rockfish, greenblotched rockfish, greenspotted rockfish, greenstriped rockfish, harlequin rockfish, honeycomb rockfish, kelp greenling, kelp rockfish, leopard shark, lingcod, Mexican rockfish, olive rockfish, Pacific cod, Pacific ocean perch, pink rockfish, quillback rockfish, redstripe rockfish, rosethorn rockfish, rosy rockfish, rougheye rockfish, sharpchin rockfish, shortbelly rockfish, shortraker rockfish, silvergray rockfish, speckled rockfish, spotted ratfish, squarespot rockfish, starry rockfish, stripetail rockfish, tiger rockfish, treefish, vermilion rockfish, widow rockfish, yelloweye rockfish, yellowmouth rockfish, and yellowtail rockfish (NMFS 2005a).

Offshore Habitat Recovery Times

Offshore habitat recovery from the effects of trawl fishing varies by habitat type (Table 3-1). Offshore biogenic habitats generally have longer recovery times from trawl gear impact compared to offshore unconsolidated habitats. Offshore hard bottom habitats are intermediate and may take up to three years to recover to pre-fishing conditions.

Table 3-1: Summary of Habitat Sensitivity For habitat found in the RCAs Relative To Bottom Trawl Gear (2005 EFH FEIS Table 3-1).

Habitat Category	Habitat Type	Sensitivity to impact a/	Recovery from impact (years)
Offshore Biogenic	Macrophyte	1.0-3.0	1.5-4.5
	Shelf Shellfish	1.4-2.2	1.0-3.0
	Shelf Sponge	2.0-2.4	1.0-1.6
	Slope Sponge	2.5-3.0	3.5-10.5
	Shelf Coral	2.0-3.0	1.0-1.6
	Ridge	2.0-3.0	2.0-3.0
	Basin	2.0-3.0	3.5-10.5
	Continental Rise	2.0-3.0	3.5-10.5
Offshore Unconsolidated Bottom	Shelf Soft Bottom	0.5-1.0	0.2-0.6
	Shelf canyons, gullies, and ice formed features	0.5-1.0	0.2-0.6
	Ridge	0.5-1.0	0.5-1.0
	Slope canyons, gullies, and ice formed features	0.5-1.5	1.0-2.0
	Continental Rise canyons, gullies, and landslide	0.5-1.5	0.5-1.5
Offshore Hard Bottom	Canyon and ice formed features	2.0-3.0	1.0-2.0
	Exposure	2.0-3.0	1.0-2.0
	Slope canyons, gullies, landslides, and exposures	2.5-3.0	2.5 - 3.0
	Basin	0.5-1.5	2.5 - 3.0

a/
0 = No detectable adverse impacts on the seabed; i.e., no significant differences between impact and control areas in any metrics.
1 = Minor impacts, such as shallow furrows on bottom; small differences between impact and control sites, less than 25% in most measured metrics.
2 = Substantial changes, such as deep furrows on bottom; differences between impact and control sites 25-50% in most metrics measured.
3 = Major changes in bottom structure, such as re-arranged boulders; large losses of many organisms.

3.1.3.2 Habitat Areas of Particular Concern (HAPCs)

EFH guidelines published in Federal regulations (50 CFR 600.815(a)(8)) identify HAPCs as types or areas of habitat within EFH that are identified based on one or more of the following considerations: the importance of the ecological function provided by the habitat; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are or will be stressing the habitat type; and the rarity of the habitat type. The HAPCs that are of greatest concern in this EA are those that occur in the offshore area where the midwater fishery takes place. These are briefly described below.

Rocky Reefs
Rocky habitats are generally categorized as either nearshore or offshore in reference to the proximity of the habitat to the coastline. 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.

Areas of Interest

Areas of interest are discrete areas that are of special interest due to their unique geological and ecological characteristics. The following areas of interest are designated HAPCs (see 2005 EFH EIS for a more detailed description of these areas of interest):

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

Given where midwater fishing has occurred in recent years, the midwater trawl fishery interactions with HAPCs are most likely to occur in areas identified as offshore rocky reef. These can occur within or outside of areas identified as Areas of Interest, which have specific boundaries identified in regulation. .

A map of coastwide HAPCs including estuaries, nearshore habitats and offshore habitats is shown below as Figure 3-2.

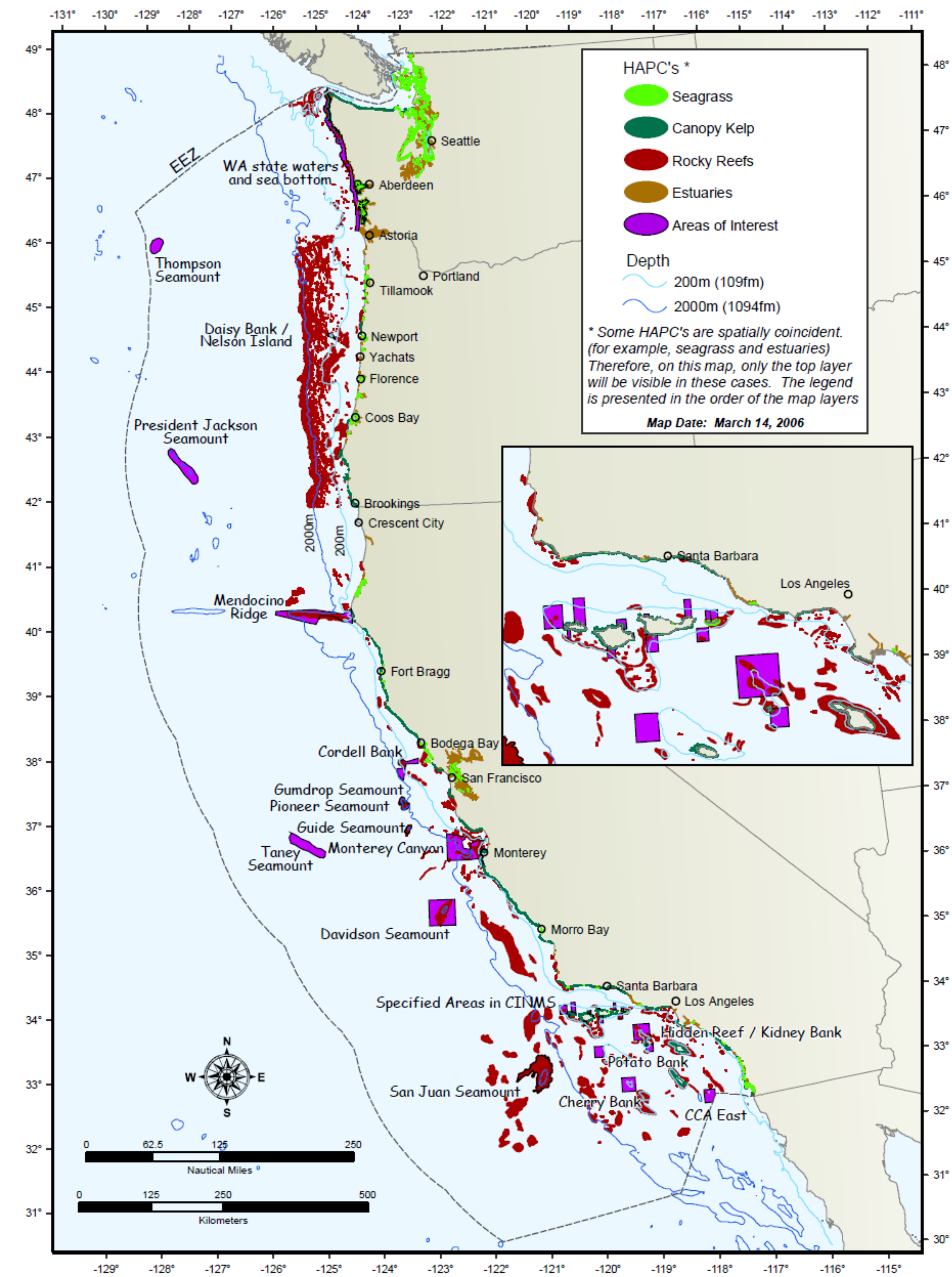

Figure 3-2: Map showing Habitat Areas of Particular Concern.

3.1.3.3 Essential Fish Habitat Conservation Areas (EFHCA)

An EFHCA, a type of closed area, is a geographic area defined by coordinates expressed in degrees of latitude and longitude at 50 CFR §§ 660.75 through 660.79, subpart C, where specified types of fishing are prohibited. EFHCAs apply to vessels using bottom trawl gear or to vessels using "bottom contact gear," to include bottom trawl gear, among other gear types. Midwater trawling is allowed in EFHCAs when midwater trawl fishing is allowed in adjacent waters by the groundfish regulations (50 CFR 660 Parts C-G available at http://www.trawl.org/Groundfish%20Regulations/pink-pages.pdf).

3.1.3.4 Rockfish Conservation Areas (RCA)

RCAs, are large-scale closed areas that extend along the entire length of the U.S. Pacific Coast (Figure 3-3). RCA boundaries are lines that connect a series of latitude/longitude coordinates intended to approximate particular depth contours. RCA boundaries for particular gear types differ between the northern and southern areas of the coast. RCA boundaries change at different times of the year (Table 3-2). The locations of the RCA boundaries are set in order to minimize opportunities for vessels to incidentally take overfished rockfish by eliminating fishing in areas where, and times when, those overfished species are most likely to co-occur with more healthy stocks of groundfish. RCAs protect various benthic habitat types, hard bottom or rocky habitats in particular, where overfished rockfish are most abundant.

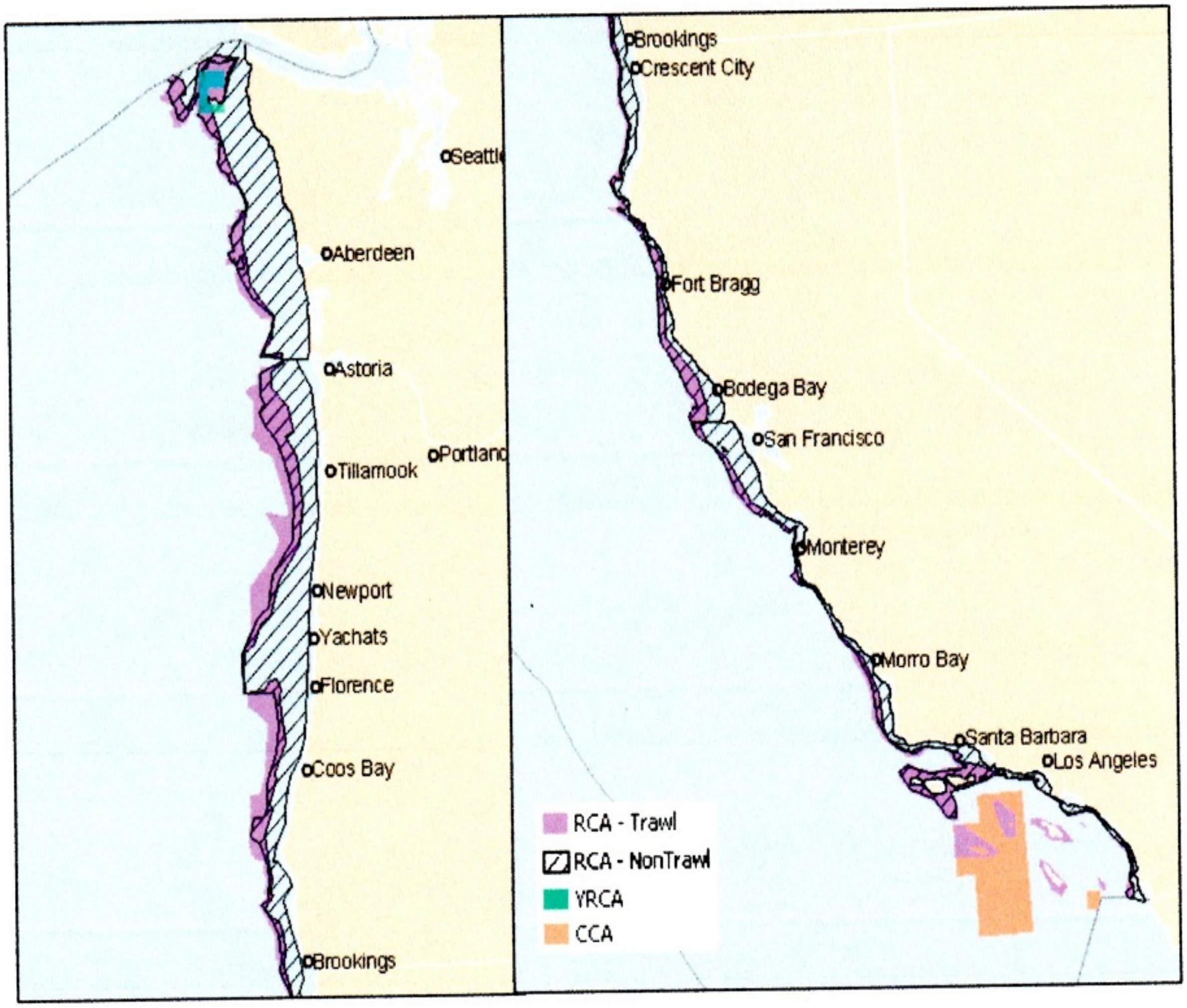

Figure 3-3: Example map showing trawl and non-trawl RCA boundaries.

Table 3-2: Changes in trawl RCAs depth restrictions over time (fathoms).

Year	Area (North of 40°10')	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2001	North of 40°10'	N/A, PFMC (Council) introduced Cowcod Conservation Areas south of 40°10'											
2002	North of 40°10'	N/A, PFMC (Council) retained Cowcod Conservation Areas south of 40°10'								Shore-250	100-250	100-250	100-250
2003	North of 40°10'	100-m250		100-250		50-200		75-200		50-200		0-m200	
2004	North of 40°10'	75-m200		60-200		60-150		75-150			0-250		
2005	North of 40°10'	75-m200		100-200							0-250		
2006	North of 40°10'	75-m200		75-200				100-250		75-250		75-m250	
	North of 48°10'	75 - m250		75 - 250	0 - 150					0 - 200	75 - 200	75 - m200	
	48°10' - 46°38'				75 - 150					75 - 200			
	46°38' - 46°16'				60 -150					60 -200			
	46°16' - 45°03'				75 - 150			75 - 200					
	45°03' - 43°20'				75 - 200								
	43°20' - 42°40'				0 - 200						75 - 200		
2007	42°40' -40°10'				75 - 200								
	North of 48°10'	0 - m200		0 - 200		0 - 150						0 - m200	
	48 10 - 46 38.17	75 - m200		60 - 200		60 - 150					75 - 150	75 - m200	
	46 38.17 - 46 16			60 - 200				60 - 150					
	46 16 - 45 46			75 - 200		75 - 150				75 - 200			
	45 46 - 43 20.83			75 - 200									
	43 20.83 - 42 40.50	0 - m200		0 - 200								0 - m200	
2008	42 40.5 - 40 10	75 - m200		75 - 200		60 - 200					75 - 200	75 - m200	
	North of 48°10'	0 - m200			0 - 200	0 - 150				0 - 200		0 - m200	
	48°10' - 45°46'	75 - m200			75 - 200	75 - 150		100 - 150		75 - 200		75 - m200	
2009	45°46' - 40°10'					75 - 200		100 - 200					
	North of 48°10'	0 - m200		0 - 200		0 - 150				0 - 200		0 - m200	0 - 250
	48°10' - 45°46'	75 - m200		75 - 200		75 - 150		100 - 150		75 - 200		75 - m200	75 - 250
2010	45°46' - 40°10'					75 - 200		100 - 200					
	North of 48°10'	0 - m200		0 - 200		0 - 150				0 - 200		0 - m200	
	48°10' - 45°46'	75 - m200		75 - 200		75 - 150		100 - 150		75 - 150			
2011	45°46' - 40°10'					75 - 200		100 - 200		75 - 200		75 - m200	
	North of 48°10'	0 - m200		0 - 200		0 - 150				0 - 200		0 - m200	
	48°10' - 45°46'	75 - m200		75 - 150		100 - 150						75 - 150	
2012	45°46' - 40°10'			75 - 200		100 - 200						75 - m200	

The PFMC introduced RCAs in 2002. From 2002 to 2011, midwater trawl gear used to target Pacific whiting has been exempted from RCA restrictions in the area north of 40°10' N. latitude during the primary whiting season. Beginning in 2011, the groundfish midwater trawl fishery has expanded under the trawl rationalization program, and includes targeting of pelagic rockfish complex species. Vessels have targeted pelagic rockfish within the RCAs north of 40°10' N. latitude during the primary whiting season. Since 2005, midwater trawling has been allowed in the area south of 40°10' N. latitude for (1) all groundfish species when fishing seaward of the trawl RCA and (2) within the trawl RCA by vessels targeting Pacific whiting during the primary whiting season.

The trawl RCAs and related gear restrictions were established in order to reduce bycatch of overfished species and have been modified over the years (Table 3-2). Because of the long rebuilding periods for many of the overfished groundfish species, the RCAs were expected to be in place for many years, reducing the effects of trawl gear types on bottom habitat within the RCAs. Because the RCA restrictions on bottom trawling have been in place since 2002, a great deal of recovery to pre-fishing conditions has likely occurred in the baseline environment described in the 2005 EFH FEIS.

3.2 Biological Resources

Federal regulations at 50 CFR 600.10 define the term “fishery management unit” (FMU) to mean:

> “…a fishery or that portion of a fishery identified in an FMP relevant to the FMP's management objectives. The choice of an FMU depends on the focus of the FMP's objectives, and may be organized around biological, geographic, economic, technical, social, or ecological perspectives.”

Fish stocks that are classified as FMU species are considered to be in the fishery, whether as target or non-target species. Federal regulations at 50 CFR 600.310(d)(3) and (4) provide the following definitions for “target stocks” and “non-target species,” both of which are considered FMU species: “Target stocks” are stocks that fishers seek to catch for sale or personal use, including “economic discards” as defined under MSA 3(9). “Non-target species” and “non-target stocks” are fish caught incidentally during the pursuit of target stocks in a fishery, including “regulatory discards” as defined under MSA section 3(38). They may or may not be retained for sale or personal use. Non-target species may be included in a fishery and, if so, they should be identified at the stock level. Some non-target species may be identified in an FMP as ecosystem component (EC) species or stocks.

In following sections, the target and non-target stocks of the midwater trawl fishery are described. In Chapter 4, the impacts of the alternatives are assessed relative to each of the alternatives described in Chapter 2.

3.2.1 Target Species

The primary target species of the midwater trawl fishery from 2001 to 2011 have been Pacific whiting (whiting) and chilipepper rockfish. Historically (pre-2002) the pelagic rockfish complex species were more commonly targeted with midwater and bottom trawl gear. Since 2011 and the implementation of trawl rationalization, interest by fishermen and fish processors in targeting widow and yellowtail rockfish has increased. Much of the midwater trawl fishery opportunity has been limited to whiting because of limited QP of overfished rockfish species, widow rockfish in particular. That situation is expected to change in the near future because widow rockfish has been declared rebuilt from overfishing, and in 2013 the allowable catch limit (ACL) is increased. As the widow rockfish ACL increases, more targeting on pelagic rockfish complex species is expected to occur. In addition, new midwater trawl target species may emerge. The midwater trawl fishery for non-whiting target fishing has been emerging since 2011. The regulations already allow for non-whiting target fishing south of 40˚ 10' N. latitude, but the fishery using midwater gear is limited to waters seaward of the RCA where abundance of the three target species is relatively low.

3.2.1.1 *Pacific Hake (Whiting)*

The following is from CDFG 2001a. Pacific hake are distributed from the Gulf of Alaska to the Gulf of California. Four major stocks have been identified within this area. The most abundant and widely distributed stock (which is the subject of this report) spawns between central

California and northern Baja California and is referred to as the "coastal stock." The oceanic coastal stock of adult Pacific hake is migratory and inhabits the continental slope and shelf within the California Current system from Baja California to British Columbia (Figure 3-4). It is often classified as a demersal species (living on or near the sea bed), but its distribution and behavior suggests a pelagic existence. It exhibits extreme night and day movement during spring and summer feeding migrations as it feeds on a variety of pelagic fishes or zooplankton. It is commonly found at depths of 160 to 1,500 feet but has been found from the surface to 2,600 feet. Coastal Pacific hake are pelagic spawners that appear to spawn from January to March. The location of spawning appears to center on the Southern California Bight, but spawning may take place within an area from San Francisco to Baja California at depths of 660 to 1,600 feet and as far as 300 miles offshore. Active spawners aggregate in loose, stationary bands that can be up to 150 feet thick.

In late winter, following spawning, adult hake migrate north in deep water overlying the continental slope to the summer feeding grounds off northern California, Oregon, Washington, and Vancouver Island. The peak period of northward migration appears to be in March and April. The migration behavior of hake is strongly age dependent, and influenced by oceanographic conditions. In warm years, a significant portion (up to 50 percent) of the stock may move into Canadian waters off Vancouver Island. Large adults may travel up to 1,100 miles, while newly mature hake may travel a maximum of 900 miles from southern California spawning grounds during the summer feeding period. Hake caught from Oregon to Vancouver Island range from 16 to 18 inches, fork length, and are four to 10 years old.

When northward-migrating hake inhabit waters overlying the continental shelf and slope, they form schools that may be characterized as long, narrow bands usually oriented parallel to the depth contours. During the summer, when feeding adults are distributed over the continental shelf, schools exhibit pronounced movement into midwater associated with nighttime feeding activities. At dawn, coastal hake descend and begin to regroup into schools near the sea bed (seven to 70 feet above the ocean floor), usually in the same area where they were the day before. The degree to which hake congregate during the day appears to be related to the type of food that was available during the feeding period. Schools are more dispersed when feeding on fish and other mobile nekton, but more compact when feeding on euphausiids.

The southward spawning migrations of the adults appears to occur in November and December, just prior to the spawning period. Availability of Pacific hake to bottom and midwater trawls off Oregon, Washington, and Vancouver Island drops sharply in November and is practically nil during winter.

The most recent stock assessment for whiting was in 2011 (IJTCPH 2012). The base-case stock assessment model indicated that the Pacific hake female spawning biomass was well below the average unfished equilibrium in the 1960s and 1970s. The current median posterior spawning biomass is estimated to be 32.6 percent of the average unfished equilibrium level (*SB0*). However, this estimate is quite uncertain, with 95 percent posterior credibility intervals ranging from historical lows to above the average unfished equilibrium levels. The estimate for 2012 is 0.62 million metric ton, much smaller than the two estimates in the 2011 assessment (1.87, and

2.18 million metric ton). This change is largely driven by the very low 2011 acoustic survey biomass index.

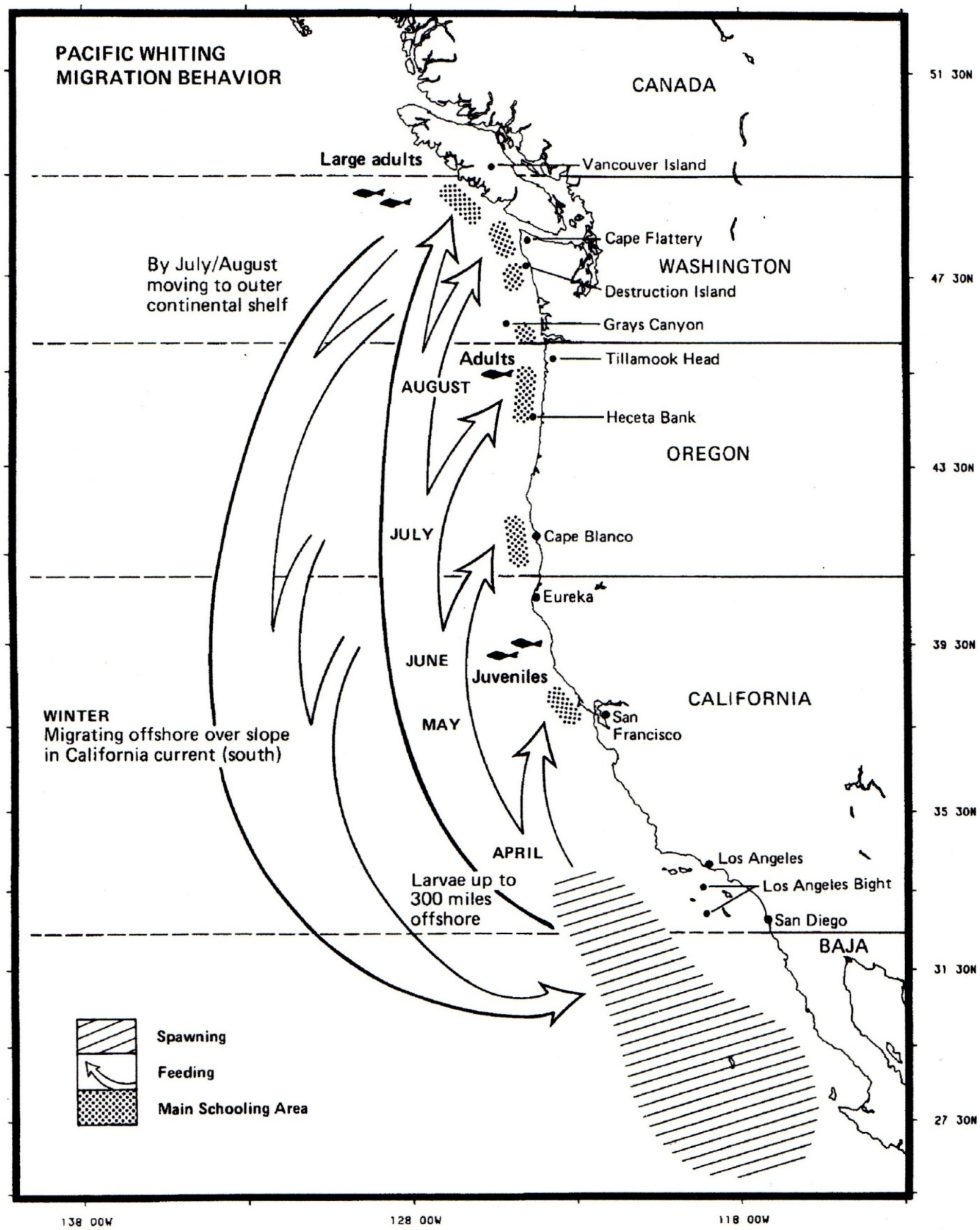

Figure 3-4: Migratory pattern of Pacific whiting (Bailey *et al*. 1982)

3.2.1.2 Widow rockfish

The widow rockfish *(Sebastes entomelas)* was an untargeted species in northern California prior to 1979. Before that it had been taken primarily with bottom trawl from widely spaced aggregations in 40-140 fathoms. These aggregations produced high catch rates during the fall and spring, which are the mating and spawning seasons for the species. In 1979 a highly directed midwater trawl fishery developed for widow rockfish. New technology, incorporating the use of electronic navigation, fish finding equipment, and midwater nets, extended fishing operations into previously unfished areas and enabled vessels to follow shifts in widow rockfish concentrations throughout the year (Quirollo 1987, Demory 1987). Schooling behavior of widow rockfish allows them to be targeted easily by fishermen, and catches (when the fishery was active) were often 100 percent widow rockfish. Midwater trawling for widow rockfish historically occurred at night when they formed dense off-bottom schools (Tagart 1987). Species most commonly caught incidentally to widow rockfish include yellowtail rockfish and Pacific whiting. Other *Sebastes* landed with widow rockfish include Pacific Ocean perch, bocaccio rockfish, canary rockfish, and sharpchin rockfish (Tagart 1987).

The following is from CDFG 2001b. Widow rockfish are found from Todos Santos Bay, Baja California, to Kodiak Island, Alaska. Peak abundance is off northern Oregon and southern Washington, with significant aggregations occurring south to central California. While many commercial catches occur at bottom depths between 450 and 750 feet, young fish occur near the surface in shallow waters, and adults have been caught over bottom depths to 1,200 feet. Widow rockfish often form midwater schools, usually at night, over bottom features such as ridges or large mounds near the shelf break. The schooling behavior of widow rockfish is quite dynamic and probably related to feeding and oceanographic conditions. There appears to be some seasonal movement of fish among adjacent grounds, and there is evidence that fish move from area to area as they age, with fish of the same size tending to stay together. The maximum recorded age for widow rockfish is 59 years, but fish older than 20 years are now uncommon. Most are less than 21 inches long, corresponding to a weight just under five pounds. The maximum size is 24 inches or about 7.3 pounds. At first, growth is fairly rapid and by age five widow rockfish average 13.5 inches. By age 15, growth slows greatly, when the average size is about 19 inches for females and 17.5 inches for males. Widow rockfish do not become reproductive until years after birth. For example, only 50 percent are mature by age five, but almost all are mature by age eight when they are 16.5 inches long. Off California, fecundity ranged from 55,600 eggs for a 12.8-inch female to 915,200 eggs for an 18.8-inch fish. The release of larvae by widow rockfish peaks in January-February and appears to occur in the same areas where they are caught during that season. The larvae are about 0.2 inch when released. The young fish lead a pelagic existence until they are about five months old. During the latter part of the pelagic stage, the two-inch fish feed mostly on copepods and small stages of euphausiids. Adult widow rockfish feed on midwater prey such as lantern fish, small Pacific whiting euphausiids, sergestid (deep-water) shrimp, and salps. Juvenile rockfish, including widow rockfish, are important prey items for sea birds and Chinook salmon in May and June. Little is known about predation of adult widow rockfish.

The most recent widow rockfish assessment in 2011 applied to widow rockfish (*Sebastes entomelas*) located in the territorial waters of the U.S., including the Vancouver B.C., Columbia, Eureka, Monterey, and Conception areas. The stock is assumed to be a single mixed stock and subject to five major fisheries (He *et al*. 2011). Stock spawning biomass of widow rockfish showed a steady decline between 1980 and 2001, soon after major commercial fisheries for widow rockfish began. The stock was declared overfished in 2001. A stock that has declined to less than 25 percent of its unfished spawning biomass is considered "overfished" until it rebuilds to 40 percent of its unfished spawning biomass. The most recent stock assessment showed that the stock had rebuilt to a depletion level of 51 percent and a spawning stock size of 36,342 metric ton. The assessment showed that the stock has rebuilt (He *et al*. 2011).

3.2.1.3 Yellowtail rockfish

The following is from CDFG 2001c. Yellowtail rockfish are found from Kodiak Island, Alaska to San Diego, although they are rare south of Point Conception. They are wide-ranging and are reported to occur from the surface to 1,800 feet and are known to form large schools, either alone or in association with other rockfish, including widow rockfish, canary rockfish, redstripe rockfish, and silvergray rockfish. They are primarily distributed over deep reefs on the continental shelf, especially near the shelf break, where they feed on krill and other micronekton. Some allozyme and parasitological evidence supports the view that multiple stocks exist, whereas other genetic data indicate one single coastal stock. Like many other species of rockfish, yellowtail is long lived. The age distribution of fish sampled in commercial fisheries off Oregon and Washington can span six decades, with the oldest known specimen a 64-year-old male. They typically reach their maximum size at about 15 years of age and the largest recorded specimen was a 28-inch female. Females begin to mature at 10 to 15 inches, with half reaching maturity by a size of 15 to 18 inches; males do not grow quite as large as females.

The most recent stock assessment for yellowtail rockfish showed the following: The estimated age of the 4+year old biomass in 2004 for the stock north of 40 10 N. lat. was estimated to be 72,152 metric ton with a 26 percent CV, an increase from 58,025 metric ton in 2003. The spawning biomass has remained above 40 percent of unfished spawning biomass since 1995. Annual fishing mortalities have been less than FMSY since 1997, due to more restrictive regulations put in place to rebuild other overfished rockfishes (Wallace and Lai 2005).

3.2.1.4 Chilipepper rockfish

Chilipepper rockfish range from Queen Charlotte Sound, British Columbia to Magdalena Bay, Baja California. The area of greatest abundance is found between Point Conception and Cape Mendocino, California (Field 2007). Adults are found on deep rocky reefs, as well as on sand and mud bottoms, from 150 to 1,400 feet; juvenile’s school and are frequently found in shallow nearshore waters, particularly in kelp beds. Spawning occurs from September to April with a peak occurring in December and January. About 50 percent of female chilipepper are sexually mature at four years when they are between 11 and 12 inches, while males mature at two years and between eight and nine inches. Chilipepper attain a maximum age of 35 years and a size of up to 23 inches, with females growing substantially larger than males. Adults feed on krill and other small crustaceans, squid, and a variety of small fishes. Probable predators of chilipepper include marine birds and mammals, Chinook salmon, lingcod, Pacific hake, sablefish, and other rockfish (CDFG 2001d).

The last stock assessment of chilipepper in 2007 indicated the stock was in quite good condition. The base model in that assessment suggested a spawning biomass of 23,889 tons in 2006, corresponding to approximately 70 percent of the unfished spawning biomass of 33,390 tons and representing a near tripling of spawning biomass from the estimated low of 8,696 tons (26 percent of unfished) in 1999 (Field 2007). Although chilipepper rockfish have been a commercially important species in California waters since well before the Second World War, the exploitation rate has rarely exceeded the current target exploitation rate (SPR 50 percent). The highest exploitation rates occurred from the late 1980s through the mid-1990s, when they were above target levels and the stock was approaching its lowest estimated historical levels. From the late 1990s through the present, exploitation rates have been declining significantly, as a result of management measures implemented to rebuild other depleted rockfish species (Field 2007).

3.2.2 Non-target Fish Species

The biological resources covered in this section include those species that share the same marine environment both temporally and spatially with Pacific whiting (coastal stock), a principal species under consideration in this environmental assessment, and the three rockfish species that comprise the pelagic rockfish species complex historically targeted with midwater trawl gear: widow, yellowtail, and chilipepper rockfish.

3.2.2.1 Incidence of Non-target Species in Pacific Whiting Fisheries

At-sea whiting fishery (tribal and non-tribal) observer data for 2006-2011 were examined to determine the species and relative abundance by species or species group impacted in the fishery. The at-sea fisheries, catcher/processors, motherships, and tribal mothership had 100 percent observer coverage (nearly all hauls were sampled) during this period. The data show that the at-sea whiting vessels incidentally catch a wide variety of species and species groups in addition to whiting. By weight, three species or species groups made up over 80 percent of the non-target species catch: Humboldt squid (Other Non-groundfish), spiny dogfish (Other Groundfish), and unidentified squid (Forage Fish Species), in that order (Table 3-3). The 2007-2011 non-target species average was 1.93 percent with a range of from 0.77 percent to 6.24 percent.

Table 3-3: Tribal and Non-tribal at-sea Pacific whiting fishery catch (mt) data by species and year, 2006-2011 (NMFS whiting fishery annual report[a/]).

	2006	2007	2008	2009	2010	2011	AVG (07-11)
OVERFISHED GROUNDFISH							
Canary rockfish	0.770	2.000	3.790	2.740	1.180	1.080	2.158
Darkblotched rockfish	10.970	12.010	6.330	0.980	8.170	12.170	7.932
POP	3.470	4.030	15.830	5.090	16.830	9.150	10.186
Widow rockfish	141.400	145.820	114.780	109.910	44.480	38.730	90.744
Yelloweye rockfish	0.030	0.010	0.010	0.000	0.010	0.000	0.006
SUBTOTAL	156.640	163.870	140.740	118.720	70.670	61.130	111.026
OTHER GROUNDFISH							
All other groundfish	NA	2.020	20.320	14.230	0.580	0.000	7.430
All other rockfish	NA	32.765	76.230	1.240	24.680	0.030	26.989
Arrowtooth	NA	3.000	6.290	5.750	12.990	48.980	15.402
Black rockfish	NA	0.000	0.000	0.020	0.000	0.000	0.004
Chilipepper rockfish	NA	0.320	0.670	2.450	1.070	0.010	0.904
Dover sole	NA	0.060	0.770	0.120	1.860	1.180	0.798
English sole	NA	0.000	0.010	0.170	0.010	0.020	0.042
Lingcod	3.200	6.220	5.560	2.870	0.990	0.320	3.192
Longspine thornyhead	NA	0.000	0.450	0.000	0.000	0.390	0.168
Minor shelf rockfish	NA	NA	NA	NA	NA	0.930	NA
Minor slope rockfish	NA	NA	NA	NA	NA	81.220	NA
Other flatfish	NA	0.270	0.460	0.470	10.420	1.920	2.708
Pacific cod	NA	0.000	0.070	0.510	0.000	0.040	0.124
Pacific Whiting	139,764.000	126,239.000	180,496.000	72,164.000	106,308.000	128,074.000	122,656.200
Petrale sole	NA	0.010	0.000	0.000	0.000	3.950	0.792
Shortbelly rockfish c/	NA	0.010	0.000	0.050	0.000	0.000	0.012
Shortspine thornyhead	NA	2.730	5.350	0.500	3.970	13.280	5.166
Spiny dogfish	NA	154.710	674.260	162.560	277.630	783.760	410.584
Splitnose rockfish	NA	2.180	0.660	1.220	43.530	11.910	11.900
Starry flounder	NA	0.000	0.000	0.000	0.000	0.000	0.000
Thornyhead, unid.	NA	0.000	1.430	0.000	0.000	0.130	0.312
Yellowtail rockfish	NA	79.630	173.990	90.910	150.060	101.180	119.154
SUBTOTAL	NA	126,522.925	181,462.520	72,447.070	106,835.790	129,123.250	123,261.881
PROHIBITED AND PROTECTED SPECIES (NUMBERS)							
Chinook	3,115	2,034	879	1,139	1,364	4,362	1,956
Coho	NA	236	21	20	5	15	59
Chum	NA	170	60	52	11	65	72
Pink	NA	35	0	2	0	394	86
Sockeye	NA	0	2	0	2	0	1
Salmon, unid.	NA	0	18	0	2	6	5
Steelhead	NA	0	0	0	0	0	0
Pacific halibut	NA	106	495	53	144	71	174
Dungeness crab	NA	46	12	0	0	4	12
Eulachon	NA	NA	NA	NA	NA	1,482	296
NON-GROUNDFISH SPECIES							

	2006	2007	2008	2009	2010	2011	AVG (07-11)
Forage Fish Species (NMFS extract)							
American shad	24.691	14.460	0.895	1.071	0.261	35.074	10.352
Mackerel, unid.	10.185	0.365	3.949	1.399	1.477	14.276	4.293
Lanternfish, unid.	0.081	0.273	0.365	0.097	0.080	0.948	0.352
N. anchovy	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Pac. herring	9.603	0.052	0.012	0.021	0.077	0.238	0.080
Pac. mackerel	3.709	0.137	0.000	0.002	0.102	0.107	0.070
Pac. sand lance	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pac. sardine	0.286	0.378	0.252	0.001	0.100	0.015	0.149
Pac. saury	0.000	0.000	0.020	0.000	0.000	0.000	0.004
Shrimp, unid.	0.000	0.000	0.003	0.001	0.001	0.021	0.005
Deepsea smelt, unid.	0.000	0.000	0.010	0.007	0.000	0.111	0.026
Eulachon smelt	0.001	0.000	0.003	0.005	0.000	0.133	0.028
Rainbow smelt	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Smelt, unid.	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Squid, unid.	91.907	66.064	85.589	44.303	76.390	79.366	70.342
Smelt/herring, unid.	0.000	0.000	0.036	0.000	0.000	0.000	0.007
SUBTOTAL	140.463	81.729	91.134	46.907	78.491	130.291	85.711
Other Non-groundfish (NMFS extract)							
Ascidian, sea squirt, tunicate	-	-	-	-	-	0.000	0.000
Barnacles, unid.	-	-	0.001	-	-	-	0.000
Basket starfish	-	0.000	-	-	-	0.000	0.000
Black eelpout	-	0.000	-	-	-	-	0.000
Brittle starfish, unid.	-	-	-	-	-	-	0.000
Corals, bryozoans, unid.	-	0.000	-	-	-	-	0.000
Dungeness crab	0.009	0.016	0.004	0.001	-	-	0.004
Eelpout, unid.	0.002	0.004	0.039	0.002	0.016	0.308	0.074
Humboldt squid	853.461	732.499	2,762.418	4,347.035	146.721	0.011	1,597.737
Invertebrate, unid.	-	0.510	0.000	0.030	0.001	0.005	0.109
Isopod	-	-	-	-	-	-	0.000
Jellyfish, unid.	1.260	0.324	0.292	0.543	0.319	0.136	0.323
Lamprey, unid.	0.034	0.024	0.092	0.014	0.043	0.038	0.042
Pac lamprey	0.004	0.006	0.028	0.010	0.003	0.001	0.010
Paperbones, unid	-	-	0.001		0.000	0.173	0.035
Pearleyes, unid.	0.000	0.001	0.000	0.000	-	-	0.000
Poacher, unid.	-	-	-	-	0.015	0.000	0.003
Prowfish	-	0.019	0.009		0.000	0.014	0.008
Ragfish	10.446	25.686	64.046	3.602	0.305	2.744	19.277
Ribbon barracudina	-	0.000	0.012	0.003	0.003	0.000	0.004
Ronquil, unid.	-	0.000	0.002	-	-	-	0.000
Sea anemone, unid	0.000	0.000	0.000	0.001	0.002		0.001
Sea cucumber, unid.	-	-	-	-	-	0.000	0.000
Sea pen, Sea whip, unid.	0.003	0.007	0.000	0.000	0.000	0.001	0.002
Slender snipe eel	-	-	-	-	-	-	0.000
Snailfish, unid.	-	0.003	0.036	0.001	0.037	0.036	0.022
Snipe eel, unid.	-	0.000	0.000	-	-	0.000	0.000
Tubeshoulder, unid.	0.003	0.018	0.062	0.016	0.002	0.004	0.020

	2006	2007	2008	2009	2010	2011	AVG (07-11)
Viperfish, unid.	0.002	0.021	0.061	0.008	0.028	0.008	0.025
SUBTOTAL	865.226	759.139	2,827.105	4,351.267	147.497	3.479	1,617.697
TOTAL FISH AND INVERTEBRATES b/	NA	127,527.66	184,521.50	76,963.96	107,132.45	129,318.15	125,076.31
TOTAL NON-WHITING b/	NA	1,288.66	4,025.50	4,799.96	824.45	1,244.15	2,420.11
PROPORTION NON-WHITING b/	NA	1.01%	2.18%	6.24%	0.77%	0.96%	1.93%

a/ http://www.westcoast.fisheries.noaa.gov/fisheries/management/whiting/whiting_reports_and_rulemakings.html

b/ Excludes protected and prohibited species

c/ Could be considered a forage species

Shoreside whiting fishery logbook data for 2008-2011 also show a wide variety of fish and invertebrate species in the catch. The shoreside whiting fishery logbook data reflect landed catch and do not show discarded catch. These data have been reported by industry and cannot be verified for accuracy or completeness for species encountered. The catch rate for non-target species ranged from 0.25 percent to 1.04 percent per year and averaged 0.71 percent (Table 3-4). Three species made up 64 percent of the non-target species catch: yellowtail rockfish, squid (unspecified) and widow rockfish.

Table 3-4: Metric tons of whiting and non-whiting species caught in the shoreside whiting fishery by species or species group and year 2008-2011, as reported by industry in state logbooks (PacFIN database).

	2008	2009	2010	2011	Averages
OVERFISHED GROUNDFISH					
BOCACCIO ROCKFISH	0.38	0.01	0.00	0.00	0.10
CANARY ROCKFISH	0.85	0.33	3.14	0.74	1.26
DARKBLOTCHED ROCKFISH	0.43	0.20	3.39	1.16	1.29
UNSP. POP GROUP	0.05	14.90	6.40	0.18	5.38
OTHER GROUNDFISH					
ARROWTOOTH FLOUNDER	0.83	0.66	3.30	10.14	3.73
BANK ROCKFISH	0.00	0.00	0.01	0.00	0.00
BLACK ROCKFISH	0.00	0.00	0.00	0.00	0.00
CHILIPEPPER	4.03	2.45	20.76	0.00	6.81
DOVER SOLE	0.01	0.00	0.58	0.07	0.17
ENGLISH SOLE	0.00	0.00	0.14	0.00	0.04
LINGCOD	1.27	0.12	1.68	3.67	1.69
LONGNOSE SKATE	0.00	0.01	0.00	0.17	0.05
LONGSPINE THORNYHEAD	0.00	0.00	0.12	0.00	0.03
NOR. UNSP. NEAR-SHORE ROCKFISH	0.02	0.00	0.01	0.00	0.01
NOR. UNSP. SHELF ROCKFISH	0.20	0.01	0.94	0.35	0.38
NOR. UNSP. SLOPE ROCKFISH	1.07	0.20	16.82	9.08	6.79
OTHER FLATFISH	0.00	0.00	0.00	0.00	0.00
OTHER GROUNDFISH	0.12	0.03	1.26	0.28	0.42
OTHER SHARK	0.09	0.00	0.00	0.00	0.02
PACIFIC COD	0.02	0.00	0.09	6.21	1.58
PACIFIC SANDDAB	0.00	0.00	0.33	0.00	0.08
PACIFIC WHITING	49,225.33	32,952.95	65,797.99	86,500.74	58,619.25
PETRALE SOLE	0.00	0.02	0.02	0.00	0.01
REX SOLE	0.02	0.00	0.65	0.85	0.38

	2008	2009	2010	2011	Averages
SABLEFISH	0.08	3.28	8.70	30.28	10.58
SHORTBELLY ROCKFISH	0.00	0.05	0.20	0.00	0.06
SHORTSPINE THORNYHEAD	0.01	0.00	1.15	2.05	0.81
SOUPFIN SHARK	0.00	0.00	0.39	0.26	0.16
SPINY DOGFISH	58.69	5.07	79.21	92.03	58.75
SPLITNOSE ROCKFISH	0.00	0.79	14.06	0.00	3.71
STARRY FLOUNDER	0.00	0.00	0.31	0.00	0.08
STRIPETAIL ROCKFISH	0.00	0.00	0.00	0.00	0.00
UNSP. FLATFISH	0.00	0.00	0.00	0.00	0.00
UNSP. SANDDABS	0.00	0.00	0.01	0.00	0.00
UNSP. SHARK	0.57	0.50	16.44	1.12	4.66
UNSP. SHELF ROCKFISH	0.00	0.00	0.10	0.00	0.03
UNSP. SKATE	0.20	0.08	0.39	0.43	0.28
UNSP. SLOPE ROCKFISH	0.05	0.00	0.00	0.00	0.01
WALLEYE POLLOCK	0.00	0.00	0.43	0.00	0.11
WIDOW ROCKFISH	67.74	31.33	35.85	103.71	59.66
YELLOWTAIL ROCKFISH	36.75	18.46	120.45	331.42	126.77
NON-GROUNDFISH SPECIES					
BLUE SHARK	0.01	0.00	0.00	0.06	0.02
BROWN CAT SHARK	0.13	0.00	0.64	3.25	1.01
CAPELIN	0.00	0.00	0.01	0.00	0.00
CHINOOK SALMON (protected)	0.00	0.02	0.01	0.00	0.01
CHUB MACKEREL	0.76	0.00	0.01	0.11	0.22
DUNGENESS CRAB (Prohibited)	0.01	0.00	0.00	0.00	0.00
JACK MACKEREL	46.87	0.33	2.88	13.13	15.80
MARKET SQUID	0.00	0.05	7.54	0.01	1.90
MISC. FISH	0.18	0.01	0.19	0.29	0.17
MISC. FISH/ANIMALS	0.02	0.08	1.00	0.01	0.28
NORTHERN ANCHOVY	0.05	0.00	0.00	0.00	0.01
PACIFIC HALIBUT (protected)	0.02	0.01	0.00	0.00	0.01
PACIFIC HERRING	0.13	0.01	35.46	0.19	8.95
PACIFIC SARDINE	0.23	0.81	0.02	0.01	0.27
PACIFIC PINK SHRIMP	0.00	0.00	0.00	0.00	0.00
UNSP. ECHINODERM	0.01	0.01	0.00	0.00	0.01
UNSP. MACKEREL	2.67	0.00	0.00	0.00	0.67
UNSP. OCTOPUS	0.02	0.00	0.00	0.02	0.01
UNSP. SHAD	0.99	2.52	3.23	2.90	2.41
UNSP. SQUID	289.66	1.19	65.90	13.02	92.44
__ALL CRAB	0.00	0.00	0.00	0.00	0.00
CALIFORNIA MUSSEL	0.00	0.00	0.00	0.00	0.00
WOLF EEL	0.00	0.00	0.00	0.00	0.00
COMMON THRESHER SHARK	0.00	0.00	0.17	0.35	0.13
PROWFISH	0.00	0.00	0.00	0.00	0.00
SPOTTED RATFISH	0.00	0.00	0.01	0.00	0.00
UNSP. SEA CUCUMBERS	0.00	0.00	0.00	0.00	0.00
UNSP. HAGFISH	0.00	0.00	0.00	0.00	0.00
TOTAL ALL	49,740.61	33,036.52	66,252.38	87,128.30	59,039.45
NON-TARGET SPECIES	515.27	83.58	454.39	627.57	420.20
PROP. WHITING	98.96%	99.75%	99.31%	99.28%	99.29%
PROP. NON-WHITING	1.04%	0.25%	0.69%	0.72%	0.71%

3.2.2.2 Incidence of Non-Target Species in the Pelagic Rockfish Fishery

Non-target species data for the pelagic rockfish fishery were obtained from two sources: (1) the West Coast Groundfish Observer Program (WCGOP) database maintained by the NMFS and (2) the State logbook database (PacFIN) maintained by the Pacific States Marine Fisheries Commission. The WCGOP data requested for this EA were for the years 2002-2011. Most or perhaps all the data received were collected in 2011 because fishing regulations during 2002-2010 did not provide for directed pelagic rockfish fishing. The first year of the trawl rationalization program was 2011. Beginning that year fishers had to cover their groundfish catches for IFQ species with QP and an observer was required onboard the vessel to document total fishery impacts. Trip limits were in place for non-IFQ species. For this EA, WCGOP data were combined on a coastwide basis. The data were collected from 12 vessels on 20 trips during which 49 tows were observed and estimated for discarded catch, retained catch, and total catch by species or species group and weight, reported here in metric tons. For this analysis widow rockfish is treated as a target species because QP was available to cover widow rockfish catches beginning in 2011.

The pelagic rockfish fishery catch (of widow, yellowtail and chilipepper rockfish) of 195.52 metric ton represented 53 percent of the total observed catch (Table 3-5). It is noteworthy that the observed trips took over 56 metric ton of bank rockfish, all of which were caught south of 40° 10' N latitude. These fish represented 15 percent of the total catch of all species combined. Nearly all of these fish (99.9 percent) were retained and may have been a target species on the observed trips. Overall 65 percent (239.81 metric ton) of the observed catch for all species combined was retained and 35 percent (127.21 metric ton) was discarded. These data show a much higher discard rate than estimated from logbooks, which are discussed below.

Table 3-5: West Coast Groundfish Observer Program catch data in metric tons for rockfish targeted midwater trawl trips collected during 2002-2011. [a/]

SPECIES	Discarded	Retained	Total Catch
Overfished Species			
Bocaccio Rockfish	3.243	0.000	3.243
Canary Rockfish	0.307	0.498	0.805
Cowcod Rockfish	0.070	0.000	0.070
Darkblotched Rockfish	0.000	0.016	0.016
Pacific Ocean Perch Rockfish	0.056	0.000	0.056
Petrale Sole	0.000	0.254	0.254
Other Groundfish Species			
Arrowtooth Flounder	0.019	0.004	0.023
Bank Rockfish	0.011	56.162	56.172
Big Skate	0.259	0.000	0.259
Blackgill Rockfish	0.000	0.007	0.007
Bocaccio Rockfish	0.015	0.003	0.018
California Skate	0.069	0.000	0.069
Chilipepper Rockfish	1.816	4.435	6.251
Curlfin Turbot	0.020	0.000	0.020
Dover Sole	0.513	0.000	0.513
English Sole	0.438	0.381	0.819
Greenspotted Rockfish	0.038	0.000	0.038
Greenstriped Rockfish	0.092	0.000	0.092
Harlequin Rockfish	0.006	0.000	0.006
Lingcod	0.087	0.030	0.117

SPECIES	Discarded	Retained	Total Catch
Longnose Skate	4.329	0.045	4.374
Pacific Cod	0.000	0.008	0.008
Pacific Hake	34.355	0.070	34.425
Pacific Sanddab	0.071	0.000	0.071
Redstripe Rockfish	0.589	0.251	0.840
Rex Sole	0.429	0.001	0.430
Rockfish Unid	33.389	0.320	33.710
Rosethorn Rockfish	0.000	0.001	0.001
Sablefish	7.030	0.000	7.030
Sharpchin Rockfish	0.078	0.000	0.078
Shelf Rockfish Unid	0.000	0.341	0.341
Shortbelly Rockfish	16.842	0.023	16.864
Silvergray Rockfish	0.000	0.002	0.002
Skate Unid	0.000	0.299	0.299
Spiny Dogfish Shark	1.586	0.000	1.586
Splitnose Rockfish	0.416	0.006	0.422
Spotted Ratfish	0.038	0.000	0.038
Stripetail Rockfish	1.088	0.000	1.088
Widow Rockfish	11.268	74.926	86.194
Yellowtail Rockfish	1.752	101.320	103.072
Non-groundfish Species			
American Shad	0.004	0.000	0.004
Armored Box Crab	0.071	0.000	0.071
Brown Cat Shark	0.000	0.000	0.000
Dungeness Crab (prohibited)	0.033	0.000	0.033
Jack mackerel	0.023	0.000	0.023
Jellyfish Unid	0.002	0.000	0.002
King (Chinook) Salmon (protected)	0.100	0.000	0.100
King of the Salmon	0.010	0.000	0.010
Mackeral Unid	0.168	0.000	0.168
Market Squid	0.000	0.127	0.127
Mixed species	5.508	0.000	5.508
Mola Mola (Sunfish)	0.013	0.000	0.013
Pacific Electric Ray	0.009	0.000	0.009
Pacific Herring	0.178	0.000	0.178
Red Rock Crab	0.051	0.000	0.051
Ribbonfish Unid	0.005	0.000	0.005
Sandpaper Skate	0.336	0.000	0.336
Shark Unid	0.011	0.000	0.011
Silver (Coho) Salmon (protected)	0.002	0.000	0.002
Slender Sole	0.132	0.000	0.132
Spot Shrimp	0.006	0.000	0.006
Squid Unid	0.228	0.276	0.504
Catch Summaries			
Overfished groundfish	3.676	0.768	4.444
Pelagic rockfish species	14.836	180.681	195.517
Other groundfish species	101.809	57.954	159.763

SPECIES	Discarded	Retained	Total Catch
Non-groundfish species	6.889	0.403	7.292
All species	127.210	239.806	367.015
Catch Proportions			
Overfished species/All species	2.9%	0.3%	1.2%
Pelagic rockfish/All species	11.7%	75.3%	53.3%
Other groundfish/All species	80.0%	24.2%	43.5%
Non-groundfish/All species	5.4%	0.2%	2.0%
All species	34.7%	65.3%	100.0%
Total	100.0%	100.0%	100.0%

a/ Observer coverage summary: North of 40° 10' N latitude: 8 vessels, 11 trips, 33 tows. South of 40° 10' N latitude: 4 vessels, 9 trips, 16 tows. Coastwide: 12 vessels, 20 trips, 49 tows.

The state logbook data examined for this report were collected during 2000- 2002. These were years in which directed fishing was allowed coastwide for the pelagic rockfish complex and the fishery was managed with relatively high trip limits (e.g., 30,000 lbs/2 months each for widow and yellowtail rockfish; PFMC 1999) compared to years between 2003 and 2010 when widow rockfish was declared overfished and the midwater fishery for widow and yellowtail rockfish was essentially closed. State logbooks which were required in the trawl fishery and completed by the vessel operators cannot be verified as to their accuracy of the species encountered or the precision of the estimated weights of fish captured and landed. The data do not show the species or amounts of fish that were discarded. Logbook data for the three states combined show a wide variety of non-target species in the pelagic rockfish fishery catch during 2000-2002 with the proportion of non-target species in the catch ranging from 2.6 percent to 6.0 percent annually and averaging 2.7 percent for all years combined (Table 3-6).

Table 3-6: Catch in Metric Tons of Non-target and Target Species in Pelagic Rockfish Midwater Tows by Species and Year based on Trawl Logbook Entries, 2000-2002: Washington, Oregon and California combined.

	2000		2001		2002		Total	
Category	Pounds	P	Pounds	P	Pounds	P	Pounds	P
OVERFISHED ROCKFISH								
Bocaccio rockfish	0.948	0.000	1.345	0.001	2.033	0.003	4.327	0.001
Canary rockfish	2.823	0.001	1.693	0.001	1.092	0.002	5.609	0.001
Darkblotched rockfish	0.000	0.000	0.357	0.000	0.088	0.000	0.446	0.000
POP	0.139	0.000	0.006	0.000	0.006	0.000	0.151	0.000
Yelloweye rockfish	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.000
SUBTOTAL	3.910	0.001	3.402	0.001	3.224	0.005	10.537	0.001
OTHER GROUNDFISH								
Arrowtooth flounder	0.123	0.000	0.680	0.000	1.545	0.003	2.348	0.000
Bank rockfish	0.279	0.000	1.199	0.000	0.093	0.000	1.571	0.000
Black rockfish	0.006	0.000	0.000	0.000	0.008	0.000	0.014	0.000
Blackgill rockfish	0.000	0.000	0.455	0.000	0.000	0.000	0.455	0.000
Brown rockfish	0.075	0.000	0.000	0.000	0.000	0.000	0.075	0.000
Butter sole	0.000	0.000	0.000	0.000	0.020	0.000	0.020	0.000
Chilipepper rockfish	55.936	0.013	70.633	0.028	49.263	0.081	175.832	0.023
Copper rockfish	0.004	0.000	0.000	0.000	0.000	0.000	0.004	0.000
Cowcod rockfish	0.004	0.000	0.000	0.000	0.000	0.000	0.004	0.000
Curlfin sole	0.001	0.000	0.010	0.000	0.006	0.000	0.017	0.000
Dover sole	0.926	0.000	2.083	0.001	3.563	0.006	6.573	0.001
English sole	4.262	0.001	6.579	0.003	2.496	0.004	13.336	0.002
Flatfish, unid.	0.000	0.000	0.003	0.000	0.000	0.000	0.003	0.000
Flathead sole	0.000	0.000	0.023	0.000	0.054	0.000	0.078	0.000
Greenspotted rockfish	0.020	0.000	0.000	0.000	0.043	0.000	0.064	0.000
Greenstriped rockfish	0.073	0.000	0.000	0.000	0.000	0.000	0.073	0.000
Kelp greenling, unid.	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Lingcod	1.155	0.000	1.162	0.000	1.792	0.003	4.109	0.001
Longspine thornyhead	0.000	0.000	0.216	0.000	0.088	0.000	0.303	0.000
Nearshore rockfish	0.000	0.000	0.000	0.000	0.049	0.000	0.049	0.000
Nor. Shelf rockfish, unid.	2.059	0.000	0.501	0.000	0.058	0.000	2.618	0.000
Nor. Slope rockfish, unid.	5.811	0.001	3.205	0.001	0.450	0.001	9.466	0.001
Pac. Cod	0.243	0.000	0.145	0.000	0.323	0.001	0.711	0.000
Pac. Sandab	0.008	0.000	0.014	0.000	0.014	0.000	0.035	0.000
Pac. Whiting	65.486	0.015	2.018	0.001	0.000	0.000	67.504	0.009
Petrale sole	2.318	0.001	3.015	0.001	4.371	0.007	9.705	0.001
Red rockfish, unid.	0.024	0.000	0.029	0.000	0.010	0.000	0.064	0.000
Rex sole	0.024	0.000	0.590	0.000	0.168	0.000	0.782	0.000
Rock sole	0.019	0.000	0.076	0.000	0.024	0.000	0.118	0.000
Rockfish, unid.	0.236	0.000	0.270	0.000	0.009	0.000	0.515	0.000
Rosefish rockfish, unid.	0.800	0.000	0.000	0.000	0.161	0.000	0.960	0.000
Rosethorn rockfish	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sablefish	2.969	0.001	4.040	0.002	6.413	0.011	13.422	0.002
Sand sole	0.015	0.000	0.002	0.000	0.143	0.000	0.160	0.000

TABLE CONTINUED. PAGE 2.								
Sanddabs, unid.	3.167	0.001	0.000	0.000	0.000	0.000	3.167	0.000
Sanddabs, unid.	0.000	0.000	0.603	0.000	0.208	0.000	0.811	0.000
Shelf rockfish, unid.	0.491	0.000	0.574	0.000	0.997	0.002	2.062	0.000
Shortbelly rockfish	6.654	0.001	4.378	0.002	0.000	0.000	11.032	0.001
Shortspine thornyhead	0.004	0.000	0.014	0.000	0.031	0.000	0.049	0.000
Shortspine thornyhead	0.045	0.000	0.012	0.000	0.055	0.000	0.112	0.000
Skate, unid.	3.262	0.001	4.587	0.002	1.629	0.003	9.479	0.001
Slope rockfish, unid.	0.095	0.000	2.195	0.001	0.207	0.000	2.498	0.000
Small red rockfish, unid.	0.103	0.000	0.011	0.000	0.000	0.000	0.114	0.000
Spiny dogfish	0.477	0.000	0.314	0.000	0.002	0.000	0.793	0.000
Splitnose rockfish	0.000	0.000	0.220	0.000	1.128	0.002	1.348	0.000
Starry flounder	0.002	0.000	0.085	0.000	0.028	0.000	0.115	0.000
Thornyhead, unid.	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000
Vermillion rockfish	0.000	0.000	0.008	0.000	0.000	0.000	0.008	0.000
Widow rockfish	2,570.063	0.579	1,212.507	0.482	176.878	0.291	3,959.448	0.524
Yellowtail rockfish	1,696.704	0.382	1,181.370	0.470	345.821	0.568	3,223.894	0.426
SUBTOTAL	4,423.946	0.997	2,503.827	0.996	598.150	0.983	7,525.922	0.995
NON-GROUNDFISH								
Protected or Prohibited Species								
Dungeness crab	0.000	0.000	0.004	0.000	0.000	0.000	0.004	0.000
Green sturgeon	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.000
Other Non-groundfish								
Calif. Halibut	0.000	0.000	0.097	0.000	0.000	0.000	0.097	0.000
Chub mackerel	0.889	0.000	0.000	0.000	0.000	0.000	0.889	0.000
Common thresher shark	0.107	0.000	0.000	0.000	0.000	0.000	0.107	0.000
Jack mackerel	0.187	0.000	0.000	0.000	0.000	0.000	0.187	0.000
Mackerel, unid.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Market squid	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000
Misc. fish	0.000	0.000	0.000	0.000	0.003	0.000	0.004	0.000
No code	7.929	0.002	7.463	0.003	6.584	0.011	21.976	0.003
Octopus, unid.	0.000	0.000	0.056	0.000	0.394	0.001	0.450	0.000
Shad, unid.	0.006	0.000	0.000	0.000	0.000	0.000	0.006	0.000
Shark, unid.	0.000	0.000	0.010	0.000	0.070	0.000	0.080	0.000
Soupfin shark	0.007	0.000	0.029	0.000	0.012	0.000	0.048	0.000
White croaker	0.005	0.000	0.000	0.000	0.000	0.000	0.005	0.000
Wolf eel	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000
SUBTOTAL	9.131	0.002	7.660	0.003	7.067	0.012	23.859	0.003
NON-TARGET SPECIES	114.284	0.026	50.379	0.020	36.479	0.060	201.143	0.027
TARGET SPECIES	4,322.703	0.974	2,464.510	0.980	571.962	0.940	7,359.175	0.973

3.2.2.3 Non-target Groundfish

Section 3.1.1 in the proposed harvest specifications and management measures for the 2013-2014 Pacific Coast groundfish fishery FEIS describes the species and stocks managed under the Groundfish FMP. This information is incorporated by reference and summarized below. More than 90 fish species are managed under the Groundfish FMP. The remaining discussion on Biological Resources is largely taken from PFMC 2012d. Presented below are only those species specifically associated with the Pacific whiting and pelagic rockfish complex fisheries.

Starting in 2011 groundfish are managed with species specific IFQ, species complex IFQs, trip limits (for non IFQ groundfish species and non-groundfish species), sector allocations and set-asides. Each of these harvest management objectives has different levels of accountability (individual vs. trawl fleet vs. entire groundfish fishery). The risk of overfishing groundfish under the alternatives being considered in this EA is analyzed in Chapter 4.

Overfished Groundfish

All species of overfished groundfish are actively managed in all ocean management areas and fisheries. They occur as bycatch in the Pacific whiting fishery as shown in at-sea catches (Table 3-3) and in state logbook data (Table 3-4). They also occur as bycatch in the pelagic rockfish fishery as shown in WCGOP data (Table 3-5) and state logbook data (Table 3-6).

Habitat preference and latitudinal and depth distributions vary among the species (NMFS 2005a, Appendix I). Most overfished species are subject to whiting fishery interception due to the broad geographic distribution of the whiting fishery (Figure 3-5). The two overfished species exceptions to primary whiting fishery interception include bocaccio and cowcod rockfish, species that primary occur south of the primary whiting fishery fishing area. All six overfished groundfish species are subject to interception in the pelagic rockfish fishery, which historically has taken place as far north as Cape Flattery in Northern Washington to as far south as about Port San Luis in Central California (data provided by Ed Waters, Fishery Consultant).

The presence of overfished groundfish in whiting and pelagic rockfish fishery catches, though very small in comparison to associated target species catches, can be explained as off-bottom feeding, spawning, or redistribution movements of the fish subjecting them to midwater trawl net capture. Catches are likely exacerbated when trawling is conducted in close proximity to preferred rockfish habitats. Deep water fishing for whiting occurs because adult whiting school at depth during the day, then move to the surface and disband at night for feeding. Fishing near rocky habitat is the usual fishing strategy when targeting pelagic rockfish species, thus occurrences of overfished rockfish species in the catch can be expected because rockfishes, in general, orient to rocky habitats.

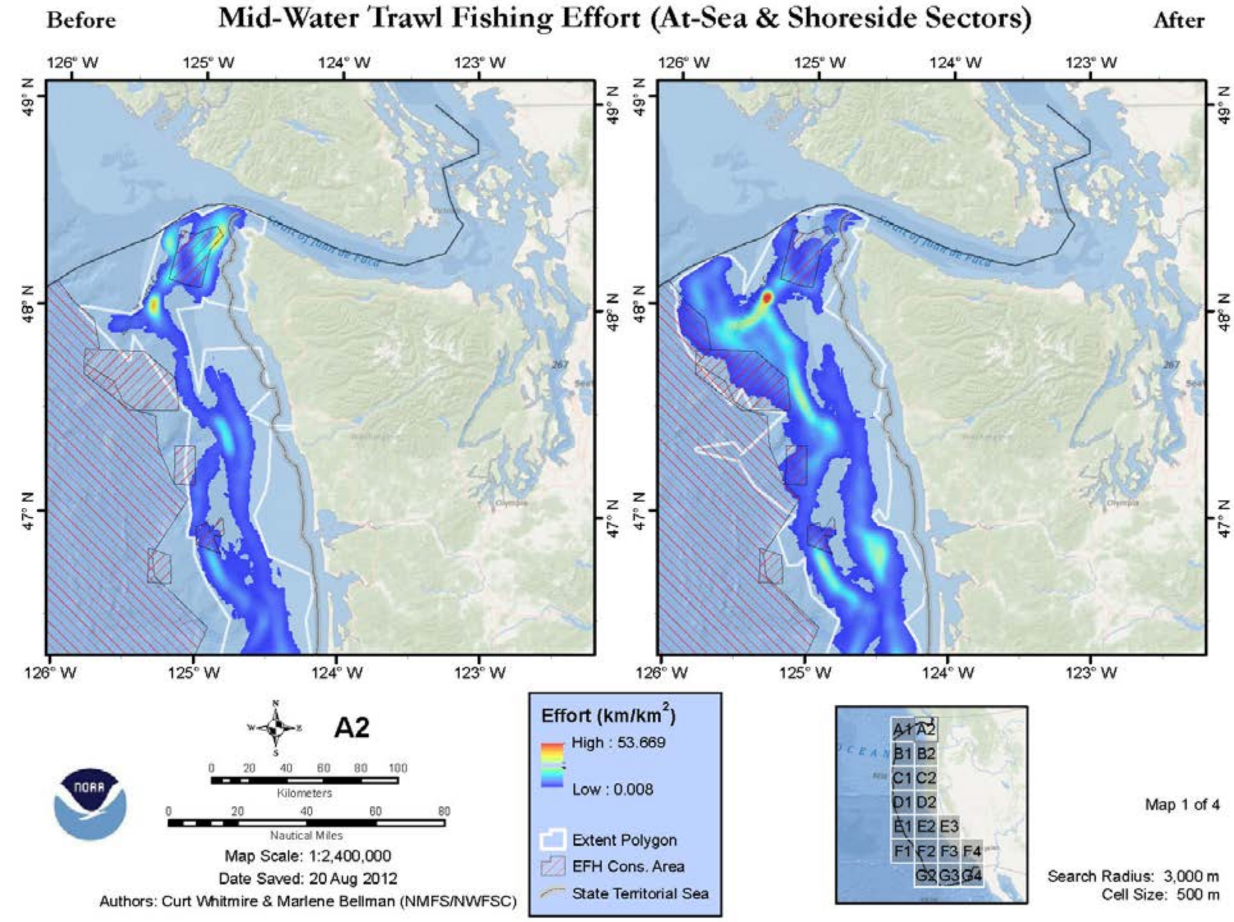

Figure 3-5: Maps of at-sea and shoreside whiting fishery trawl effort distribution: Northern Washington Coast, 2002-June 11, 2006 and June 12, 2006-2010, left and right maps, respectively (PFMC 2012g).

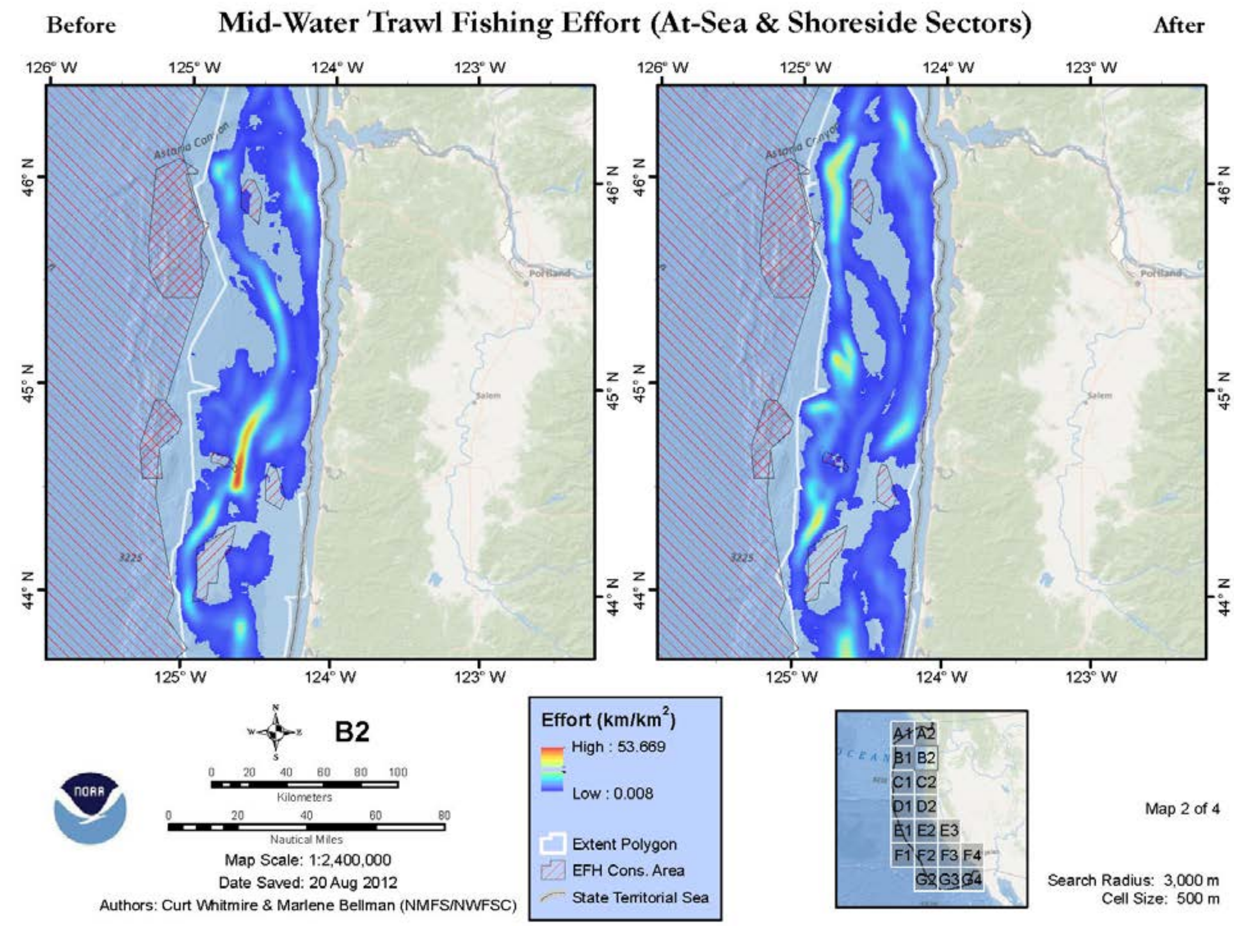

Figure continued: Southern Washington and Northern Oregon Coasts.

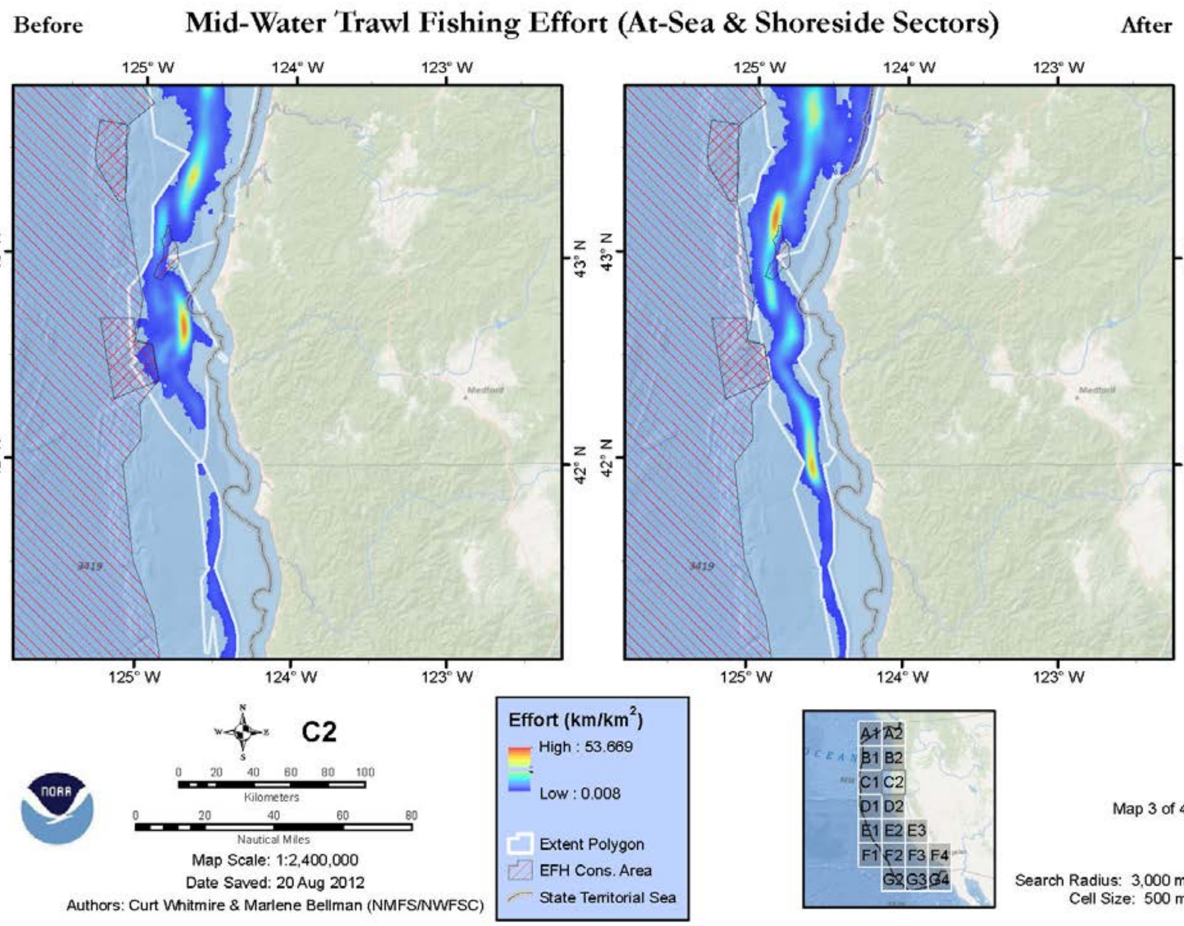

Figure continued: Southern Oregon and Northern California Coasts.

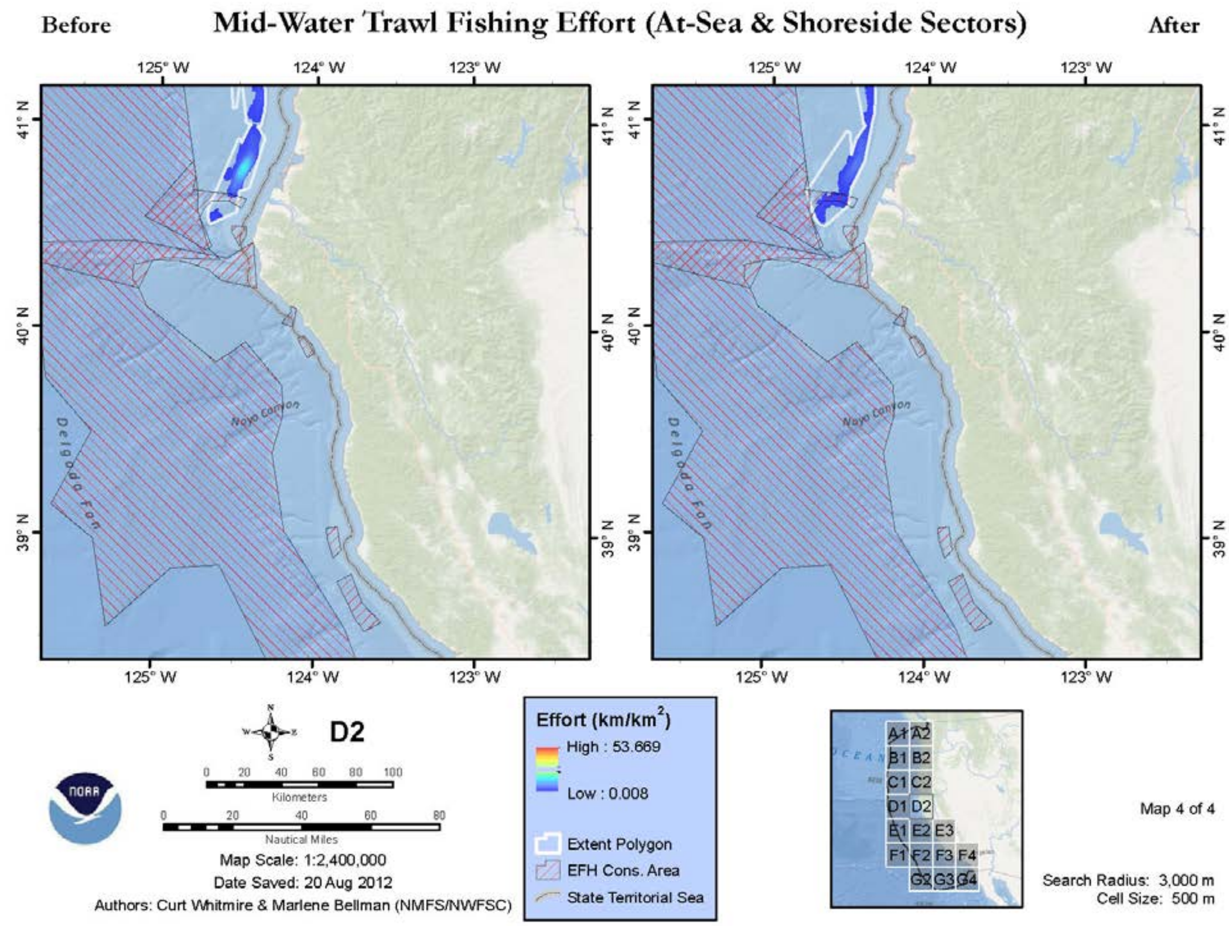

Figure Continued: Remainder of Northern California Coast.

The most recent stock assessments for overfished groundfish species has shown improving recovery trends (measured as a percent of unfished stock) for canary and darkblotched rockfish (from 10 percent for both species to 24 percent and 30.2 percent, respectively) and that widow rockfish has successfully rebuilt (51.1 percent of unfished). The status trend for POP continues to show very low recovery rate (19.1 percent of unfished), which is substantially below the status objective for all rockfish stocks of 50 percent of unfished population size.

Other Non-target Groundfish Species

Other groundfish species (other than overfished groundfish) are frequently caught in the at-sea whiting and pelagic rockfish fisheries. Notable ones because of their relatively large tonnages in the at-sea whiting fishery include yellowtail rockfish, widow rockfish, and dogfish shark (Table 3-3: Tribal and Non-tribal at-sea Pacific whiting fishery catch (metric ton) data by species and year, 2006-2011 (NMFS whiting fishery annual report[a/]). State logbook data collected during 2008-2011 showed three other groundfish species made up 56 percent of the total non-target species bycatch: yellowtail rockfish, dogfish and widow rockfish (Table 3-4). WCGOP data from 2002-2011 collected in the pelagic rockfish fishery showed that three species or species groups made up 73 percent of the bycatch: bank rockfish, Pacific whiting, and unidentified rockfish (Table 3-5). Most of the whiting and unidentified rockfish were discarded but nearly all of the bank rockfish were retained (and may have been the target of the fishing). Logbook data collected during 2000-2002 when the pelagic rockfish fishery had relatively high trip limits showed over 40 different groundfish species or species groups in the catch. Pacific whiting was the species encountered in greatest volume (67.5 metric ton, 34 percent of non-target catch) (Table 3-6).

3.2.2.4 Pacific Halibut

Pacific halibut (*Hippoglossus stenolepis*) belong to a family of flounders called Pleuronectidae. Pacific halibut are managed by the bilateral (U.S./Canada) International IPHC with implementing regulations set by Canada and the U.S. in their own waters. The Pacific Halibut Catch Sharing Plan for waters off Washington, Oregon, and California (Area 2A) specifies IPHC management measures for Pacific halibut on the Pacific Coast . Pacific halibut mortality in the groundfish trawl fishery is managed with individual bycatch quotas (IBQ).Pacific halibut are occasionally caught in the whiting fishery. During 2007-2011 the at-sea whiting fishery took between 53-495 and averaged 145 halibut per year (Table 3-3). No Pacific halibut were reported caught in the pelagic rockfish fishery during 2000-2002 based on logbook reports (Table 3-6). None was observed caught in WCGOP sampling conducted during 2002-2011 (Table 3-5).

3.2.2.5 Coastal Pelagic Species (CPS)

CPS (Pacific sardine, Pacific mackerel, jack mackerel, northern anchovy, market squid) are taken incidentally in the groundfish fishery, and are believed to be more vulnerable to midwater trawl gear when compared to other groundfish gear types. Their vulnerability is because of their off bottom schooling behavior. Estimates of total catch in the mothership, catcher/processor, shoreside and tribal whiting fisheries from 2006-2010 ranged from nil for northern anchovy in several years to 91.9 metric ton for squid (unidentified) in 2006 (Table 3-3). State logbook data showed a total of 289.7 metric ton of squid (unidentified) caught in the shoreside whiting fishery in 2008 (Table 3-4). CPS catches were reportedly very small (<1 metric ton for any species) in 2000-2002 pelagic rockfish fishery catches based on fishery logbooks (Table 3-6).

3.2.2.6 Highly Migratory Species and Salmon

Highly migratory species, such as albacore, were not recorded in at-sea whiting fishery catches during 2007-2011(Table 3-3). Salmonids, mostly Chinook salmon, were caught in at-sea whiting fisheries during the same period, ranging from 879 in 2008 to 4,362 in 2011 (Table 3-3). A few (<0.03 metric ton) of Chinook salmon were reported caught in the shoreside whiting fishery based on state logbook data during 2008-2011 (Table 3-4). About 220 lbs of Chinook salmon and one or two Coho salmon (5 lbs) were observed caught and discarded in the WCGOP sample (Table 3-5). No salmonids were reported caught in the pelagic rockfish fishery during 2000-2002 based on fishery logbook data (Table 3-6). The major concern with salmon interception has to do with listed species impacts, which are discussed below.

3.2.2.7 Misc. non-groundfish

A wide variety of non-groundfish species have been recorded in at-sea whiting fishery and pelagic rockfish fishery catches (see Table 3-3, Table 3-4, Table 3-5 and Table 3-6). NMFS has compiled data on fish caught in the at-sea whiting fishery into two groups: forage fish and other non-groundfish (Table 3-3).

Forage Fish Species
These are lower trophic level species that are preyed upon by higher level species such as most groundfish species, including Pacific whiting. The data for 2006-2011 show modest swings in forage fish bycatch in the at-sea fishery from about 44.3 metric ton to 91.9 metric ton. The 2007-2011 average was 70.3 metric ton (Table 3-3). Several of the species identified as forage species are managed under PFMC FMPs including Coastal Pelagic Species (northern anchovy, Pacific mackerel, and Pacific sardine). Shortbelly rockfish is a groundfish species that is also an important forage fish species (Field, *et al*. 2007) but is not included in the above forage fish calculations. The remaining species are under state management authority except for eulachon, which is classified as threatened under the ESA. Eulachon were present in catches in small quantities in most of the years during 2006-2011.

Other Incidentally Caught Non-groundfish
During 2006-2012, catches of incidentally caught non-groundfish species included both vertebrate and invertebrate species. Total catches by weight in all years were mostly of ragfish and jellyfish (Table 3-3).

3.2.3 Protected Species

Protected species are species listed under the ESA, the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA), and EO 13186.

- The ESA protects species in danger of extinction throughout all or a significant part of their range, and mandates the conservation of critical habitat. The ESA defines “species” as a species, a subspecies, or for vertebrates a distinct population. A species is listed as “endangered” if it is in danger of extinction throughout a significant portion of its range and “threatened” if it is likely to become an endangered species within the foreseeable future throughout all, or a significant part, of its range.

- The MMPA guides marine mammal protection and conservation. Stock assessments are conducted annually for strategic stocks and every three years for non-strategic stocks. “Strategic stocks” are those with a human-caused mortality and injury level that exceeds the potential biological removal level (defined as “the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population…”) Marine mammal populations with an abundance that falls below its optimum sustainable level are listed as “depleted.” All marine mammal species are protected under the MMPA, regardless of species or stock listings under the ESA.

- The MBTA implements treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, it is unlawful to take, kill, or possess migratory birds. In addition, Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, directs Federal agencies to negotiate Memoranda of Understanding with the United States Fish and Wildlife Service (USFWS) that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. All migratory seabird species are protected under the MBTA and EO 13186, regardless of species or stock listings under the ESA.

3.2.3.1 ESA-listed Salmon and Steelhead (NMFS 2006)

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

Table 3-7 shows the estimated annual catch of salmonids in all sectors of the Pacific whiting fishery from 2005 to 2010. On an annual basis there is temporal and spatial variation in the catch of salmon that is associated with the behavior and biology of Chinook salmon and Pacific whiting. Salmon bycatch rates tend to be higher closer to shore and earlier in the season. The shorebased IFQ fishery tends to fish closer to shore where salmon are m. However, no such factors adequately account for inter-annual variation in bycatch. Previous work found no "obvious or consistent correlation" between annual Chinook abundance and bycatch. Ocean conditions may play a role, but specific causative factors, at least any that can be used predicatively, have not been identified. (NMFS 2006). Ocean conditions may play a role, but specific causative factors, at least any that can be used predicatively, cannot be identified.

Table 3-7. Estimated Annual Catch of Salmonids in the Pacific Whiting Fishery, All Sectors, 2005-2010.

Salmonid Species							
Year	Chinook	Coho	Pink	Chum	Sockeye	Steelhead	Unidentified
2005	11,916	467	480	28	0	0	8
2006	3,975	53	0	136	0	0	0
2007	6,186	475	595	291	0	0	0
2008	3,380	52	16	79	2	0	31
2009	2,740	106	157	54	0	0	107
2010	4,489	21	0	19	2	0	4

The salmonid take in the pelagic rockfish fishery in years since 2003 has been very low or nil because the directed fishery has been all but closed due to fishery constraints aimed at protecting widow rockfish. The WCGOP data collected during 2003-2011 showed a total Chinook salmon catch of 0.1 metric ton (220 lbs) compared to a total pelagic rockfish species complex catch of 195.5 metric ton (Table 3-5). The total catch of Chinook salmon is likely to be closer to what it was in years prior to 2003 when the directed fishery was fully engaged, particularly in the area north of 40° 10' N. lat. State logbook data for 2000-2002 showed no salmon were caught in a catch of 7,359.2 metric ton of pelagic rockfish using midwater trawl gear (Table 3-6).

3.2.3.2 ESA-listed Green Sturgeon

The southern distinct population segment (DPS) of North American green sturgeon was listed as threatened under the ESA in 2006 (71 FR 17757), and critical habitat was designated in 2009 (74 FR 52300). The North American green sturgeon southern DPS is defined as coastal and Central Valley populations, south of the Eel River in California. Green sturgeon critical habitat is designated from 0 to 60 fathom (74 FR 52300). The depth distribution of all observed tows encountering green sturgeon bycatch was similar, with 60 percent of tows in the depth range of 5-15 fathom and 75 percent from 5-20 fathom (Al-Humaidhi, *et al.* 2011). Incidental take of adult and subadult Southern DPS green sturgeon is anticipated to occur as a result of fishing under the PCGFMP. Injury or mortality may occur as a result of encounters with fishing gear. Green sturgeon bycatch in the at-sea whiting fishery has been very low (zero catch in most years), as the at-sea observer program recorded a total of only three green sturgeon occurring in 2005 and 2006. Data were not available for green sturgeon bycatch in the pelagic rockfish fisheries.

3.2.3.3 ESA- listed Eulachon

Eulachon are found in the eastern North Pacific Ocean from northern California to southwest Alaska and into the southeastern Bering Sea. The southern DPS of eulachon was listed as threatened under the ESA in 2010 (75 FR 13012). The eulachon southern DPS is defined from the Mad River in northern California north to the Skeena River in British Columbia. Eulachon is an anadromous smelt. Adults migrate from the ocean to freshwater creeks and rivers where they spawn from late winter through early summer. The offspring hatch and migrate back to the ocean to forage until maturity. Once juvenile eulachon enter the ocean, they move from shallow nearshore areas to deeper areas over the continental shelf. There is little information available about eulachon movements in nearshore marine areas and the open ocean. Eulachon are incidentally caught in the groundfish trawl fisheries (Table 3-).

The take of threatened southern DPS eulachon is anticipated to occur as a result of fishing under the PCGFMP. Take of southern DPS eulachon occurs as incidental catch in the groundfish bottom trawl and at-sea hake fisheries, and mortalities result from encounters with fishing gear. Table 3- shows estimates of the number of eulachon caught by trawl fisheries during 2002-2011. Eulachon have been encountered in the shoreside trawl fishery, the at-sea whiting fishery and tribal whiting fishery. The depth distribution of observed tows encountering eulachon bycatch from 2002-2010 indicates that 86 percent of tows that encountered eulachon were in the depth range of 60-90 fm. The shallowest observed tow that encountered eulachon was at 1fm.

Table 3-8: Eulachon catch estimates by fishery 2002-2011.

Year	Bycatch estimate by fishery (number of fish) [a/b/]		
	LE trawl[/]	At-sea whiting (mothership and catcher/processor	Tribal Whiting
2002	821	0	0
2003	52	0	0
2004	5	0	0
2005	0	0	1
2006	0	145	0
2007	72	10	0
2008	0	43	0
2009	67	36	32
2010	21	0	0
2011	not yet available	1,322	160

a/ Point estimates of bycatch fluctuate due to a number of non-biological factors, including annual variation in observer coverage rates, fishing behavior, and various physical characteristics. Estimates of observer data uncertainty are presented the form of confidence intervals around bycatch estimates.
b/ Does not include data representing catch in the shoreside whiting fishery c/ Includes all LE trawl not just those vessels targeting whiting

3.2.3.4 ESA and MMPA listed Marine Mammals (PFMC 2012d)

U.S. Pacific Coast waters support a variety of marine mammals. Approximately 30 species, including seals, sea lions, sea otters, whales, dolphins, and porpoise, occur within the EEZ. Many species seasonally migrate through Pacific Coast waters, while others are year-round residents. Two of nine ESA listed marine mammal species that occur in the action area have a higher probability of encounter in groundfish fisheries: humpback whales (endangered) and Stellar sea lions (threatened).

Among the catches of marine mammal in groundfish trawl fisheries, bycatch estimates have been highest for California sea lions, which were caught primarily in trawl nets in the limited entry trawl fishery (bottom and whiting). The next highest were Steller sea lions which were also caught in the limited entry trawl (bottom trawl and whiting) and California halibut trawl fisheries. Steller sea lions taken on the Pacific Coast are from the eastern stock (east of 140° W. longitude). It is estimated that an average of 14 Steller sea lions per year will be caught, with a maximum of 45 Steller sea lions caught in a single year. The majority of elephant seals that were caught were taken in the at-sea whiting fishery (Jannot, *et al*. 2011).

3.2.3.5 Seabirds (PFMC 2012d)

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

Two of the seabird species with documented interactions with the Pacific Coast groundfish fishery (short-tailed albatross and marbled murlette) are listed under the ESA. The California least tern (*Sterna antillarum browni*), which is found on the Pacific Coast, is also listed under the ESA. California least terns forage primarily in nearshore ocean waters and in shallow estuaries and lagoons, although some adults also feed close to shore in ocean waters. Fisheries are unlikely to impact California least tern populations directly through bycatch of individuals, and there have been no reported lethal takes of California least tern in west coast groundfish fisheries.

Short-tailed albatrosses (*Phoebastria albatrus*) are large, pelagic seabirds with long narrow wings adapted for soaring just above the water surface. Short-tailed albatross forage extensively along continental shelf margins, spending the majority of time within national EEZs, particularly the U.S. off Alaska, Russia, and Japan, rather than over international waters (Suryan, *et al.* 2007a; Suryan, *et al.* 2007b). Juveniles and sub-adults are prevalent off the west coasts of Canada and the U.S. (Environment Canada 2008). Short-tailed albatross may also 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 (NMFS 2006a), or become entangled on the outside of nets towed at or near the surface; those striking cables are very unlikely to show up on the vessels deck to be sampled (USFWS 2008).

The marbled murrelet is a small seabird. In the Pacific Northwest and California, murrelets tend to forage within 2 km of the coast during the breeding season, with somewhat greater dispersal during the non-breeding season. The WCGOP reported single interactions with marbled murrelets in 2001 and 2002 in northern California. Both of these occurred in the limited entry trawl sector, and were reported as “boarded vessel only” (Jannot, *et al*. 2011).

3.2.3.6 Sea Turtles

Major threats to sea turtles in the U.S. include, but are not limited to, destruction and alteration of nesting and foraging habitats; incidental capture in commercial and recreational fisheries; entanglement in marine debris; and vessel strikes. Leatherback turtles are present and potentially vulnerable as bycatch in the Pacific coast groundfish fishery during the summer-fall period (June through November) (Jannot, *et al.* 2011). Upwelling associated with the California Current system is most intense north of Point Conception, CA (Bakun, *et al.* 1974), but decreases considerably north of Cape Blanco, OR due to inconsistent wind patterns and changes in localized surface currents (Barth, *et al.* 2000). Although green and loggerhead turtles occur in the area, there are no known interactions with the groundfish fisheries.

Leatherbacks primarily forage on cnidarians (jellyfish and siphonophores) and, to a lesser extent, tunicates (pyrosomas and salps) (NMFS and USFWS 1998). Foraging occurs in temperate waters where leatherbacks appear to use convergence zones, and upwelling areas in the open ocean along continental margins and in archipelagic waters (Morreale *et al*. 1994; Eckert 1998, 1999). Foraging is also likely aggregated in productive coastal areas where jellyfish prey is abundant

(NWFSC 2011). Also based on available information, use of the California Current by leatherbacks appears highly seasonal, with turtles arriving along the U.S. West Coast during summer and fall months when large aggregations of jellyfish form (Bowlby 1994; Starbird *et al*. 1993; Benson *et al*. 2007b; Graham 2009). Midwater trawl fisheries for Pacific whiting capture leatherback prey (particularly jellyfish) as bycatch. However, lack of prey is not a presently identified threat to the species' recovery (NWFSC 2011).

3.3 Description of the Socio-economic Environment

Section 3.2 in the proposed harvest specifications and management measures for the 2013-2014 Pacific Coast groundfish fishery FEIS (PFMC 2012d) describes commercial fisheries targeting groundfish. Associated with that description is a series of tables summarizing landings and ex-vessel revenues in the groundfish fisheries, landings, and revenue by port, and indicators of fishery participation. The DEIS, and associated tables, and data developed by PFMC staff using PacFIN and NorPac data are the primary sources of information for this section. The document also provides information on tribal and recreational groundfish fisheries and fishing communities.

3.3.1 Pacific Whiting Fishery

Under the groundfish FMP, midwater trawls are used to harvest Pacific whiting. The whiting fishery is subdivided into four components. The shorebased IFQ fishery delivers its catch to processing facilities on land, and the vessels are similar in size and configuration (with the exception of the type of net used) to the non-whiting fishery. The mothership sector depends on catcher vessels to deliver product to them. The catcher-processor sector is composed of vessels that both catch Pacific whiting and process it on board. The tribal fishery includes both an at-sea component and a shorebased component. The Pacific whiting fishery is managed within the groundfish limited entry program. This program restricts the number of vessels that may use specified gear types to catch allocated groundfish. Limited entry permits define the groundfish trawl sector (further subdivided among vessels delivering catch shoreside, catcher vessels delivering Pacific whiting to at-sea mothership processors, and at-sea Pacific whiting catcher-processors), and the limited entry fixed gear sector, which uses longline and pot gear mainly to catch sablefish.

Each sector of the Pacific whiting fishery receives an annual allocation, and the fishery is managed under a primary season structure where vessels harvest Pacific whiting until the sector allocation is reached and the fishery is closed. The at-sea sectors receive annual allocations and set-asides (based on historical landings) to cover certain overfished groundfish species impacts. Regulations provide for the automatic closure of the commercial (nontribal) portion of the Pacific whiting fishery upon attainment of an overfished species allocation. Set-asides are reconsidered with each cycle of the biennial specifications process.

Incidental take of endangered or threatened salmon is a concern for the Pacific whiting fishery. Chinook is the salmon species most likely to be affected because of the spatial/temporal overlap between the Pacific whiting fishery and the distribution of Chinook salmon that could result in incidental take of listed salmon. The season start dates are, in part, meant to prohibit fishing when listed Chinook salmon are most likely to be taken incidentally. The NMFS also has the option of closing inshore areas to fishing if too many salmon are caught or are projected to be caught, although this authority has not been used to date.

Pacific Coast treaty Indian tribal allocations, set-asides, and regulations are specified during the biennial harvest specifications process. Tribal allocations and regulations are developed in consultation with the affected tribe(s). Fishing regulations such as fishing seasons and gear restrictions apply equally to tribal and nontribal fishers except that tribal fishers are not subject to groundfish plan limited entry provisions (50 CFR § 660.50 Pacific Coast treaty Indian fisheries).

Prior to 2011, the primary management constraints were sector allocations of whiting and bycatch limits of key overfished species, season start dates, and limited entry permits. The catcher/processor fishery was managed via an industry sponsored fishing cooperative (coop). Under the Trawl Rationalization Program starting in 2011 the catch control rules now include whiting IFQs for the shoreside whiting sector (allocated to both processors and limited entry permit holders), coops for the at-sea sectors, catch history endorsements for mothership catcher-vessels, and limited entry permits for the mothership processors. The shorebased IFQ fishery catch is monitored by observers on the vessels. The catch in the at-sea fisheries is monitored by 2 observers on board each mothership processors and catcher/processors. Shorebased processors or landing stations that receive whiting from shoreside whiting trawlers have to meet certain monitoring requirements including the use of catch monitors to observe the offload of the catcher vessels and to double check the accuracy of fish tickets associated with the offload.

3.3.1.1 Whiting Harvests, Revenues and Prices

Notes and Observations on Whiting Harvests (Figure 3-6)

- Total whiting harvests have varied over the years.

- Actual harvests track closely with allowable harvest levels.

- Highest harvests (2006 - 589 million lbs) and lowest harvests (2009 - 268 million lbs) have both occurred since 2003.

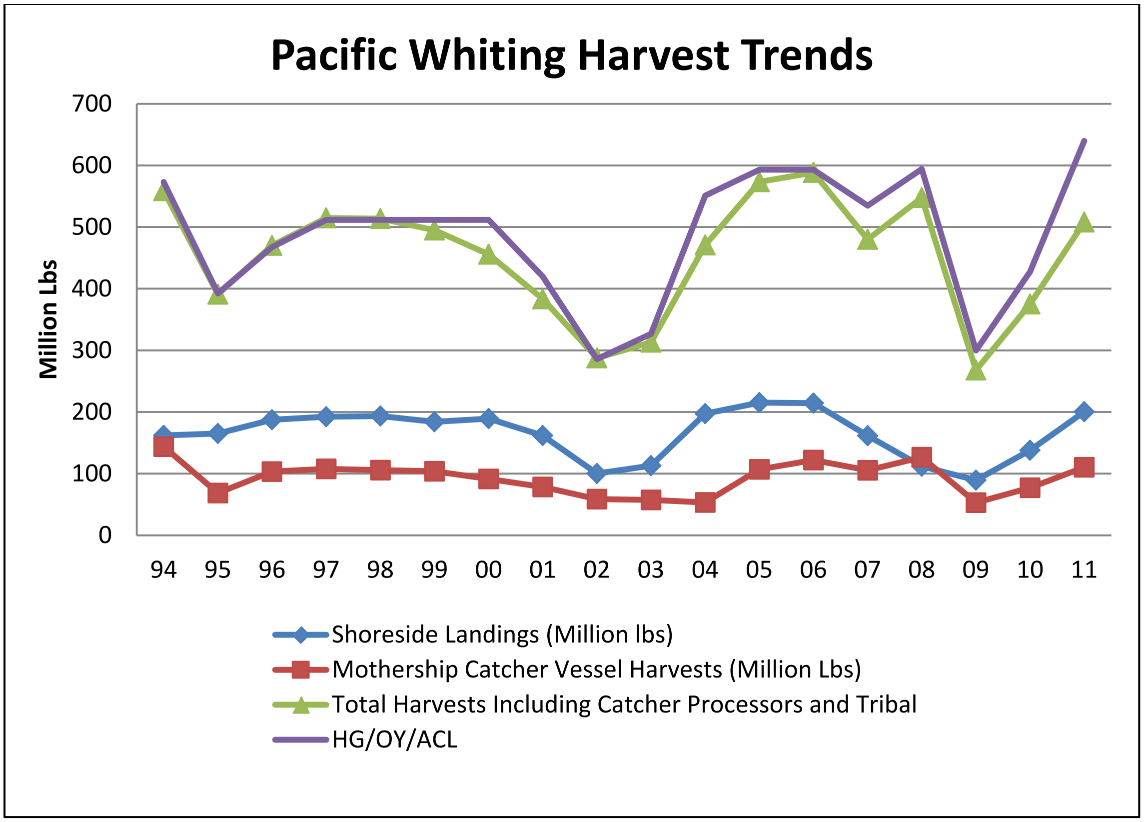

Figure 3-6: Pacific whiting harvest trends by sector, 1994-2011 (PFMC 2012e)

Notes and Observations on Pacific Whiting Ex-vessel Revenues (Figure 3-7):

- Whiting ex-vessel revenues (including imputed exvessel revenues for the catcher-processor sector) have ranged from a low of $12 million in 1996 to a peak of $60 million in 2008.

- Ex-vessel revenues began an increasing trend in 2003. It is presumed that the declines in 2009 and 2010 are due to the status of world economy and allowable harvest levels. (See ex-vessel price and export trends below)

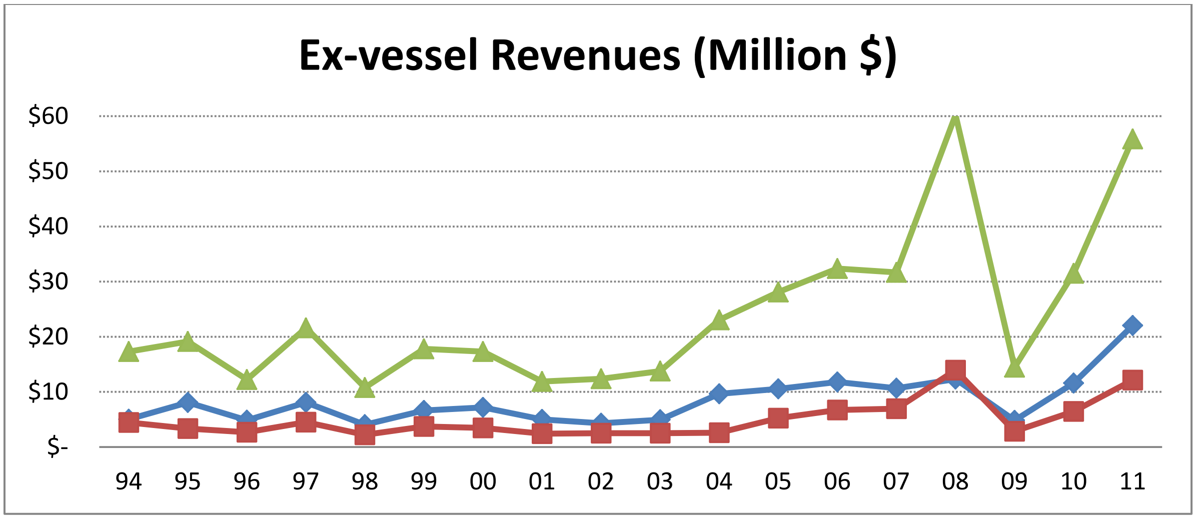

Figure 3-7: Pacific whiting fishery ex-vessel revenues by sector, 1994-2011 (PFMC 2012e) (sector labels are the same as above)

Notes and Observations on Whiting Ex-vessel Prices (Figure 3-8):

- Ex-vessel price trends are similar to revenue trends.
- After taking into account the world recession in 2008-2011, ex-vessel prices have been increasing since 2003, even as total harvests also increased.

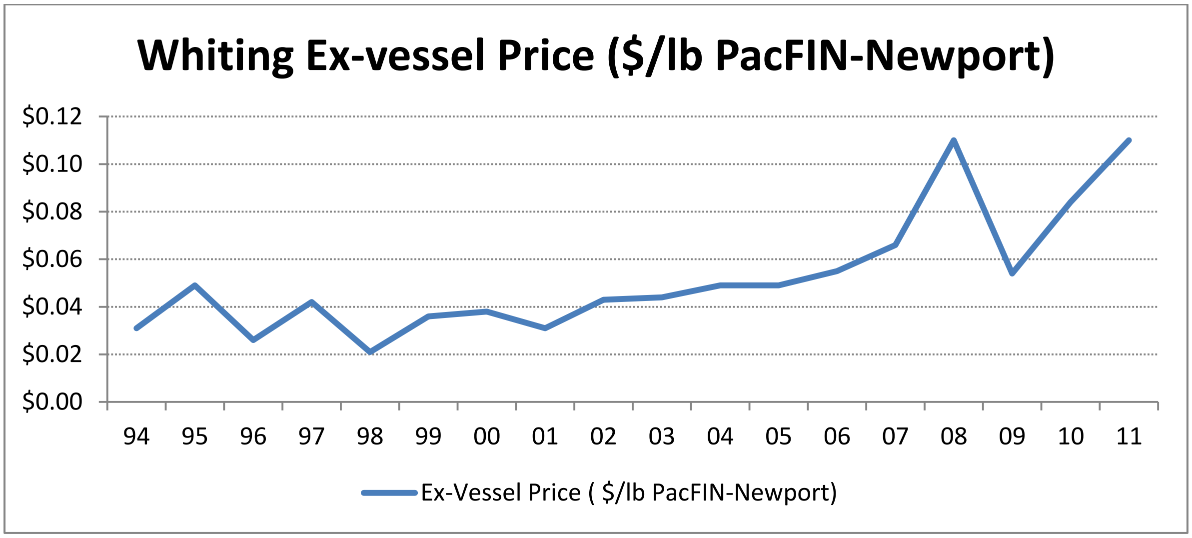

Figure 3-8: Pacific whiting ex-vessel price 1994-2011 (PFMC 2012e)

At-sea Sectors

The at-sea whiting fishery sectors accounted for 21.9 percent of coastwide revenue (including imputed exvessel revenues for the catcher-processor sector) during 2005-2010, averaging $18.8 million (adjusted for inflation) per year (Table 3-9). The tribal at-sea (mothership) sector averaged $1.9 million (2.2 percent) over the same period. The (imputed) catcher-processor component garnered almost two-thirds of the at-sea sectors' revenue. Preliminary estimates for 2011 show nine vessels participated in the whiting catcher-processor fishery, and 18 catcher vessels (and five motherships) participated in the mothership whiting sector.

Table 3-9: Groundfish ex-vessel revenue (inflation adjusted) by sector, 2005-2010 (PFMC 2012e).

Sector	2005	2006	2007	2008	2009	2010	Annual Avg.	Pct. of Total
At-sea catcher processors (imputed)	$9,428,186	$10,134,108	$11,080,172	$24,517,340	$4,011,936	$9,546,576	$11,453,053	13.30%
At-sea mothership catcher vessels	$5,728,696	$6,930,776	$7,123,228	$15,400,000	$2,844,808	$6,169,777	$7,366,214	8.60%
Shoreside whiting trawl	$12,157,911	$13,606,554	$12,039,922	$11,891,171	$5,531,348	$10,033,034	$10,876,657	12.70%
Shoreside nonwhiting bottom trawl	$23,943,395	$24,390,064	$26,308,400	$32,115,396	$30,866,692	$25,344,495	$27,161,407	31.60%
Limited entry fixed gear	$11,418,091	$12,439,155	$10,785,736	$12,578,395	$15,844,988	$17,740,842	$13,467,868	15.70%
Open access nearshore	$3,096,647	$3,034,965	$3,290,257	$3,356,919	$3,158,253	$2,720,686	$3,109,621	3.60%
Open access non nearshore	$3,399,327	$3,337,553	$2,047,886	$2,984,962	$4,828,147	$5,405,164	$3,667,173	4.30%
Tribal mothership catcher vessels	$2,964,756	$795,621	$846,248	$3,467,174	$1,257,675	$2,222,099	$1,925,596	2.20%
Tribal shoreside whiting	$1,347,541	$3,646,851	$2,868,530	$3,779,512	$1,066,915	$201,363	$2,151,785	2.50%
Tribal shoreside nonwhiting	$3,900,363	$3,554,376	$3,347,305	$3,778,853	$4,958,073	$4,898,182	$4,072,859	4.70%
All other groundfish revenue	$842,465	$620,477	$515,764	$477,750	$520,590	$1,184,642	$693,615	0.80%
Coastwide Total	$78,227,378	$82,490,500	$80,253,447	$114,347,473	$74,889,425	$85,466,860	$85,945,847	100.00%

Shoreside Sector
During 2005-2010 the shoreside sector of the groundfish trawl fishery accounted for the largest share of groundfish revenue with 44.3 percent for both the whiting and non-whiting (bottom trawl) components (Table 3-99**)**. At $27.1 million per year (on average) the non-whiting fishery earned almost two-thirds of the combined revenue of the whiting and non-whiting components. The whiting component of the shoreside trawl fishery, like the at-sea whiting sectors, catches proportionately fewer incidental species than the bottom trawl fishery. During 2007-2010, the shoreside whiting fishery's incidental catch rate of nonwhiting species was just over 1 percent, averaging 697 metric ton annually.

3.3.1.2 Number of Active Permits and Ex-vessel Revenues

Notes and Observations on Participation (Figure 3-9*)*

- "Active" means that that a permit fished or entity received fish that year.
- Whiting is landed either at buying stations or directly at processing sites. Analysts have related landings to processors based on buying station linkages, where known. For companies that process whiting at multiple sites, landings have been summed to reflect a single processing entity.
- The number of permits fished includes buyback permits in years prior to 2004 (Buyback occurred in December 2003). Twenty two permits involved in the Pacific whiting fishery were bought back.
- The number of active shorebased processing entities increased from seven in 2005 to 14 in 2010.
- All sectors had lower numbers of active participants in 2011 than in 2010.

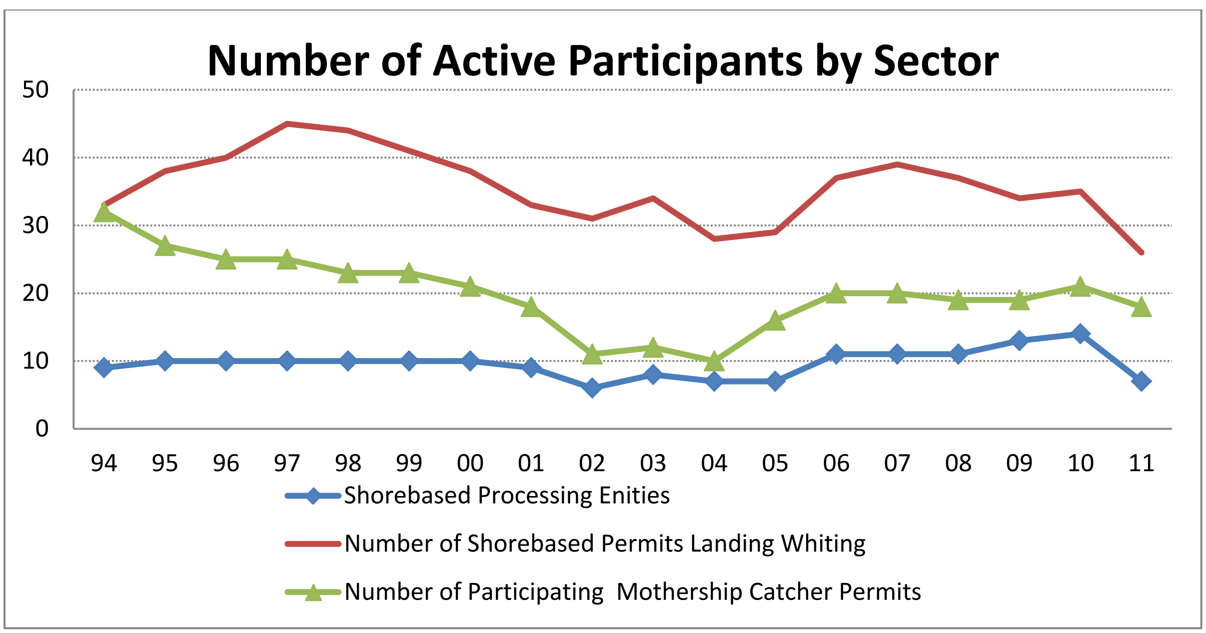

Figure 3-9: Number of active whiting fishery participants by sector, 1994-2011 (PFMC 2012e)

Notes and Observations on Ex-Vessel Revenues per Permit (Figure 3-10*)*

- Revenues per mothership catcher-vessel permit generally increasing after 2003 and in line with sector allocation.
- Revenues per shorebased permit were similar to the mothership trend except in 2008.
- In 2008, the whiting fishery was closed early because the best available information on August 18, 2008 indicated that the 4.7 metric tons (metric ton) bycatch limit of canary rockfish for the non-tribal whiting fisheries was projected to be reached. The shorebased fishery was not re-opened, but unused shorebased allocations were distributed to the mothership and catcher-processor sectors during the fall and winter.
- Relatively high revenues per permit in 2011 reflect increases in allowable catch, high ex-vessel prices, and decreases in the number of active permits. Permit revenues were also likely high due to the Trawl Rationalization Program. Shorebased permits were able to fish quota pounds of other vessels, and mothership catcher-vessel permits were able to fish the catch history assignments of other permits.

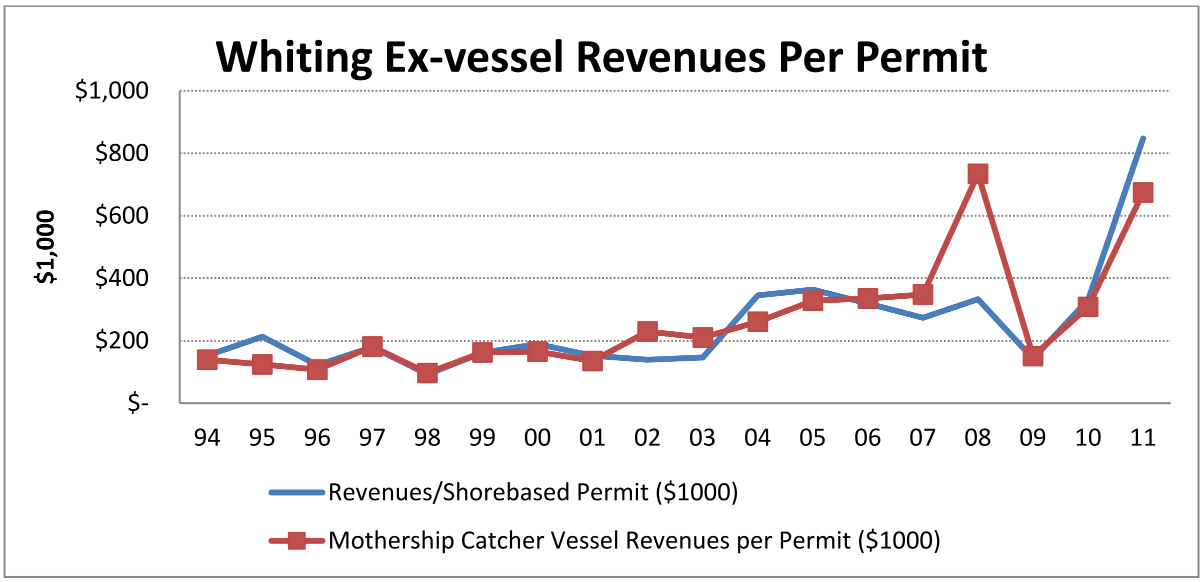

Figure 3-10: Trends in ex-vessel revenues per permit for shorebased and mothership/catcher permits, 1994-2011 (PFMC 2012e).

Vessel Revenues

A total of 127 vessels participated in the shoreside trawl sector in 2008. These vessels averaged $19,474 in accounting net revenues (Table 3-). Similarly, participation in non-whiting trawl fisheries produced average accounting net revenues of $32,360. Note that these estimates spread total revenues and total costs across all 127 vessels engaged in the shoreside trawl fishery that year and so are intended for comparison purposes only. The data show that in 2008 about 37 vessels actually participated in the shoreside whiting fishery (Table 3-) while 127 vessels made landings in the non-whiting trawl fishery (Table 3-). (Note: 13 shoreside whiting vessels also participated in the at-sea mothership whiting sector and 28 participated in shoreside non-whiting trawl fisheries). Therefore the actual distribution of revenues, costs and accounting net revenues for vessels participating in the shoreside whiting sector is probably considerably more skewed than the averages. Preliminary estimates for 2011 show 26 vessels participated in the shoreside whiting fishery, and 129 vessels were counted in the non-whiting trawl sector.

Table 3-10: Estimated average accounting net revenue per vessel for vessel types participating in Pacific Coast non-tribal shoreside groundfish fisheries in 2008 (PFMC 2012e).

Vessel Type	Vessel Count	Average Revenue from Groundfish ($)	Average Reported Costs ($)	Average Accounting Net Revenue ($)
Shoreside Whiting	127	78,896	59,422	19,474
Shoreside Nonwhiting Trawl	127	264,885	232,525	32,360
Shoreside LE Fixed Gear	128	87,050	77,423	9,627
Shoreside Open Access	231	35,370	30,920	4,450

Table 3-11: Counts of vessels participating in whiting groundfish fishery sectors 2005-2011.

Groundfish Sector	2005	2006	2007	2008	2009	2010	2011
Catcher-Processors	6	9	9	8	6	7	9
Mothership whiting CVs	17	20	20	19	19	22	18
Shoreside whiting trawl CVs	29	37	39	37	34	36	26
Vessels participating in both shoreside whiting and nonwhiting fisheries	20	27	27	28	26	24	14
Vessels participating in both shoreside and at-sea whiting fisheries	7	12	15	13	13	15	13

* Source: PacFIN. Vessel counts for 2011 are preliminary.

3.3.1.4 Participation in Pacific Coast and Alaska Fisheries

Table 3- shows participation by catcher vessels in Pacific Coast and Alaskan fisheries. This table shows that of the 16 permits that were inactive in Pacific Coast fisheries after 2003, one permit was associated with vessels that continued to be active in Alaska, one was associated with a vessel that also left Alaskan fisheries after 2003 and 14 were associated with vessels that did not have any activity in Pacific Coast or Alaskan fisheries after 2003 (i.e., a total of 15 show no activity after 2003). The table also shows that of 43 vessels that were active in the Pacific Coast fishery after 2003, 27 (63 percent) fished in the Alaska fishery and 17 (37 percent) fished the Pacific Coast fishery only.

Table 3-12: Participation on the shoreside whiting fishery for two periods (1994-2003 and 2004-2010) for catcher vessels showing participation patterns for all other Pacific Coast fisheries (combined) and Alaska (shaded indicate no activity after 2003) (PFMC 2012e).

		Activity in All Other Pacific Coast fisheries (combined, including mothership whiting)				
		Active in Both Periods	Entering After 2003 (Not Active in Earlier Period)	Exiting After 2003 (Active Only in Earlier Period)	Not Active	Total
Shoreside Whiting Participation	Alaska Participation	Number of Catcher Vessel Permits				
Active in Both Periods ('94-'03 & '04-'10)						
	Active in Both Periods	25	-	-	-	25
	Entering After 2003	-	-	-	-	-
	Exiting After 2003	-	-	-	-	-
	Not Active	13	-	-	-	13
Entering After 2003						
	Active in Both Periods	1	-	-	-	1
	Entering After 2003	-	1	-	-	1
	Exiting After 2003	-	-	-	-	-
	Not Active	-	4	-	-	4
Exiting After 2003						
	Active in Both Periods	5	-	1	-	6
	Entering After 2003	-	-	-	-	-
	Exiting After 2003	-	-	1	-	1
	Not Active	-	-	14	-	14
Total Shoreside Whiting Participants		44	5	16	0	65
Those that also participated in Alaska		31	-	2	-	33

Notes: Based on annual PacFIN summary file data and participation records from AKFIN. Alaska participation was evaluated for the vessel associated with the permit in each year.

3.3.2 Pelagic Rockfish Fishery

3.3.2.1 Pelagic Rockfish Harvests and Revenues

The main species harvested with midwater trawl nets historically have included Pacific whiting and the following rockfish species: widow rockfish, yellowtail rockfish and chilipepper rockfish (pelagic rockfish species complex). The midwater trawl fishery in the action area has primarily taken place north of 40˚ 10' N. latitude (Northern management area). During 1994-2011 the northern fishery landed an average of 73,674 metric ton of pelagic rockfish, which represented over 99 percent of the northern and southern management area (i.e., south of 40˚ 10' N. latitude) catches combined. Only chilipepper rockfish showed a higher average catch in the southern area during 1994-2011 (12 metric ton) compared to the northern area (7 metric ton) (Table 3-7).

Pacific whiting has been the major species harvested using midwater trawl gear in the fishery management area. During 1994-2011 whiting averaged 98 percent of the total catch of all midwater species followed by widow rockfish (1 percent), yellowtail rockfish (1 percent) and chilipepper rockfish (negligible) (Table 3-7). The midwater rockfish fishery fell off steeply starting with the 2003 season corresponding to implementation of the RCA and reduced trip limits for widow rockfish, which had been declared overfished. Catches of yellowtail rockfish rebounded somewhat in 2011 the first year of the IFQ program (Table 3-7 and Figure 3-11).

Table 3-7: Midwater (shoreside) trawl landings (mt) of specified pelagic rockfish species by management area and year, 1994-2011. Page 1.

	Species	1994	1995	1996	1997	1998	1999	2000	2001	2002
North [a/]	PWHT	68,640	70,751	73,371	79,590	77,133	74,296	85,824	73,372	45,679
	WDOW	1,768	1,597	1,599	1,756	849	1,845	3,464	1,663	242
	YTRK	272	292	470	231	411	436	2,583	1,560	439
	CLPR	0	0	2	0	0	0	28	1	1
	Subtotal	70,681	72,640	75,441	81,577	78,393	76,577	91,900	76,595	46,361
South	PWHT	0	0	0	0	0	0	0	0	0
	WDOW	0	8	0	19	0	18	274	55	0
	YTRK	0	0	0	0	0	0	21	0	0
	CLPR	0	0	0	0	0	0	82	106	32
	Subtotal	0	8	0	19	0	18	376	162	32
Both	PWHT	68,640	70,751	73,371	79,590	77,133	74,296	85,825	73,372	45,679
	WDOW	1,768	1,604	1,599	1,774	849	1,863	3,738	1,718	242
	YTRK	272	292	470	231	411	436	2,603	1,560	439
	CLPR	0	0	2	0	0	0	110	107	32
	Total	70,681	72,648	75,441	81,595	78,393	76,595	92,276	76,757	46,392

a/ North and South mean north and south of 40˚ 10' N. lat., respectively

Table continued (Page 2).

	Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
North a/	PWHT	51,220	89,634	97,587	97,266	73,280	50,787	40,293	62,320	52,439	72,358
	WDOW	13	28	77	50	82	101	109	62	111	856
	YTRK	45	118	173	156	186	43	75	198	151	452
	CLPR	10	21	26	13	6	4	2	21	0	7
	Subtotal	51,287	89,801	97,863	97,484	73,554	50,936	40,479	62,601	91,966	73,674
South	PWHT	0	0	40	2	0	0	0	0	0	2
	WDOW	0	0	0	0	0	0	0	0	0	21
	YTRK	0	0	0	0	0	0	0	0	0	1
	CLPR	0	0	0	2	0	0	0	0	0	12
	Subtotal	0	0	40	4	0	0	0	0	0	37
Both	PWHT	51,220	89,634	97,627	97,268	73,280	50,787	40,293	62,320	91,406	72,361
	WDOW	13	28	77	50	82	101	109	62	113	877
	YTRK	45	118	173	156	186	43	75	198	446	453
	CLPR	10	21	26	15	6	4	2	21	0	20
	Total	51,287	89,801	97,903	97,488	73,554	50,936	40,479	62,601	91,966	73,711

a/ North and South mean north and south of 40˚ 10' N. lat., respectively

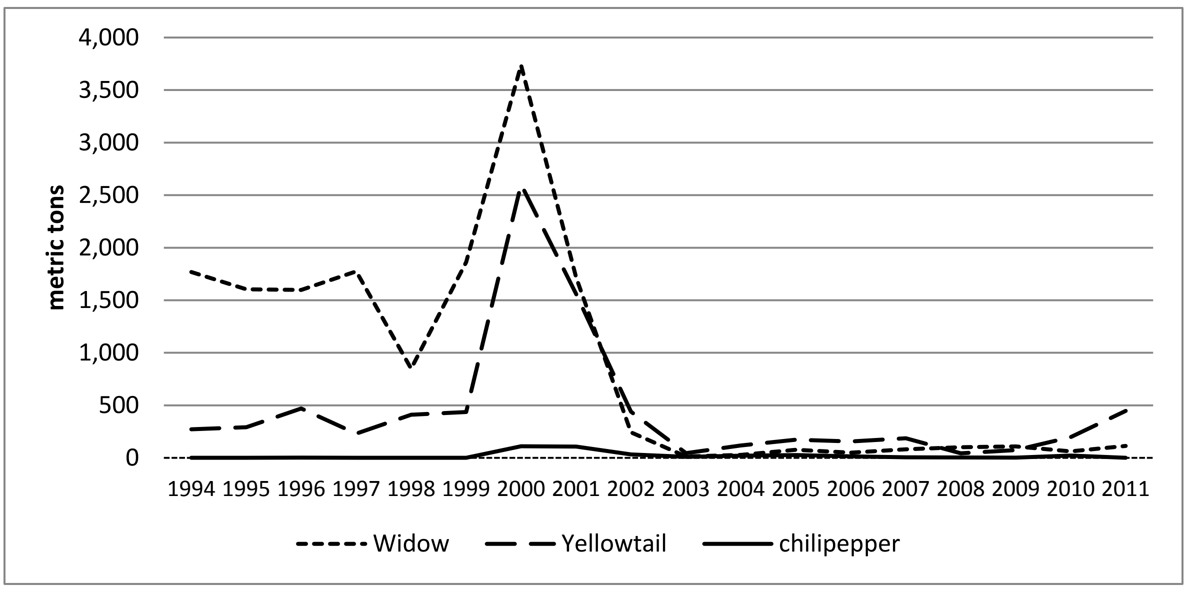

Figure 3-11: Shoreside midwater trawl landings in metric tons of pelagic rockfish by species and year, 1994-2011.

Pelagic rockfish in midwater trawl landings have been relatively small in comparison to whiting based on weight of fish landed, but have been significant in terms of ex-vessel revenues. Prior to 2003, the combined midwater rockfish landings for the period 1994-2002 averaged 24 percent of total midwater revenues and ranged from 14 percent to 45 percent of total annual midwater revenues (Table 3-; Figure 3-12).

Table 3-14: Ex-vessel value ($) of shoreside midwater trawl landings of whiting and pelagic rockfish by species and year, 1994-2011.

	Species	1994	1995	1996	1997	1998	1999	2000	2001	2002
North a/	PWHT	4,637,616	7,432,009	4,371,075	7,343,657	4,129,336	6,029,838	7,613,620	5,206,908	4,361,007
	WDOW	1,201,053	1,120,664	1,025,334	1,219,443	609,287	1,548,590	3,309,339	1,612,376	233,256
	YTRK	189,133	215,946	311,585	175,351	238,892	314,510	2,506,085	1,536,468	431,994
	CLPR	3	100	917	151	29	34	23,774	1,030	398
	Subtotal	6,027,805	8,768,719	5,708,911	8,738,602	4,977,544	7,892,972	13,452,818	8,356,782	5,026,655
South	PWHT	0	0	0	0	0	0	25	9	0
	WDOW	0	5,819	0	13,610	0	15,872	302,872	60,020	8
	YTRK	0	0	0	23	0	0	24,168	34	2
	CLPR	0	0	0	34	0	0	91,982	124,073	32,740
	Subtotal	0	5,819	0	13,667	0	15,872	419,047	184,136	32,750
Both	PWHT	4,637,616	7,432,009	4,371,075	7,343,657	4,129,336	6,029,838	7,613,645	5,206,917	4,361,007
	WDOW	1,201,053	1,126,483	1,025,334	1,233,053	609,287	1,564,462	3,612,211	1,672,396	233,264
	YTRK	189,133	215,946	311,585	175,374	238,892	314,510	2,530,253	1,536,502	431,996
	CLPR	0	100	917	185	0	34	115,756	125,103	33,138
	Total	6,027,802	8,774,538	5,708,911	8,752,269	4,977,515	7,908,844	13,871,865	8,540,918	5,059,405

a/ North and South mean north and south of 40˚ 10' N. lat., respectively

Continuation of Table (Page 2).

	Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
North a/	PWHT	4,870,809	6,936,658	10,760,442	12,540,808	11,328,551	11,584,919	5,306,434	9,691,290	22,032,378
	WDOW	10,987	23,112	61,560	37,017	68,113	69,426	79,551	44,370	106,736
	YTRK	37,018	102,198	148,091	132,760	133,217	30,498	57,202	155,292	449,898
	CLPR	6,716	14,715	19,750	9,045	3,616	1,955	1,585	4,466	0
	Subtotal	4,925,530	7,076,683	10,989,843	12,719,630	11,533,497	11,686,798	5,444,772	9,895,418	22,589,012
South	PWHT	0	0	4,423	167	0	0	0	0	0
	WDOW	0	0	2	4	0	0	0	0	0
	YTRK	0	0	0	0	0	0	0	0	0
	CLPR	0	0	161	2,594	471	0	0	0	0
	Subtotal	0	0	4,586	2,765	471	0	0	0	0
Both	PWHT	4,870,809	6,936,658	10,764,865	12,540,975	11,328,551	11,584,919	5,306,434	9,691,290	22,032,378
	WDOW	10,987	23,112	61,562	37,021	68,113	69,426	79,551	44,370	106,736
	YTRK	37,018	102,198	148,091	132,760	133,217	30,498	57,202	155,292	449,898
	CLPR	6,716	14,715	19,911	11,639	4,087	1,955	1,585	4,466	0
	Total	4,925,530	7,076,683	10,994,429	12,722,395	11,533,968	11,686,798	5,444,772	9,895,418	22,589,012

a/ North and South mean north and south of 40˚ 10' N. lat., respectively

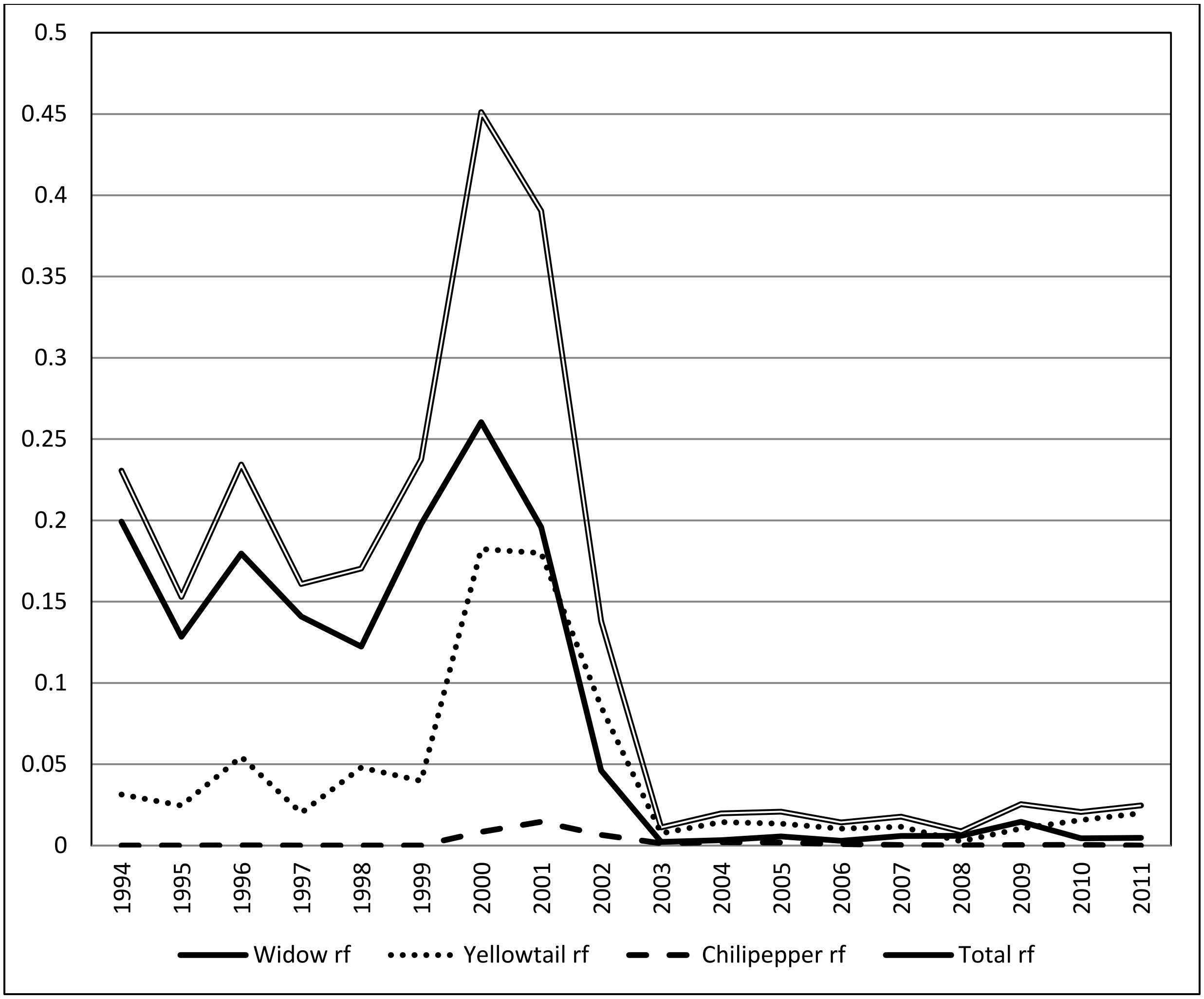

Figure 3-12: Shoreside midwater trawl ex-vessel landings revenues of pelagic rockfish expressed as a proportion of total shoreside midwater trawl ex-vessel revenues by species and in total by year, 1994-2011.

3.3.2.2 Historical Participation in Pelagic Rockfish Fishery

The number of vessels landing pelagic rockfish dropped off starting in 2002 and reached a low of 28 in 2004. The average number of vessels landing rockfish shoreside during 1994-2002 averaged 74.1 coastwide, ranging from 51-130. The 2003-2011 average was 33.8 vessels with a range of 28-41 (Table 3-8). The whiting fleet was relatively stable throughout the period 1994-2011 ranging from 27-46 vessels per year with an average of about 34 (Table 3-85). Prior to 2003 there were consistently more rockfish vessels than shoreside whiting vessels; since and including 2003 the number of rockfish and whiting vessels was usually the same each year (Table 3-8; Figure 3-13). This is because whiting vessels consistently landed rockfish but not all rockfish vessels landed whiting. The difference in rockfish and whiting vessel numbers represents the number of vessels that only landed rockfish. Prior to 2003 the rockfish fleet ranged from 15 to 84 vessels with an average of 38.7 vessels per year. Since and including 2003 the average rockfish fleet dropped to 0.2 vessels per year (Table 3-8; Figure 3-13).

Table 3-8: Number of vessels using midwater trawl gear to land whiting, rockfish and all species combined north and south of 40º10’ N. lat. Page 1.

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
North	Whiting	33	36	35	37	35	35	45	30	31	33
	Rockfish	53	56	51	63	50	66	123	102	72	33
	All species	53	56	51	63	50	66	123	102	72	33
South	Whiting	0	0	0	0	0	0	1	1	0	0
	Rockfish	0	1	0	1	0	1	16	18	8	0
	All species	0	1	0	1	0	1	16	18	8	0
N+S	Whiting	33	36	35	37	35	35	46	31	31	33
	Rockfish	53	57	51	64	50	67	130	115	80	33
	All species	53	57	51	64	50	67	130	115	80	33
N+S	Rockfish only	20	21	16	27	15	32	84	84	49	0

Continuation of Table (Page 2).

		2004	2005	2006	2007	2008	2009	2010	2011	Avg 94-02	Avg 03-11
North	Whiting	27	30	37	39	37	34	36	27	35.2	33.3
	Rockfish	28	30	37	39	37	35	36	27	70.7	33.6
	All species	28	30	37	39	37	35	36	27	70.7	33.6
South	Whiting	0	1	1	0	0	0	0	0	0.2	0.2
	Rockfish	0	1	1	2	0	0	0	0	5.0	0.4
	All species	0	1	1	2	0	0	0	0	5.0	0.4
N+S	Whiting	27	30	37	41	37	34	36	27	35.4	33.6
	Rockfish	28	30	37	41	37	35	36	27	74.1	33.8
	All species	28	30	37	41	37	35	36	27	74.1	33.8
N+S	Rockfish only	1	0	0	0	0	1	0	0	38.7	0.2

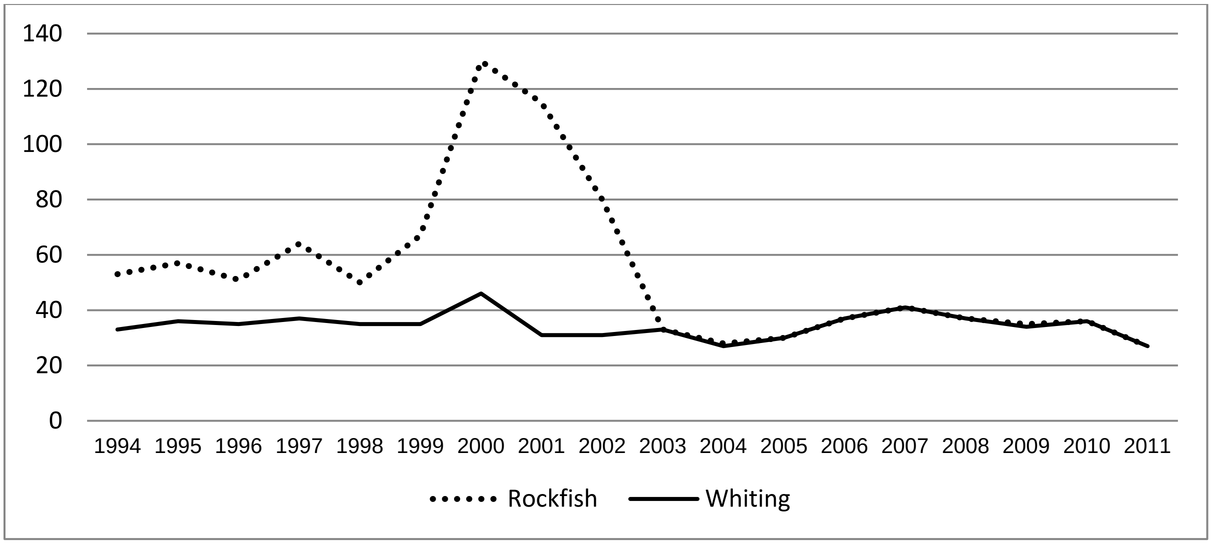

Figure 3-13: Number of vessels landing pelagic rockfish and whiting shoreside using midwater trawl gear during 1994-2011.

3.3.3 Processor Sector

The following section is based in part on the proposed harvest specifications and management measures for the 2013-2014 Pacific Coast groundfish fishery Final EIS (PFMC 2012) and the 2008 SAFE document (PFMC 2008).

Processors serve groundfish fisheries that are viewed and managed in terms of fishery "sectors." These sectors are defined by the permit status of participating vessels, gear type, target species, and various other factors. Entities that process groundfish operate in the at-sea whiting and shoreside groundfish sectors.

The at-sea non-tribal whiting sectors include the at-sea catcher/processors and the mothership sector. In both sectors a single cooperative manages fishing activity. Each is allocated a portion of the Pacific whiting TAC along with selected bycatch species.

Shoreside processors serve a groundfish fishery that has historically been composed of two separately managed sectors: a seasonal fishery targeting Pacific whiting with midwater trawl gear, and a year-round trawl sector targeting other groundfish species. Under trawl rationalization these two fisheries were merged beginning in 2011 in terms of management through the IFQ program. During 2005-2010, the shoreside non-tribal groundfish trawl sector including both whiting and nonwhiting trawl components accounted for 44.3 percent of total landings based on landed weight (PFMC 2012d). At $27.1 million per year (on average) the nonwhiting fishery earned almost two-thirds of the combined groundfish revenues (PFMC 2012d).

The number of fish dealers by state and shoreside fishery sector during 1986-2005 showed a substantial decline for all groundfish sectors and for all fisheries combined (Table 5-16 from PFMC 2008). The decline has resulted in consolidation of fish buying to a relatively few companies. In 2004-2005 the top three companies that purchased groundfish accounted for 77.8

percent of the groundfish by weight while the top six companies accounted for nearly 90 percent of the groundfish by weight (Table 5-18 from PFMC 2008). The numbers of commercial groundfish entities that received groundfish in 2011 by fishery, sector and state are shown in the following Table 3-9.

Table 3-9: Numbers of commercial groundfish receivers by fishery, sector and state, 2011.

Fishery	Sector	WA	OR	CA	Total
At-sea Whiting	Catcher/Processor	n/a	n/a	n/a	9
	Mothership*	n/a	n/a	n/a	6
Shorebased Groundfish	Primarily whiting [a/]	1	2	0	3
	Primarily other groundfish [b/]	29	64	199	292
	Whiting and other groundfish [c/]	0	3	0	3

*/ Includes one Mothership that received whiting only from catcher vessels in the tribal fishery.
a/ Primarily whiting: >10% exvessel revenue from whiting and <10% from other groundfish species.
b/ Primarily other groundfish: <10% exvessel revenue from whiting and >10% from other groundfish species.
c/ Whiting and other groundfish: >10% exvessel revenue from whiting and >10% from other groundfish species.

3.3.4 Communities

The 2013-2014 proposed harvest specifications and management measures DEIS (PFMC 2012) contains extensive community impact data for status quo whiting fishery regulations, which is hereby incorporated by reference (http://www.pcouncil.org/wp-content/uploads/May_2012_Main_Document_13-14_DEIS_SPEX.pdf).

Notes and Observations on Community Whiting Harvest Trends (Figure 3-14):

- Over the years the following ports have been the major communities receiving whiting:, Westport , Ilwaco Astoria, Newport, Coos Bay, Crescent City and Eureka. “Other” includes Blaine, and Brookings.
- Newport, Astoria and Westport are the major centers of shorebased whiting processing.
- The share of whiting landed in communities has varied over several periods: 1994-1998; 1999-2005; 2006-2010 and 2011 (Note that these estimates do not include tribal whiting).
- In the early years Newport was the lead port, but Westport has been steadily increasing. In 2011 Astoria was the lead port.
- The 1998-2004 chart covers the years used to allocate whiting quota share to processors.
- None of the California ports received whiting landings in 2011.

Notes and Observations on Community Pelagic Rockfish Harvest Levels (Figure 3-14)

- Average annual pelagic rockfish landings coded to midwater trawl gear in the action area during 1999-2002 (prior to widow rockfish being declared overfished) averaged about 3.2 thousand metric tons.
- Two port areas collectively received over 60 percent of the fish: Astoria, Oregon, (38 percent) and Newport, Oregon (24 percent).
- The fish were landed as far south as Avila, California, and as far north as Port Townsend, Washington.
- Other than Astoria and Newport, no single port area or general port area received over 6 percent of the fish.

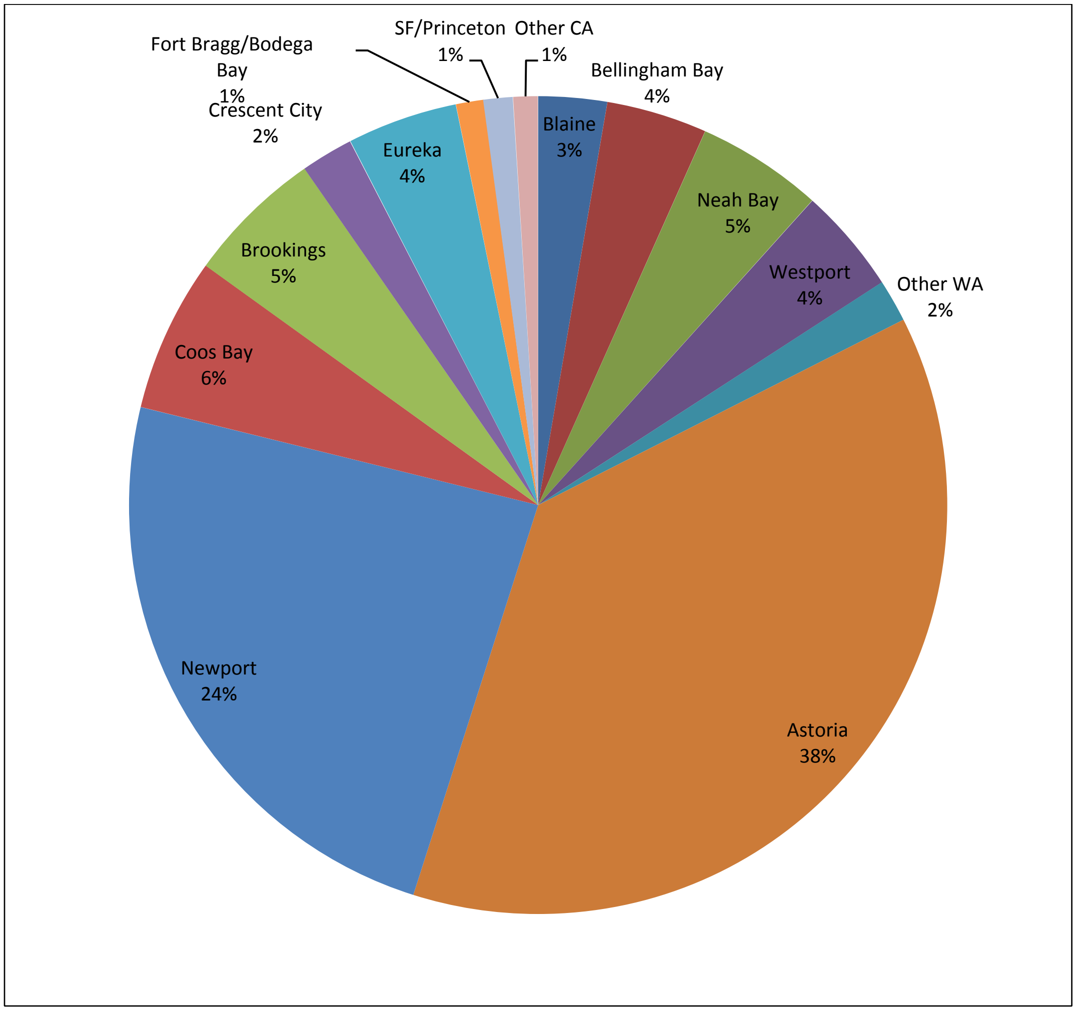

Figure 3-14: Average annual pelagic rockfish landed using midwater trawl gear in metric tons by port area or general area, 1999-2002.

Notes and Observations on Commercial Fishery Landings and Revenues by State and Port Group (Table 3-):

- Coastal communities benefit economically from a variety of commercial fisheries in addition to the target species identified in Section 3.2.1 of this EA: Pacific whiting and pelagic rockfish.
- During 2009-2011 for all three years combined, coastal ports received about 550 thousand metric tons of fishery products.
- The ex-vessel value of the landings was about $525 million.
- CPS species comprised 53 percent of the landings by weight while crab was the most valuable single species group at 28 percent for all species combined.
- Groundfish represented 27 percent by weight and 22 percent by ex-vessel value of total fishery landings.
- The leading port groups in terms of weight of fish landed were Los Angeles (19 percent), Santa Barbara (15 percent), Columbia River, Oregon (18 percent) and Coastal Washington (12 percent).
- The leading port groups in terms of ex-vessel value of fish were Santa Barbara (13 percent) and, at 10 percent each, Columbia River (Oregon), Los Angeles and Newport.

Table 3-17: Pacific Coast non-tribal commercial fishery landed weights (round, metric tons) and revenues (dollars) by PacFIN port group and species management group: 2009-2011 combined.

		Groundfish		**Salmon**		**Shellfish**		**Shrimp**		**Crab**	
State	Port Group	Weight	Revenues	Weight	Revenues	Weight	Revenues	Weight	Revenues	Weight	Revenues
WA	N Puget S	2,681.0	$4,005,161	0.2	$761	0.0	$0	1.1	$7,776	676.0	$4,686,055
	S Puget S	0.0	$0	2.4	$20,523	0.0	$0	0.0	$0	383.3	$1,941,411
	Coastal	26,923.5	$7,602,512	448.7	$4,381,132	234.3	$838,345	6,158.4	$5,309,177	5,546.1	$29,679,748
	Col. WA	5,820.2	$4,125,104	16.9	$108,962	0.0	$0	1,059.5	$817,649	1,986.9	$8,766,424
	Unknown	0.1	$198	2.3	$25,101	0.0	$0	0.0	$0	0.0	$0
	WA Total	35,424.7	$15,732,975	470.6	$4,536,478	234.3	$838,345	7,218.9	$6,134,602	8,592.3	$45,073,638
OR	Col. OR	43,594.0	$19,824,886	95.8	$770,299	59.2	$278,441	5,915.7	$4,253,451	2,497.1	$10,980,170
	Tillamook	98.0	$325,042	46.0	$290,317	171.9	$192,074	30.6	$72,583	628.5	$3,140,135
	Newport	37,385.0	$20,298,414	115.4	$1,096,201	1.0	$1,058	5,575.8	$4,225,017	3,757.2	$17,581,476
	Coos Bay	9,429.2	$12,508,542	66.2	$682,033	23.1	$33,688	11,406.0	$8,554,965	3,618.4	$16,187,028
	Brookings	3,477.8	$8,811,503	24.6	$294,075	0.0	$0	1,459.5	$1,054,546	1,888.3	$8,058,914
	OR Total	93,984.0	$61,768,387	348.0	$3,132,926	255.3	$505,261	24,387.6	$18,160,561	12,389.5	$55,947,723
CA	Cres. City	5,361.1	$3,559,140	1.0	$9,171	0.0	$0	2,578.0	$2,453,914	3,888.5	$16,814,249
	Eureka	5,715.6	$8,304,135	9.4	$87,509	0.0	$235	462.4	$333,481	2,857.1	$12,685,939
	Fort Bragg	3,440.4	$7,428,863	89.1	$972,023	0.0	$0	0.0	$0	118.3	$770,848
	Bodega Bay	150.2	$578,827	7.2	$61,862	0.0	$0	0.1	$2,222	438.3	$2,322,562
	San Fran	1,466.4	$2,791,093	1.3	$15,202	0.0	$0	67.0	$719,454	1,349.2	$7,312,796
	Monterey	956.0	$2,494,892	10.3	$90,494	0.0	$0	20.3	$519,143	156.7	$994,462
	Morro Bay	1,713.6	$7,737,079	0.1	$925	0.0	$0	68.7	$490,783	35.3	$133,383
	San Barb	357.5	$2,030,200	0.0	$136	1.0	$1,311	332.7	$2,920,273	905.5	$2,663,119
	Los Angeles	265.5	$1,874,535	0.0	$0	0.0	$137	87.9	$1,873,757	108.2	$299,656
	San Diego	205.0	$1,405,654	0.0	$0	0.6	$798	41.6	$838,061	103.9	$243,389
	CA Total	19,631.1	$38,204,418	118.4	$1,237,322	1.6	$2,480	3,658.7	$10,151,087	9,961.0	$44,240,401
Pacific Coast Total		149,039.8	$115,705,780	937.0	$8,906,726	491.3	$1,346,086	35,265.2	$34,446,250	30,942.8	$145,261,762

Table continued. Page 2									
		HMS		CPS		OTHER		ALL SPECIES	
State	Port Group	Weight	Revenues	Weight	Revenues	Weight	Revenues	Weight	Revenues
WA	N Puget S	294.8	$781,519	0.0	$0	79.3	$64,649	3,732.4	$9,545,920
	S Puget S	18.5	$44,382	0.0	$0	115.3	$194,581	519.5	$2,200,897
	Coastal	7,385.3	$16,285,510	18,898.3	$3,830,655	1,132.0	$1,904,129	66,726.7	$69,831,207
	Col. WA	5,289.0	$12,949,475	2,235.2	$601,132	46.7	$193,159	16,454.4	$27,561,904
	Unk	0.4	$1,932	0.0	$0	0.9	$9,914	3.7	$37,145
	WA Total	12,988.1	$30,062,817	21,133.5	$4,431,787	1,374.2	$2,366,432	87,436.7	$109,177,073
OR	Col. OR	3,176.6	$8,093,128	42,486.2	$10,554,222	373.3	$245,240	98,198.0	$54,999,837
	Tillamook	203.5	$449,373	0.5	$3,000	7.9	$12,222	1,186.7	$4,484,748
	Newport	4,128.1	$9,572,002	11.1	$0	851.2	$1,284,792	51,824.7	$54,058,961
	Coos Bay	1,785.0	$4,174,953	23.8	$7,621	775.5	$1,287,285	27,127.2	$43,436,115
	Brookings	76.3	$186,456	0.0	$0	451.5	$499,898	7,378.0	$18,905,392
	OR Total	9,369.5	$22,475,913	42,521.5	$10,564,842	2,459.4	$3,329,438	185,714.7	$175,885,052
CA	Cres. City	235.1	$513,538	0.0	$0	17.9	$18,893	12,081.6	$23,368,905
	Eureka	333.2	$858,675	0.0	$0	708.5	$809,706	10,086.2	$23,079,681
	Fort Bragg	51.1	$141,012	0.2	$122	2,703.0	$3,879,704	6,402.2	$13,192,573
	Bodega Bay	16.2	$38,114	0.0	$0	302.6	$572,818	914.6	$3,576,404
	San Fran	303.2	$1,335,624	1,712.5	$628,252	742.4	$2,602,882	5,642.0	$15,405,304
	Monterey	68.4	$188,700	49,137.6	$15,295,832	171.7	$355,637	50,521.0	$19,939,159
	Morro Bay	91.1	$349,450	162.2	$111,230	398.1	$947,709	2,469.1	$9,770,559
	San Barb	104.2	$225,676	73,011.0	$40,960,854	6,423.7	$17,541,413	81,135.5	$66,342,981
	Los Angeles	583.1	$1,095,028	101,277.2	$39,389,825	3,491.3	$9,842,991	105,813.3	$54,375,929
	San Diego	306.8	$1,257,078	94.5	$48,314	1,063.0	$7,312,886	1,815.5	$11,106,179
	CA Total	2,092.5	$6,002,895	225,395.3	$96,434,429	16,022.3	$43,884,639	276,881.0	$240,157,672
Pacific Coast Total		24,450.0	$58,541,626	289,050.3	$111,431,059	19,855.9	$49,580,510	550,032.4	$525,219,797

3.3.5 Enforcement and Management

3.3.5.1 Comparison of North Pacific Fishery Management Council Midwater (Pelagic) Trawl and Pacific Fishery Management Council Midwater Trawl Restrictions

A review of the midwater (pelagic) trawl gear restrictions between the PFMC and NPFMC areas are shown in Table 3-18. The PFMC regulations were more restrictive in several areas (codend mesh construction; chafing gear placement; footrope construction and bareness of net lines running parallel to the footrope, sweep lines and bridle lines). PFMC also prohibits the use of double-walled codends. The NPFMC regulations were more restrictive in other areas (minimum mesh size; chafing gear placement on the footrope and headrope; attachment mechanism between the main fishing net and the headrope and footrope; prohibitions on configurations that would possibly negate the intent of minimum mesh size regulations; presence of flotation devices; limitation on number footropes and fishing lines; and presence of metallic components other than for fishing instrumentation).

In addition, The Alaska fishery regulations contain performance standards for pelagic trawl that are intended to keep the gear off bottom (i.e., prohibitions on the number of crab that may occur in a pelagic haul) while Pacific Coast fishery regulations require gear configurations intended to make midwater gear ineffective when in contact with the bottom. An illustration of a midwater trawl net used in the NPFMC and PFMC management areas is shown in Figure 3-15.

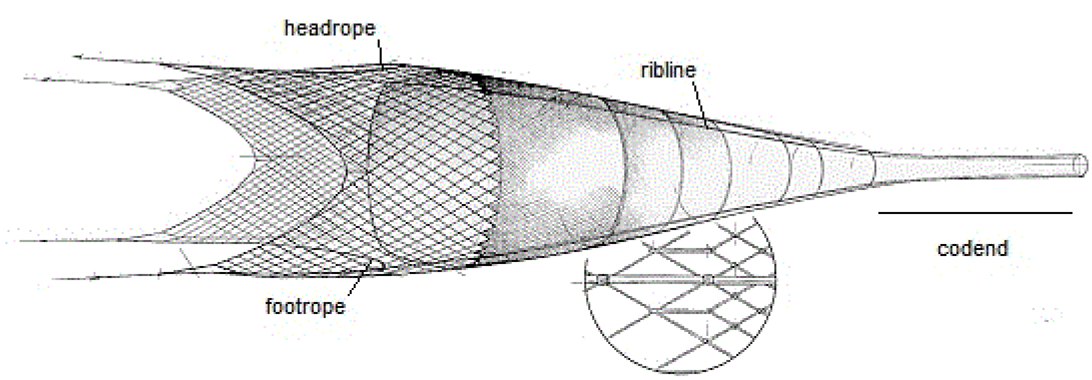

Figure 3-15: Side view illustration of a midwater trawl net used in the NPFMC and PFMC management areas (modified from NET systems web page: http://www.net-sys.com/index.php)

Table 3-10: Comparison of PFMC and NPFMC midwater (pelagic) trawl gear restrictions.

AREA:	PFMC	NPFMC	More restrictive area
Codend: [a/]	Single-walled webbing only (50 CFR §660.130(b)(1))	No comparative restriction	PFMC
Mesh size:	3 inch minimum mesh size (50 CFR §660.130(b)(2)) except for additional midwater trawl gear mesh size restrictions, explained below.	§679.2(14): (iii) Except for the small mesh allowed under paragraph (ix) of this definition (see below): (A) Has no mesh tied to the fishing line, headrope, and breast lines with less than 20 inches (50.8 cm) between knots and has no stretched mesh size of less than 60 inches (152.4 cm) aft from all points on the fishing line, headrope, and breast lines and extending passed the fishing circle for a distance equal to or greater than one half the vessel's length overall (LOA); *or* (B) Has no parallel lines spaced closer than 64 inches (162.6 cm) from all points on the fishing line, headrope, and breast lines and extending aft to a section of mesh, with no stretched mesh size of less than 60 inches (152.4 cm) extending aft for a distance equal to or greater than one-half the vessel's LOA;	NPFMC
		(iv) Has no stretched mesh size less than 15 inches (38.1 cm) aft of the mesh described in paragraph (14)(iii) of this definition for a distance equal to or greater than one-half the vessel's LOA; (ix) May have small mesh within 32 feet (9.8 m) of the center of the headrope as needed for attaching instrumentation (e.g., net-sounder device).	
Chafing (chafe) gear: [b/]	(1) Chafing gear may encircle no more than 50 percent of the net's circumference (50 CFR §660.130(b)(3))	No comparative restriction	PFMC
	(2) No section of chafing gear may be longer than 50 meshes of the net to which it is attached (50 CFR §660.130(b)(3)).	No comparative restriction	PFMC
	(3) Chafing gear (when used on the codend) may be used only on the last 50 meshes, measured from the terminal (closed) end of the codend (§660.130(b)(3)).	No comparative restriction	PFMC
	(4) Except at the corners, the terminal end of each section of chafing gear on all trawl gear must not be connected to the net (the terminal end is the end farthest from the mouth of the net). Chafing gear must be attached outside any riblines and restraining straps (50 CFR §660.130(b)(3)).	No comparative restriction	PFMC
	(5) There is no limit on the number of sections of chafing gear on a net (50 CFR §660.130(b)(3)).	No comparative restriction	Neither
	No comparative restriction	Has no chafe protection gear attached to the footrope or fishing line (§679.2(14)(ii)).	NPFMC

Continuation of Table

AREA:	PFMC	NPFMC	More restrictive area
General provisions	(1) Footrope [c/] must be bare (unprotected)(50 CFR §660.130(b)(6)).	(1) Has no discs, bobbins or rollers (50 CFR §679.2(14)(i)).	Neither
	(2) Footrope must not be enlarged with the use of chains or any other means (50 CFR §660.130(b)(6)).	No comparative restriction	PFMC
	(3) Ropes or lines running parallel to the footrope must be bare and not suspended with chains or any other materials (50 CFR §660.130(b)(6))	No comparative restriction	PFMC
	(4) Sweep lines and the bottom leg of the bridle must be bare (§660.130(b)(6)).	No comparative restriction	PFMC
	(5) For at least 20 feet behind the footrope or headrope, bare ropes or 16 inch minimum stretch mesh must encircle the net (50 CFR §660.130(b)(6)).	See 50 CFR 679.2 (14) (A and B), above.	NPFMC
	(6) A band of mesh *may* encircle the net under transfer cables, lifting or splitting straps, but must be: over riblines and restraining straps and of the same mesh size and coincide knot-to-knot with the net to which it is attached (50 CFR §660.130(b)(6)).	No comparative restriction	Optional
	No comparative restriction	(2) Contains no configuration intended to reduce the minimum mesh sizes described above (50 CFR §679.2(14)(v)).	NPFMC
	No comparative restriction	(3) Has no flotation other than for a net sounder device. (50 CFR §679.2(14)(vi)).	NPFMC
	No comparative restriction	(4) Has no more than one fishing line and one footrope (50 CFR §679.2(14)(vii)).	NPFMC
	No comparative restriction	(5) Has no metallic components except for connectors or net sounder (50 CFR §679.2(14)(viii)).	NPFMC
	No comparative restriction	(6) May have weights on the wing tips. (50 CFR §679.2(14)(x)).	Optional

a/ Codend is defined as the terminal, closed end of a trawl net (50 CFR 600.10 Definitions).

b/ Chafing gear is defined in PFMC area regulations as webbing or other material attached to the codend of a trawl net to protect the codend from wear (50 CFR §660.130 (11)(iii)(C). Chafe protection is referred to in NPFMC regulations (see above restrictions), but is not defined.

c/ Footrope is defined in PFMC area regulations as a chain, rope or wire attached to the bottom front end of the trawl webbing forming the leading edge of the bottom panel of the trawl net, and attached to the fishing line.

3.3.5.2 Prohibited Species Management in Alaska Fisheries

The Alaska trawl fisheries are managed in part to minimize bycatch of prohibited species. The regulations are found at §679.21 Prohibited species bycatch management. While the Alaska regulations as they apply to the codend of pelagic trawl gear are less restrictive than PFMC midwater trawl regulations, the Alaska regulations have catch limits for prohibited species (PSCs) that can lead to fishery closure if reached. Prohibited species means any of the following species: Pacific salmon (*Oncorhynchus spp.*), steelhead trout (*Oncorhynchus mykiss*), Pacific halibut (*Hippoglossus stenolepis*), Pacific herring (*Clupea harengus pallasi*), king crab, and Tanner crab, caught by a vessel regulated while fishing for groundfish in the BSAI or GOA, unless retention is authorized by other applicable laws (50 CFR 679.2 definitions). The crab bycatch limits serve, in part, as disincentives to trawling close to the ocean bottom where crab are found (Becky Renko, NMFS, pers. comm.; and PFMC 2012f)

Alaska also provides for prohibited species donation permits. These permits allow salmon or halibut delivered by a catcher vessel using trawl gear to shoreside processors to be distributed to hunger relief agencies, food bank networks or food bank distributors (50 CFR 679.26; Alaska Regional Office, NMFS web page http://alaskafisheries.noaa.gov/ram/psd.htm).

3.3.5.3 Current Trawl Fishery Regulations

A summary of current trawl fishery regulations is shown in Table 3-19.

Table 3-19: Summary of current trawl fishery gear use regulations by gear type and management area.

Groundfish Regulations	Midwater	Bottom Trawl									
		Bottom Trawl					Non-Groundfish Trawl a/				
		Small footrope			Large footrope						
	(unprotected footrope and large mesh at front of net)	Selective flatfish	Footrope <8 inches	Demersal	Footrope 8-19 inches	Footrope >19 inches	Pink Shrimp	Sea Cucumber (S of 38°57.50')	Ridgeback Prawn	CA Halibut (S of 38°57.50 ')	Footrope >19 inches
North of 40°10'											
Shoreward of Trawl RCA	Yes - Only during primary whiting season	Yes	No	No	No	No	Yes	No	No	No	No
Within Trawl RCA		No	No	No	No	No	Yes	No	No	No	No
Seaward of Trawl RCA		Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Non-groundfish trawl RCA							Yes	No	No	No	No
EFH - No bottom trawl, other than demersal seine	Yes - Only during primary whiting season	No	No	Yes	No	No	No	No	No	No	No
EFH - No bottom trawl		No	No	No	No	No	No	No	No	No	No
EFH - No bottom contact		No	No	No	No	No	No	No	No	No	No
EFH- Shoreward of 100 fm		No	No	No	No	No	No	No	No	No	No
EFH -Seaward of 700-fm	Yes	No	No	No	No	No	No	No	No	No	No
EFH-Davidson seamount >500 fm	No	No	No	No	No	No	No	No	No	No	No
South of 40°10'											
Shoreward of Trawl RCA	No	Yes	Yes	Yes	No	No	Yes		Yes		No
Within Trawl RCA	Yes - Whiting vessels only during the primary season	No	No	Yes b/	No	No	Yes		38°57 .50' and only to 100 fm if RCA		No
Seaward of Trawl RCA	Yes	Yes	Yes	Yes	Yes	No	Yes				No
Within Non-groundfish trawl							Yes	No	No	No	No
EFH - No bottom trawl, other than demersal seine	Yes	No	No	Yes	No	No	No	No	No	No	No
EFH - No bottom trawl	Yes	No	No	No	No	No	No	No	No	No	No
EFH - No bottom contact	Yes	No	No	No	No	No	No	No	No	No	No
EFH-Shoreward of 100 fm	No	No	No	No	No	No	No	Yes	Yes	Yes	No
EFH-Seaward of 700-fm	Yes	No	No	No	No	No	No	No	No	No	No
Farallon Islands <10fm	No	No	No	No	No	No	No	No	No	No	No
Cordell Banks <100fm	No	No	No	No	No	No	No	No	No	No	No

a/ State imposed gear restrictions are not shown in this table and may be more restrictive than federal restrictions.

b/ Demersal seine gear allowed between 38° N. lat. and 36° N. lat. shoreward of a boundary line approximating the 100 fm

CHAPTER 4 IMPACTS ON THE AFFECTED ENVIRONMENT

Introduction

The direct and indirect impacts of the actions being considered are addressed for the physical environment in Section 4.1, for the biological environment in Section 4.2 and for the socio-economic environment in Section 4.3. Cumulative impacts are discussed in Section 4.4.

The alternatives analyzed in this EA differ with regard to the amount of chafer coverage allowed on the length and breadth of the codend, the maximum length of chafer panels, and the placement of protective mesh (skirts) around codend ribbings (Table 4-1). Alternative-1 (FPA), provides for the greatest amount of codend chafing gear coverage among the alternatives and is the least prescriptive with regard to details of permissible chafing gear configurations.

Table 4-1: Relative amounts of chafing gear coverage allowed under no action and action alternatives.

	Circumference of Codend coverage	Length of coverage and maximum chafer panel length	Attachment restrictions
No Action Alternative	50% of the circumference.	Last 50 meshes of codend, maximum allowed length of a panel is 50 meshes.	The terminal end of each section must not be connected to the net. Chafing gear must be attached outside any riblines and restraining straps with an exception allowed for a band of mesh (skirt) *under* transfer cables, chokers, and lifting straps. Skirt materials and attachment constraints are described in Table 1-1.
Alternative 1 (FPA)	Allows for bottom and sides (assumed 75% of the circumference) of entire codend, which can be >400 meshes long.	Entire length of codend may be covered with a single chafing gear panel or multiple chafing gear panels.	Attached only at the open end of the codend and sides. The terminal end or the end of each chafing section must be left unattached. Chafing gear must be attached outside any riblines and restraining straps with an exception allowed for a band of mesh (a skirt) under ***or over*** transfer cables, chokers and lifting straps. Skirt materials and attachment constraints are described in Table 1-1.
Alternative 2a	50% of entire codend circumference, which can be >400 meshes long.	Entire length of codend may be covered with a single panel or multiple panels.	Same as Alternative 1.
Alternative 2b[a/]	50% of entire codend circumference, which can be >400 meshes long.	Entire length of codend may be covered, but no single panel may cover more than 50 meshes of codend (10 panels required for 500 mesh codend).	Same as No Action.

a/ Alternative 2b reflects status quo conditions (regulations in place before 2007).

The action alternatives under consideration in this EA allow for greater chafing gear coverage on the codend of midwater trawl nets used in Pacific Coast fisheries, primarily for Pacific whiting and rockfish of the pelagic species complex, compared to the No Action Alternative. The No Action Alternative restricts chafing gear coverage to 50% of the circumference of the terminal 50 codend meshes. The chafing gear restrictions of the action alternatives and the No Action Alternative are compared in Table 4-1.

The FPA (Alternative A-1) is the least restrictive of the alternatives. It would allow for roughly 75% coverage of the circumference of codends used on midwater trawl nets (for the purposes of this analysis it is assumed that the codend panels comprise the bottom and sides of the codend are of equal width) and allow chafer application to the entire length of the codend. One issue addressed in this EA is whether or not greater chafing gear coverage of the codend, compared to the No Action Alternative, would result in greater incidence of seafloor contacts with trawl gear, trawl doors and footropes in particular. Another concern is whether regulations allowing greater chafer coverage of the codend circumference could impede escape of unmarketable size and other small fish (groundfish and non-groundfish species) from codend meshes.

Baseline, Key Assumptions and Precaution on Interpretation of Results: It is important to describe the conditions against which the alternatives, if implemented in the whiting and pelagic rockfish fisheries, are compared. The conditions described under the No Action alternative are the ones that would exist if no regulatory action is taken and the reinterpreted chafing gear regulations are enforced i.e., the existing regulations would continue into the future and enforcement of the 2011 reinterpretation of the chafing gear regulations would begin (see Sections 1.4 and 2.1 for additional discussion of the interpretation issue). The No Action Alternative, as shown in the above table (Table 4-1), limits chafer coverage to 50 percent of the terminal 50 meshes of the codend. Since 2007, the whiting fishery has widely used codends that are compliant with the regulations that were in place prior to 2007 and that would be promulgated under Alternative 2b. Adoption of Alternative 2b would maintain status quo (current) environmental conditions, which is different from No Action. Under No Action, no regulations would change but human activity would change with enforcement of the reinterpreted existing regulations, changing the environmental impacts of the fishery. Adoption of any of the action alternatives, including Alternative 1 (the FPA) shown in the above table, requires analysis under National Environmental Policy Act (NEPA). Under NEPA, all alternatives must be compared to the No Action Alternative. The question to be answered is “How will the environments--physical, biological, and socio-economic, be different under each action alternative compared to the No Action Alternative?” The approach taken here is to project conditions that would be expected to occur under each of the action alternatives and compare them to expected conditions projected for the No Action Alternative (even though status quo conditions are most similar to those that exist under Alternative 2b).

Impacts to the environment occur through what are called impact mechanisms. The following two tables discuss the primary impact mechanisms for chafing gear and assess the two primary ways that greater chafing gear coverage may alter the fisheries' interaction with the natural environment through its effects on incidence of contact with the bottom and effects on retention of unmarketable and other small-sized fish, including forage fish and eulachon (a threatened species). The following table (Table 4-2) summarizes the impact mechanism effects on the physical habitat and describes where the effect is considered in detail within the analysis.

Table 4-2: Summary of analysis on impact mechanisms by target fishery: influences on physical habitat interactions expected with increased chafing gear coverage.

	Physical Habitat Impacts with Increased Chafing Coverage			
	Hard Bottom		**Soft Bottom**	
Target Fishery	**Reasons That Bottom Contact Might Be More Frequent**	**Reasons That Bottom Contact Might Not Be More Frequent**	**Reasons That Bottom Contact Might Be More Frequent**	**Reasons That Bottom Contact Might Not Be More Frequent**
Whiting	Protection offered by chafing gear may result in lesser incentive for fishers to be cautious about avoiding bottom contact (see Section 4.3.1.2).	Risk of damage to net from snagging or hanging up on hard bottom would not be lessened by increased chafing gear coverage. Nets can be very expensive to repair or replace (see Section 4.3.1.1 and 4.3.1.2).	Protection offered by chafing gear may result in lesser incentive for fisheries to be cautious about avoiding bottom contact (see Section 4.3.1.2).	Since contact rates under Alt 2b (status quo) are already quite low (≤8%), there may be low potential for increase in bottom contact in moving from No Action to greater coverage (i.e., fishermen may already be maximizing bottom avoidance under status quo).[a/b/]
		Reduced gear efficiency and increased operating costs when bottom contact occurs (see Section 4.3.1.2).		Reduced gear efficiency and increased operating costs when bottom contact occurs (see Section 4.3.1.2).
		Bare footropes, sweeps, and 16" mesh size restriction for the first 20 feet on front of net make the gear impractical or ineffective for fishing hard on the bottom (see Section 4.3.1.2).		Bare footropes, sweeps, and 16" mesh size restriction for the first 20 feet on front of net make the gear impractical or ineffective for fishing hard on the bottom (see Section 4.3.1.2).
		Wear patterns on nets indicate that when bottom contact occurs, it is probably the very end of the codend. This area is covered by chafing gear under all alternatives (see Section 4.3.1.2).		Wear patterns on nets indicate that when bottom contact occurs, it is probably the very end of the codend. This area is covered by chafing gear under all alternatives (see Section 4.3.1.2).
		Target fishing for whiting primarily takes place over soft bottom habitats (see Section 4.1.3.1 and Section 4.3.1.2)		

Non-whiting (Primarily Pelagic Rockfish)[c/]	Using cod-ends of greater than 50 meshes, may result in lesser incentive for fishers to be cautious in avoiding bottom contact (see Section 4.3.1.2).[d/]	Risk of damage to net from snagging or hanging up on hard bottom would not be mitigated by chafing gear. Nets can be very expensive to repair or replace (see Section 4.3.1.1 and Section 4.3.1.2).	When using cod-ends of greater than 50 meshes, may result in a lesser incentive for fishers to be cautious in avoiding bottom contact (see Section 4.3.1.2).	Bare footropes, sweeps, and a 16" mesh size restriction for the first 20 feet on front of net make the gear impractical and less effective for fishing hard on the bottom (Section 4.3.1.2).
		Bottom contact rates are already low with chafing gear coverage for the full length of the net (Alt 2b) (i.e., rates may already be as low as reasonably possible with no potential for change).[a/]		If pelagic gear is fished close to the bottom, it tends to be the very end of the codend which comes into contact with the bottom as the codend fills with fish. The combination of the shorter codends used for pelagic gear and the fact that under all alternatives the end of the codends are covered with chafing gear reduces the reason to believe that increased coverage toward the front of the codend would decrease the incentive for fishers to avoid bottom contact (Section 4.3.1.2).
		Bare footropes sweeps, and a 16" mesh size restriction for the first 20 feet on front of net is configured to make the gear impractical or ineffective for fishing on the bottom (Section 4.3.1.2).	.	The fishery primarily takes place over or close to hard bottom habitats. Where rockfish primarily occur (see Section 4.1.3.1).

[a/] Alternatives 1 and 2A allow for the full length of the codend bottom to be covered which is the same as status quo (Alternative 2b). Under Alternative 2b the typical rates of contact per tow are in the 2% to 4% range with rates being higher for some fishers than for other (on a per fisherman basis, the median fishermen reports encountering the bottom about 8% of the time, implying that some fishermen are contacting the bottom at a frequency substantially less than 2% to 4% (see Section 4.1.3.1 and Table 4-7). This low level of contact indicates that under the derby fishery in place prior to the catch share program (prior to 2011) there was already substantial incentive to avoid bottom contact. On this basis, the absence of chafing gear under the No Action Alternative may provide no effective change in the disincentive for avoiding bottom contact. Inversely, allowing more chafing gear relative to No Action may not provide any effective change in the disincentive for allowing bottom contact.

[b/] Bottom contact rate is already very low in the fishery, likely 8% or less (see footnote a/ for discussion). The low rates reported in footnote a/ were observed during derby fishing conditions. These rates may be even lower now that the catch share program has eliminated the race for fish and provides more time for fishermen to fish their gear in a more optimal manner. Additionally, the quota is expected to transfer to those fishermen that are most efficient. Because of the adverse effects of gear contact, more efficient vessels are likely to be those that avoid bottom contact. The Canadian fishery reports 1% bottom contact in their whiting fishery which is operated under an individual vessel quota program (see Biogenic Habitat Impacts, page 98).

[c/] The non-whiting midwater fishery is a re-emerging fishery, and the full range of species that may be targeted with midwater gear in the catch share program is unknown. Based on targeting that occurred when the fishery was largely unrestricted, pelagic rockfish are assumed to be the primary species that will be targeted with midwater gear.

[d/] Midwater trawl effort and associated bottom contact instances can be expected in increase in RCAs as the ACL for widow rockfish increases, as covered in the 2013-2014 groundfish specifications EIS (Council, 2012d). This will happen regardless of the amount of chafing gear coverage allowed on midwater trawl nets. The substantial disincentive for fishers to make hard bottom contact with midwater gear in combination with catch consolidation under catch share program provisions will likely result in bottom contact rates approaching 1 percent, which has been estimated for the Canadian whiting fishery under their catch share program (see Section 4.1.3.1).

The following table (Table 4-3) summarizes the impact mechanism effects on the retention of unmarketable and other small fish as affected by increased area of chafing gear coverage, use of single chafing gear panels, and change in protective mesh attachment methods.

Table 4-3: Summary of analysis on impact mechanisms for all midwater trawl fisheries: influences on bycatch of small fish (groundfish and non-groundfish) as a result of increased area of chafing gear coverage, use of single panels of chafing gear (rather than panels limited to 50 meshes in length), and change in attachment methods allowed.

	Impacts on Bycatch of Small Fish from Increased Chafing Gear Coverage	
	Reasons that small fish bycatch may be greater.	**Reasons that bycatch might not be greater.**
Bycatch of small species (e.g., Eulachon and other forage fish) and small-sized non-target species (e.g., juveniles)	Small fish (unmarketable size groundfish and non-groundfish species) that generally escape out of the sides and bottom of the net may become increasingly trapped in the codend as the length, circumference, and continuity of chafing gear coverage increases. [a/]	To the degree that whiting swim up to escape, the effect of chafing gear on the bottoms and sides on retention of small whiting will be minimized. For other species, escapement out of the top of the net will depend on the behavior within the net. Research on species related to Pacific whiting has shown escapement to generally occur out the top of the codend (Frandsen *et al*. 2010). In a Baltic sea herring study, the small herring that were able to escape did so through upper main net meshes (Suuronen, *et al.* 1997). As tow sizes increase to above 40 metric ton (typical for the whiting fishery), net plugging diminishes escapement from the codend, diminishing any impact chafing gear would otherwise have on small fish escapement from the codend (see Section 4.2.2.1). Fishermen may not use the maximum allowable chafer coverage and minimum mesh size. Catch of small, unmarketable-sized IFQ species is not in a fishermen's best interest because quota pounds must be used to cover catch. Small fish bycatch reduces the maximum revenue that a fisherman can generate with a given amount of quota.[/] Fishermen will likely adjust their codend mesh sizes (constrained by minimum mesh size regulations) and configure their chafing gear including chafer panel circumference, length of net coverage, and panel length (within regulatory constraints) to optimize their catch of target species and minimize catch of small fish and non-target species (see Section 4.3.1.2).[b/] The codend mesh size and chafing gear adjustments to avoid small fish bycatch may benefit escapement of forage fish and other smaller fish species, including eulachon, a threatened species that is occasionally caught in the fishery (Impacts on Whiting Harvester Profitability, page 130). Fishers do not want to lose MSC certification (see page 98)[c./] Whether protective webbing (a skirt) is placed over or under codend lifting, splitting or transfer cables should not affect the retention of unmarketable and other small-sized fish because the area covered remains the same, provided knot to knot attachment procedure is followed (see Table 1-1). The fishery is well-monitored. Over the long term, managers will be monitoring bycatch in the fishery and have opportunity to make adaptive adjustments if there is an unexpected and problematic increase in bycatch.
Bycatch of Non Target Species (Large Size)	None	None

a/ Chafing gear can create a secondary barrier to small fish escapement, especially when codend meshes are stretched due to codend filling with fish and codend and chafing gear meshes do not align knot to knot. Interaction with a secondary chafing gear layer also increases the opportunity for fish to be damaged, potentially decreasing survival after a gear encounter.
b/ For example, current regulations allow the use of a mesh size down to 3" for chafing gear, but it is reported that fishermen generally use meshes of 4" or larger (Impacts on Whiting Harvester Profitability, page 130).

c/ If increases in bycatch based on onboard observations threaten Marine Stewardship Council certification of the whiting fishery as environmentally sustainable, it is likely that fishermen will reconfigure their gear to reduce impacts such as modification of chafer coverage.

Based on these tables the following are general conclusions on the expected effects of the increased chafing gear coverage on bottom contact and bycatch.

1. On whiting trips, a slightly greater frequency in soft bottom contact might occur under any of the action alternatives relative to No Action and no change in hard bottom contact (because chafing gear provides little if any protection from hard bottom interactions). Under all options, catch consolidation under the catch share program may lower overall fishery bottom contact rate because more efficient harvesters, with low bottom contact rates, are expected to contribute a greater share of the catch. Also, there are substantial disincentives to making bottom contact that affect gear efficiency and operating cost.
2. Similarly, on pelagic species trips, there would be a slightly greater frequency in soft bottom contacts (even less than for whiting because the fishery tends to be over or in close proximity to hard bottom, and codends tend to be shorter in length, such that most of the net may be covered with chafing gear under all the alternatives) and no change in hard bottom contacts (because chafing gear provides little if any protection from hard bottom interactions).
3. There may be a higher level of catch of small bycatch species and small target species (groundfish and non-groundfish) under any of the action alternatives relative to the No Action Alternative (because of the added barrier that chafing gear creates in codends substantially longer than 50 meshes in length, which is usual in the whiting fishery), mitigated by fishermen's incentive to avoid catch of small target species (for economic reasons and the need to preserve MSC certification in the directed whiting fishery, and a robust monitoring program which will allow management adjustments as needed).

With respect to item 3 above:

- As the circumference of the net covered increases (e.g., from 50 percent to 75 percent) small fish that escape through the sides of the codend rather than the top are more likely to be retained.
- As the circumference and length covered with chafing gear increases over a greater amount of the codend, fish escaping through the sides and bottom will have to navigate two barriers in order to escape the fishing gear, decreasing the likelihood of escapement.
- As the length of the individual panels increases, the length of the net which fish must pass down in order to take advantage of escapement opportunities at the end of chafing gear panels increases, decreasing the likelihood of escapement.[9]
- Allowance for attachment of protective webbing under or over lifting, splitting, and expansion straps is expected to have no effect on bycatch because the area covered remains the same, provided current skirt attachment provisions are followed (Table 1-1).

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[9] To the degree that fish have difficulty passing through a second layer of mesh, of similar or larger size than the mesh in the codend, escapement through chafing gear on very long codends could require fish to travel the full length of the codend to escape through the terminal end of the chafing gear. This is likely to result in fewer escapements and post capture mortality after escapement would likely be higher.

4.1 Physical Environment, including Essential Fish Habitat and Ecosystems

The physical environmental elements of the action area discussed in the text (Section 3.1) related to the action area include physical oceanography, Pacific Coast marine ecosystems, issues associated with protection of groundfish EFH, potential gear impacts to different habitat types, and potential gear impacts to RCA habitats. Potential adverse impacts of the action alternatives compared to the No Action Alternative are discussed and analyzed below.

Table 4-4: Potential impacts of action alternatives compared to No Action Alternative: Physical Environment.

	No Action	**Alternative 1 (FPA)**	**Alternative 2a:**	**Alternative 2b (Status Quo):**
	Limited to 50 end meshes	**Broader and longer chafing gear on codend; unlimited chafer panel size**	**Longer chafing gear coverage; unlimited chafer panel size**	**Longer chafing gear coverage; chafer panel limited to 50 meshes**
Physical Oceanography	Nc	Nc	Nc	Nc
Pacific Coast Marine Ecosystems	Nc	Nc	Nc	Nc
EFH: Offshore biogenic habitats	Nc	LN [a/]	LN [a]/	LN [a]/
EFH: Offshore unconsolidated habits	Nc	LN [a/]	LN [a]/	LN [a]/
EFH: Hard Bottom habitat	Nc	Nc	Nc	Nc
HAPCs	Nc	Nc	Nc	Nc
RCAs	Nc	Nc	Nc	Nc

Nc = no change , N = Negative impact LN = low negative impact, see Section 4.3.1.2.

a/ See the introduction to Chapter 4 for an explanation of the expected effects of additional chafing gear coverage.

4.1.1 Physical Oceanography

The impact of the chafing gear alternatives relates to the escape of fish through codend meshes and the likelihood of gear contacting demersal fish habitats. No or very small change in impacts to the physical oceanography would be expected under any of the action alternatives compared to the No Action Alternative.

4.1.2 Pacific Coast Marine Ecosystems

The trophic interactions in the California Current ecosystem are extremely complex, with large fluctuations over years and decades. Food webs are heavily structured around coastal pelagic species (CPS) that exhibit boom-bust cycles over decadal time scales in response to low frequency climate variability, although this is a broad generalization of the trophic dynamics. The top trophic levels of such ecosystems are often dominated by highly migratory species such as salmon, albacore tuna, sooty shearwaters, fur seals, and baleen whales, whose dynamics may be partially or wholly driven by processes in entirely different ecosystems, even different hemispheres. The differences in impact among the alternatives are minor and highly unlikely to result in any measurable differences in the ecosystem (Table 4-4). The potential for reduced escapement of small fish including eulachon, a threatened species, has the potential for low negative impact to population status and sustainability of the potentially affected species or species groups. These impacts are addressed in following sections. No impact to the Pacific Coast Marine Ecosystem is anticipated from adoption of any of the alternatives under consideration in this EA.

The midwater trawl fishery targeting Pacific whiting (also known as hake) has earned Marine Stewardship Council (MSC) certification as a sustainable and well-managed fishery in 2009 and has been certified since. The fishery is the largest on the Pacific Coast of both the United States and Canada. The Pacific whiting fishery operates in the Canadian EEZ off the British Columbia coast and in the US EEZ off Washington, Oregon, and California. Its management bodies are the National Marine Fisheries Service and the PFMC in the United States, and the Department of Fisheries and Oceans in Canada. Certification of attainment of the MSC standard is intended to provide assurance to buyers and consumers that their seafood comes from a well-managed and sustainable source. MSC certification is valid for five years. During this period the performance of the fishery will be reviewed at least once a year to check that it continues to meet the MSC standard. After five years, the fishery must be reassessed in full if it wants to continue to be certified (http://www.msc.org/about-us/standards/standards/msc-environmental-standard#what-does-it-assess). As part of the MSC assessment, the three principles of the MSC standard were evaluated in detail: the status of the fish stock, the impact of the fishery on the marine ecosystem, and the management system overseeing the fishery (MSC 2009).

4.1.3 Essential Fish Habitat

Fish and other species rely on habitat characteristics to support primary ecological functions comprising spawning, breeding, feeding, and growth to maturity. Important secondary functions that may form part of one or more of these primary functions include migration and shelter. Most habitats provide only a subset of these functions. The type of habitat available, its attributes, and its functions are important to species productivity and the maintenance of healthy ecosystems. While we know that marine organisms require habitat, the relationship of habitat to population dynamics or ecological function are poorly understood.

Under the groundfish FMP, midwater trawl gear has primarily been used to harvest Pacific whiting. Other species can also be harvested with midwater trawls, including rockfish that form pelagic and semi-pelagic schools and other non-target but retained species discussed in Section

3.2.2. The non-whiting species most likely to be targeted by commercial operations are those referred to in this EA as the pelagic rockfish complex (see Section 3.2.1). Widow rockfish has been rebuilt, and fishery allocations are expected to increase beginning in 2013. Increased access to widow rockfish will provide access to other pelagic species, particularly yellowtail rockfish in the north. Midwater trawling has historically been a favored gear type to harvest widow rockfish in addition to yellowtail rockfish and, to a lesser degree, chilipepper rockfish. However, new target strategies for a broader range of species may develop in the shorebased IFQ fishery. Like bottom trawling, midwater trawling for groundfish is managed under the Pacific groundfish FMP. Fishing effects from the midwater trawl used to target Pacific whiting and non-whiting on EFH are generally limited to: (1) removal of prey species, (2) direct removal of adult and juvenile groundfish, (3) occasional, usually unintentional, contact with the bottom (Devit 2011), and (4) effects resulting from loss of trawl gear, potentially resulting in impacts to bottom habitats and ghost fishing (PFMC 2012g).

NMFS (2005b) has done an evaluation of fishing activities conducted pursuant to Alaska groundfish FMPs (Gulf of Alaska and Bearing Sea/ Aleutian Islands) on areas deemed EFH for Alaska groundfish species and species groups. The analysis, based in part on trawler surveys of gear usage, concluded that the vulnerability of pelagic trawls to damage precludes their operation on rough and hard substrates. NMFS (2005b) noted that the large forward meshes of pelagic trawl nets minimize capture of benthic organisms because the organisms drop out through the large openings that attach the footrope to the main fishing net (see Table 3-10). There is no trawl door impact effect on the seabed with most pelagic trawls because the doors are generally designed to fish above the seabed. Because pelagic trawls have unprotected footropes, their use on rough or hard surfaces is precluded, thus they have no impact on the more complex habitats that occur on these substrates. Pelagic trawl footropes may uproot or pass over sessile organisms while mobile organisms pass over the footrope with less resulting damage. On those occasions when bottom contact does occur, non-living structures may be more affected by midwater trawl footropes compared to bottom trawl footropes because pelagic trawl footropes have a sweeping effect on the seabed while bottom trawls add complexity to (stirs up) sedimentary bedforms. The requirement for large openings behind the footrope of midwater nets used in Alaska fisheries facilitates the escape of sedimentary animals before they can become entrapped in main net meshes. The Pacific Coast whiting fishery has regulations which complement the Alaska pollock fishery regulations regarding footrope protection and the large forward meshes required at the front of the fishing net (Table 3-10). PFMC 1994 reports that the use of unprotected footrope and ropes or 16 inch mesh encircling the front of the net required of midwater trawls in Pacific Coast fishing regulations (Table 3-108) were intended to "make the gear impractical or ineffective for fishing on the bottom."

Given where the fishery has occurred in recent years, specific offshore habitat types have been identified as those most likely to be potentially negatively affected by the potential increases in bottom contact rates that may occur with implementation of any of the action alternatives compared to the No Action Alternative (see Introduction to Chapter 4). These are discussed and analyzed in following sections.

4.1.3.1 Offshore Habitats

The following section includes an analysis of the potential effects of the action alternatives compared to the No Action Alternative on specific Pacific Coast offshore habitat types. An adverse effect is considered to be any impact which reduces the quality and/or quantity of that habitat type. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of that particular habitat type. Adverse effects result from actions occurring within or outside of particular habitat types and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Chafing gear coverage possibly affects instances of net contact with the ocean bottom or high profile fish habitats, particularly as it relates to targeting of pelagic and semi-pelagic rockfish species in areas where bottom contact gears have been restricted since 2002. The latter concern arises because of the concern that chafing gear may provide protection to the net from ocean abrasion sources in some habitats (habitats other than rocky and coral reef). In 2002, chafing gear coverage was limited to the 50 terminal codend meshes of small footrope bottom trawl nets, in combination with a maximum footrope size of 8 inches, based on the rationale and supporting data indicating that these measures would discourage trawling close to rocky habitat (PFMC, 2003). However, under all of the action alternatives, increasing chafing gear coverage on midwater trawl nets is expected to result in at most minimal increases in bottom contact relative to the No Action alternative. Under status quo management (Alternative 2b), only occasional bottom contact is documented in the Pacific whiting target fishery. See the Introduction to Chapter 4 and the discussion below (in this section and the section on Offshore Hard Bottom Habitat, Section 4.1.3.1).

Relative to the targeting of non-whiting species, primarily pelagic rockfish complex species, it is assumed that a similar degree (or less) of occasional contact to that observed in the Pacific whiting target fishery will occur under all of the alternatives including Alternative 2b (status quo). Relative to the targeting of non-whiting species, an increased amount of midwater trawl effort is expected to occur within the trawl RCAs and EFHCAs as fishermen use midwater gear to take advantage of recent increases in the ACLs for widow rockfish. Use of midwater gear for pelagic rockfish in these areas has been minimal since 2006 due to low ACLs for some species in the pelagic rockfish complex. The renewed midwater opportunities associated with the increased ACLs occur in areas where bottom trawl has been prohibited since 2002. As a result of the increased ACLs and concurrent increases in midwater trawl effort, more bottom contact is expected to occur within the RCAs and EFHCAs. This increase in fishing effort stemming from increased ACLs addressed as part of the biennial specification process and further discussed in the cumulative impacts section of this EA (Section 4.4).

Overall there is reason to expect that there might be a minimal increase in contact with benthic habitat as the result of additional chafing gear coverage, particularly relative to soft bottom and minimal to no increase in contact with hard bottom. See Introduction to Chapter 4 for a summary of the reasons to expect minimal or no increase in bottom contact.

Offshore Biogenic Habitat Impacts

Offshore biogenic habitats are described in Section 3.1.3.1. These are structure-forming invertebrates (such as corals, basketstars, brittlestars, demosponges, gooseneck barnacles, sea anemones, sea lilies, sea urchins, sea whips, tube worms, and vase sponges). Bycatch of corals and sponges in the at-sea whiting fleet (catcher/processors, motherships and tribal whiting sectors), as recorded by observers of the At-Sea Hake Observer Program (ASHOP),[10] is relatively rare (Table 4-5). This is most likely due to the fact that the at-sea whiting fleets use midwater trawl gear, which only makes occasional contact with the seafloor. If corals and sponges are encountered, large mesh in the forward portions of the midwater nets may also result in organisms being returned to the seafloor before entering the codend (NMFS 2005b). Between 2000 and 2010, 38 kg of combined bycatch of corals, bryozoans, sea pens/whips and sponges were recorded for vessels in the at-sea sectors. Bycatch was recorded in 0.4 percent of all observed tows in that 11-year period. Although frequency and standardized catch (catch per unit of effort) have decreased in the last five years, the relatively low rate of bycatch makes it difficult to interpret any meaning from that change.

Table 4-5: Summary of coral and sponge bycatch metrics for observed tows using midwater trawl gears, 2000-2005 and 2006-2010.[a/]

	2000-2005				2006-2010				2000-2010			
Taxon	#	FREQ	Wt	CPUE (per 1,000 hrs)	#	FREQ	Wt	CPUE (per 1,000 hrs)	#	FREQ	Wt	CPUE (per 1,000 hrs)
coral/bryozoan			9.8	3.60			0.4	0.11			10.2	1.70
sea pen/whip			17.3	6.40			10.9	3.20			28.1	4.60
sponge			0.1	0.02			0				0.1	0.01
Combined	67	0.50%	27.2	10.00	33	0.20%	11.2	3.30	100	0.40%	38.4	6.30

a/ From At-Sea Hake Observer Program database. "#" denotes number of tows where bycatch was recorded; "FREQ" denotes ratio of tows with bycatch to total tows observed; "Weight" denotes bycatch (kg); "CPUE" denotes bycatch per unit of effort (units: kg/1000 hr.). Tow counts represent only those where corals or sponges were encountered.

While the above data show very little bottom contact by midwater nets assessed in the ASHOP, it is instructive to look at bottom contact data for the bottom trawl fishery, which likely had 100 percent bottom contact with the seafloor for successfully completed hauls. The Pacific Coast Groundfish Observer Program (WCGOP) database is used for this comparison. The WCGOP database includes records of trips for vessels using a variety of bottom trawl gear configurations, including small and large footrope groundfish trawl, set-back flatfish net, and double-rigged shrimp trawl, to name a few.

Based on observer records of the limited-entry bottom trawl sector, recorded bycatch of corals and sponges were encountered on 8.4 percent of all observed tows during 2000-2010 and 10.5 percent of observed tows during 2006-2010 (Table 4-6). The data indicate the frequency (percent observed hauls) of bycatch of all three taxonomic groups combined have about doubled

[10] Unlike the limited-entry trawl sectors, observer coverage in the at-sea hake/whiting fleet is very near 100 percent.

in the recent time period. This statistic is very likely influenced by a more concerted effort by observers to identify offshore biogenic habitat-structure forming invertebrates in commercial catches. Thus, it is difficult to compare the data in Tables 4-5 and 4-6 between the two periods examined: 2000-2005 and 2006-2010.

Table 4-6: Summary of coral and sponge bycatch metrics for observed tows using bottom trawls as part of the West Coast Groundfish Observer Program (WCGOP), comparing two time periods: "Before" (3 Jan 2002 – 11 Jun 2006) and "After" (12 Jun 2006 – 31 Dec 2010) implementation of Amendment 19 regulations.[a/]

	2000-2005				2006-2010				2000-2010			
Taxon	#	FREQ	Wt	CPUE (per 1,000 km)	#	FREQ	Wt	CPUE (per 1,000 km)	#	FREQ	Wt	CPUE (per 1,000 km)
Coral	319	2.00%	9,309	49.00	335	1.80%	2,197	9.00	654	1.90%	11,507	27.00
Sea pen/ whip	198	1.30%	232	1.20	474	2.50%	145	0.59	672	1.90%	377	0.87
Sponge	469	3.00%	10,025	53.00	1,444	7.60%	45,383	190.00	1,913	5.50%	55,408	130.00
Grand Total	903	5.70%	19,567	100.00	2,003	10.50%	47,725	200.00	2,906	8.40%	67,292	160.00

a/ "#" denotes number of hauls; "FREQ" denotes ratio of hauls with positive catch of taxon to total hauls observed; "Weight" denotes catch (kg); "CPUE" denotes catch per unit effort (units: lb/1,000 km). Haul counts represent only those hauls where corals or sponges were present in the catch. Annual WCGOP coverage of the limited-entry trawl sector can be found online at: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/sector_products.cfm.

Not all bottom contact events shown for the bottom trawl fishery resulted in the capture of corals or sponges, as shown in Table 4-6. During 2006-2010 the coral and sponge contact rate in the bottom trawl fishery sample was 10.5 percent of tows. The coral and sponge contact data for the at-sea whiting fishery during the same period showed a 0.2 percent incidence of coral and sponge in catches (Table 4-5). The question is, "can these differences in contact rate be used to approximate the actual bottom contact rate in the whiting fishery?" A primary concern in using these data from the bottom trawl to ground truth data from the whiting fisheries and understand possible effects of the non-whiting midwater trawl fishing is that the fishing took place in different geographical areas of the coast; the bottom trawl fishery extends as far south as about Point Conception while the whiting fishery primarily takes place north of Cape Mendocino). Moreover, bottom trawling was conducted on the continental shelf and the continental slope, but was prohibited in the RCAs during 2006-2010. Whiting trawling during those years was conducted primarily on the shelf both within and outside of the RCA. Distribution data for corals and sponges show widespread patchy distributions (see Figure 4-1 map for example).

The bottom trawl data for 2006-2010 show that coral and/or sponge were caught in 10.5 percent of tows (Table 4-6). The bottom trawl data suggest that the actual bottom contact rate for midwater trawls during 2006-2010 was likely about 10 times (100 percent divided by 10.5 percent) higher than the midwater coral and sponge data indicate with the actual bottom contact rate in the at-sea whiting fishery being closer to 2 percent than 0.2 percent or 10 times higher than the actual contact data show. However, the actual rate would be higher if the bottom trawl data were somehow biased downward by bottom trawling in areas of relatively low coral and sponge abundance. For example, if bottom trawl and whiting data collected from the same areas showed a relatively higher coral and sponge contract rate in the bottom trawl fishery (say 20 percent compared to 0.2 percent, respectively), then the actual contact rate in the whiting fishery would be much lower (1 percent in this example). Conversely, if the range in difference was narrower (say 5 percent compared to 0.2 percent, respectively) then the estimated actual contact rate in the whiting fishery would be higher (4 percent in this example).

Devitt (2011) reported on a United States (Pacific Coast) and Canadian whiting fisherman survey conducted to collect bottom contact and bottom contact habitat information for the 2009 and 2010 fishing season. The median range in bottom contact rate by country and year ranged from 1 percent to 8 percent; the actual range in reported contacts was from no bottom contact (nil percent) to 25 percent (Table 4-7). All fishers reported that muddy or sandy bottom habitat was the habitat type most commonly contacted.

The frequency of bottom contact was consistently lower in the Canadian fishery compared to the United States (US) fishery. Although the reasons for the differences are unknown, the differences may be the result of differences in fishery management approach in the two countries in the study years. The US fishery was managed as a derby fishery under an overall quota while the Canadian fishery was managed based on Individual Vessel Quotas (IVQs), computed based on vessel qualifying criteria and as a proportion of the country quota. All catch was accounted for and applied against each vessel's IVQ holdings. Groundfish trawl license holders were accountable for all groundfish catch and responsible for ensuring sufficient IVQ holdings to cover the assigned catch that was on the vessel's groundfish trawl license (http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/pacific-hake-mid-water-trawl/assessment-downloads 1/11.01.2011_Surveillance_2010_US_Can_Pac_Whiting_Report.pdf). For this EA we use a bottom contact rate of 8 percent or less of tows to characterize the bottom contact rate that is typical for the Pacific Coast whiting fishery. However, because these data are pre-catch share and because Canadian data shows much lower bottom contact rates under a catch share program, under all alternatives it is expected that contact rates may be declining to even lower levels.

Table 4-7: Estimates of bottom contact incidents in United States and Canadian whiting fisheries based on fisherman surveys including bottom type contacted information (Devitt 2011).

	United States				
Year	No. fishers	No. tows	Contacts (range)	Median	Bottom type
2009	17	24-392	0-25%	8%	muddy/ sandy
2010	18	5-330	0-22.5%	3%	muddy /sandy
	Canada				
2009	26	30-750	0-10%	1%	muddy/ sandy
2010	26	17-180	0-15%	1%	muddy/ sandy

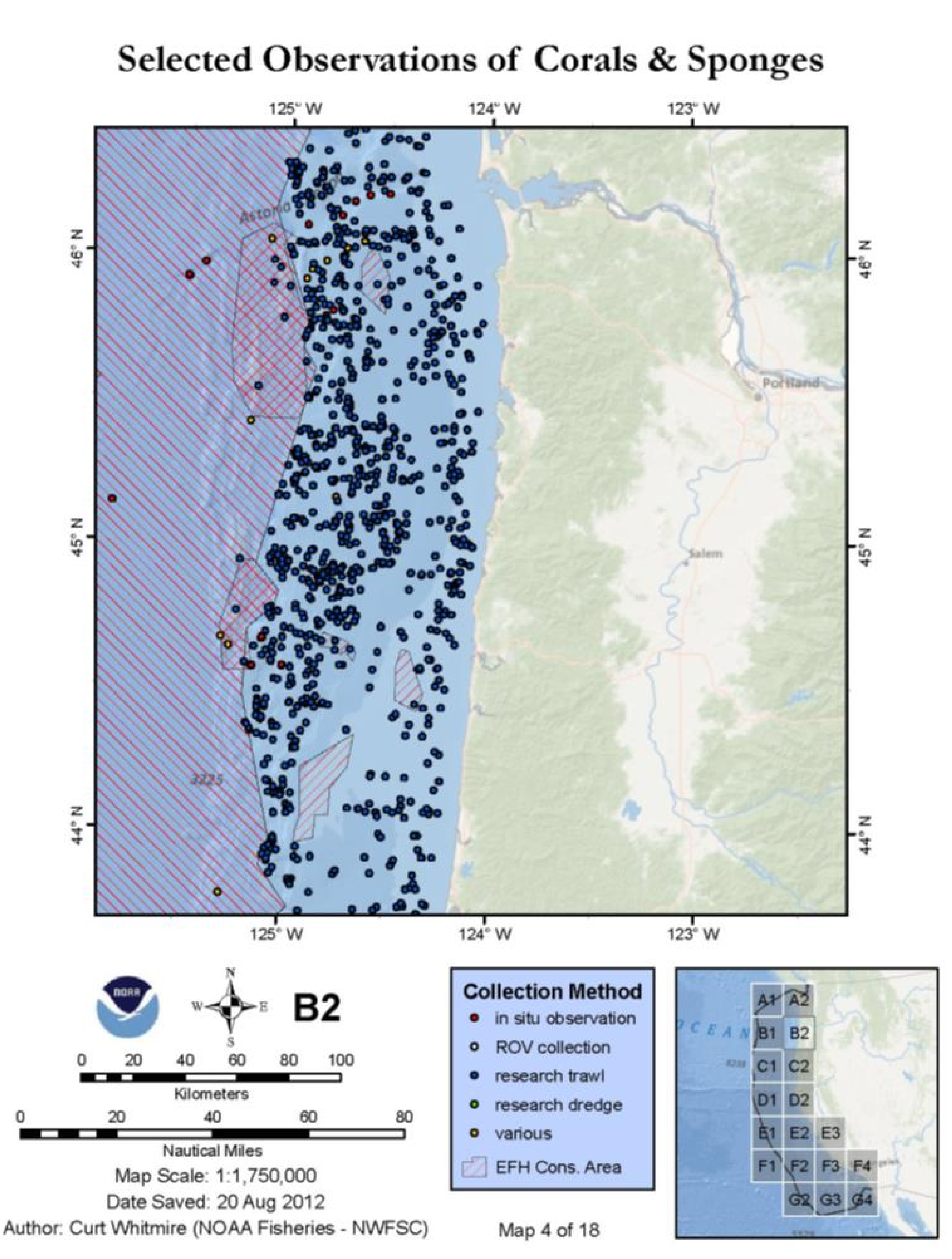

Figure 4-1: Example map of coral and sponge observations (Northern Oregon) PFMC 2012b, Appendix D).

The NOAA Deepsea Coral and Sponge geodatabase on locations of coral formation observations reported in Section 3.1.3.1 includes data from the WCGOP (PFMC 2012g). The WCGOP database includes records of trips for vessels using a variety of bottom trawl gear configurations, including small and large footrope groundfish trawl, set-back flatfish net, and double-rigged shrimp trawl, to name a few. It is important to note that records of tows using midwater trawl gear were not included in the analysis, since observers recorded no bycatch of corals or sponges using this gear type for the years under study (PFMC 2012g). The data presented above from the at-sea whiting fisheries showed only 0.2 percent of tows (1 in 500) during 2006-2010 had corals or sponges in the catch a (for more information on coral and sponge distribution observations: http://www.pcouncil.org/wp-content/uploads/H6b_EFHRC_RPT_1_SEP2012BB.pdf).

No sponges or corals were reported in the WCGOP pelagic rockfish fishery sample data collected during 2002-2011 and shown in Table 3-5. The pelagic rockfish fishery has likely and will in the future have occasional gear contacts with benthic habitats. The target species of the rockfish fishery tend to orient to rocky or hard bottom habitats as shown in Table 4-8. The pelagic rockfish fishery has primarily taken place when the fish are schooling off bottom (Tagart 1987). Whiting tend to move up and down in the water column, following prey species without regard to particular benthic habitat types. Whiting fishery contacts with benthic habitats are likely a mix of habitat types, while pelagic rockfish habitat encounters, to the degree that they might occur, would likely be primarily with or in the close vicinity of rocky habitats (discussed below). The non-whiting target fishing for pelagic rockfish complex species impacts to offshore biogenic habitats is expected to be minimal because most rockfish fishing will be over or in close vicinity to hard bottom habitats (see Table 4-8).

Table 4-8: Target pelagic rockfish species habitat association when schooling (Appendix B of NMFS 2005a).

	Schooling behavior	**Habitat association when schooling**	**Depth and latitude**
Chilipepper	Adults form schools School by sex just prior to spawning. Schools occur over areas with boulders and rock structures.	**Associated with deep, high-relief rocky areas and along cliff drop-offs.** Move as far as 45 m off the bottom during the day to feed.	0-425 m 24.5°-51° N. lat.
Widow	Adults are frequently found in large schools, but can also be solitary. Adults form dense, irregular, midwater and semi-demersal schools deeper than 100 m at night and disperse in midwater during the day.	**Occur over hard bottoms along the continental shelf (rocky banks, seamounts, ridges near canyons, headlands, and muddy bottoms near rocks).** Large widow rockfish concentrations occur off headlands such as Cape Blanco, Cape Mendocino, Pt. Reyes, and Pt. Sur.	24-549 m 31.8°-56.5° N. lat.
Yellowtail	Form large (sometimes greater than 1,000 fish) schools and can be found alone or in association with other rockfishes. Form schools, commonly within 2 m of the bottom, sometimes the schools are several meters off of the bottom.	**Found along steeply sloping shores with walls and cliffs, or above rocky reefs.** **They can be found above mud with cobble, boulder, and rock ridges, and sand habitats; they are not, however, found on mud or flat rock.**	0-549 m 32.7°-55° N. lat.

A slightly lower bottom contact rate in the whiting fishery is projected for the No Action Alternative compared to the action alternatives, which are each projected to have a bottom contact rate of 8 percent or less, based on data presented above and shown in Table 4-9. See the Introduction to Chapter 4 for additional discussion. Vessels that target rockfish will primarily fish over hard bottom habitats thus will have minimal potential impact to offshore biogenic habitats. The actual bottom contact rate in the rockfish fishery is projected to be the same under the action and No Action alternatives (Table 4-9).

Table 4-9: Summary of projected seabed contact rates for the action alternatives by habitat type and fishery, compared to No Action.

	No Action	Alternative 1	Alternative 2a	Alternative 2b (status quo)
	Whiting fishery			
Habitat type				
Offshore biogenic [a/]	< 8%	> No Action, <8%	> No Action, <8%	> No Action, <8%
Offshore unconsolidated bottom [a/]	< 8%	> No Action, <8%	> No Action, <8%	> No Action, <8%
Offshore hard bottom	< 8%	Same as No Action	Same as No Action	Same as No Action
EFH reefs/interest areas	< 8%	Same as No Action	Same as No Action	Same as No Action
RCA	< 8%	Same as No Action	Same as No Action	Same as No Action
	Rockfish fishery			
Offshore biogenic b/	Minimal	same as No Action	same as No Action	Same as No Action
Offshore unconsolidated bottom b/	Minimal	same as No Action	same as No Action	Same as No Action
Offshore hard bottom c/	<7%	same as No Action	same as No Action	Same as No Action
EFH reefs/interest areas c/	<7%	same as No Action	same as No Action	Same as No Action
RCA c/	<7%	same as No Action	same as No Action	Same as No Action

a/ Fishers may fish closer to bottom under the action alternatives compared to No Action for reasons summarized in Table 4-2, resulting in some increased bottom contact but still <8% which is the typical rate for status quo conditions (Alt 2b).
b/ Bottom contact is minimal under all alternatives because rockfish trawling primarily occurs near or close to hard bottom habitat and not biogenic or unconsolidated bottom habitats.
c/ The contact rate is lower compared to the whiting fishery rate because fishers will especially avoid bottom contact in these areas, which are well-mapped, in order to prevent net damage which would occur regardless of amount of chafing gear coverage; <7% is used to show the rate is lower than the rate range shown for offshore biogenic and offshore sedimentary habitats under the status quo alternative (<8%).

The projected potential impacts of the alternatives to offshore biogenic habitats differ between the whiting fishery and the pelagic rockfish complex fishery. This is because of differences in bottom contact rate projections in the two fisheries, as shown in Table 4-9. It is projected that the whiting fishery has the potential to have a low negative impact to offshore biogenic habitats under the action alternatives compared to the No Action Alternative, while there are no projected differences among the alternatives with regard to potential impacts of the pelagic rockfish complex fishery to offshore biogenic habitats, associated with hard bottom (Table 4-4).

Offshore Unconsolidated Bottom Habitats

Offshore unconsolidated bottom habitats are described in Section 3.1.3.1. These are habitats composed of small particles (i.e., gravel, sand, mud, silt, and various mixtures of these particles) and contain little to no vegetative growth due to the lack of stable surfaces for attachment. Benthic fauna often consist of infaunal organisms. A project, initiated as part of the EFH FEIS risk analysis (NMFS 2005a), sought to collect fishing effort information retroactively from fishermen through focus groups and to associate those data with GSI-based habitat data. The data collected covered current and historical fishing areas defined by the fishermen and fishing intensity for groundfish trawl and fixed gear fisheries within those areas. The project was conducted for a small but very important pelagic trawling area of the coast (Columbia River to Yaquina Bay, Oregon). Fishing effort data were collected in various forms for three eras: 1986-1999, 2000-2002, and 2003.

Sedimentary habitats of various types covered over 90 percent of the study area (Table 4-10 and Figure 4-2). The habitats where fishing gear was deployed varied among gear types. The midwater gear fishermen reported that they deployed their nets primarily over sedimentary shelf habitat in both of the two study eras for which data was collected for that gear type. They also reported fishing over rocky shelf habitat more frequently than any other gear type (12 to 17 times) in the study area. Rocky shelf habitat was one of the least abundant habitat types in the study area (Table 4-10 and Figure 4-2). Fishing by midwater trawlers over rocky habitat was likely primarily for pelagic rockfish, which would tend to orient to such areas. The fishing over sedimentary habitat was likely targeted at Pacific whiting, which follow prey species such as Pacific Ocean shrimp (see Section 3.2.1.1), which primarily associate with sedimentary substrates (CDFG 2008).

Table 4-10: Geologic habitats occurring in focus group study area and in areas of midwater trawl tows by focus group participants by time period (Era): 1986-1999 and 2000-2002.

Habitat type			Pelagic trawl habitat type associations	
	Area (km2)	Proportion	Era 1 (1986-1999)	Era 2 (2000-2002)
Sedimentary Shelf	7,350.67	36.65%	53.10%	61.40%
Sedimentary Slope	5,820.34	29.02%	17.40%	9.20%
Sedimentary Ridge	3,249.53	16.20%	5.90%	
Sedimentary Basin	1,824.53	9.10%	0.20%	
Rocky Ridge	787.14	3.92%	2.30%	
Sedimentary Slope Canyon Wall	289.03	1.44%	2.40%	4.20%
Sedimentary Slope Canyon Floor	224.09	1.12%	0.10%	2.50%
Rocky Shelf	219.39	1.09%	12.20%	17.00%
Rocky Slope Canyon Wall	91.29	0.46%	0.50%	0.80%
Rocky Slope	66.73	0.33%	0.50%	0.00%
Sedimentary Shelf Canyon Wall	54.47	0.27%	2.70%	
Rocky Basin	21.89	0.11%		
Sedimentary Shelf Canyon Floor	14.49	0.07%	0.10%	0.10%
Sedimentary Slope Gully	12.64	0.06%		
Sedimentary Slope Landslide	11.92	0.06%	0.20%	
Rocky Slope Landslide	8.26	0.04%		
Rocky Slope Canyon Floor	8.09	0.04%	0.50%	
Rocky Slope Gully	1.08	0.01%		
Sedimentary Shelf Gully	0.7	0.00%		
Island	0.09	0.00%		
Total	20,056.37	99.99%	98.10%	95.20%

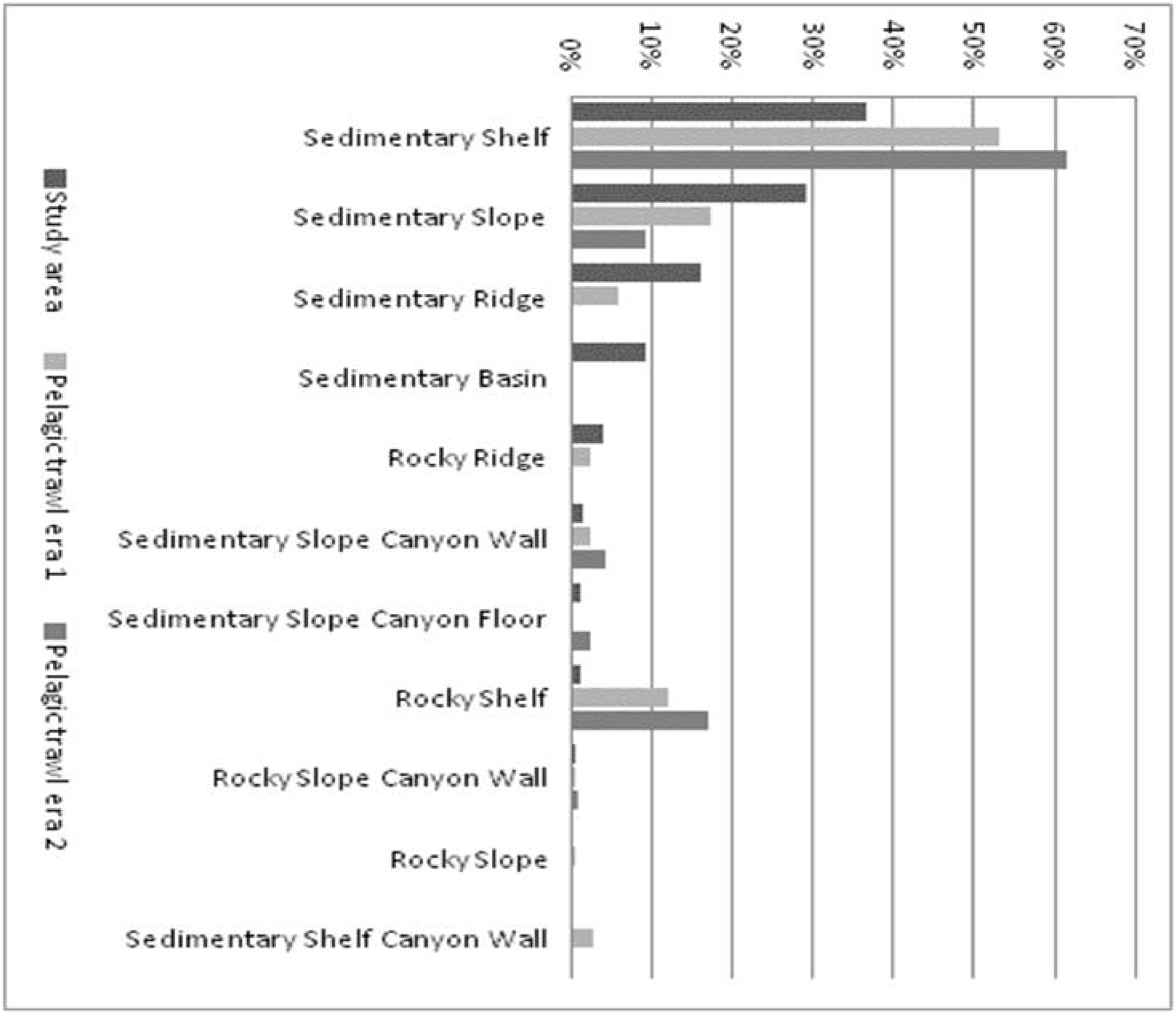

Figure 4-2: Study area and pelagic trawl fishery habitat type associations expressed as proportions of total available habitat types. Fishery associations are shown for two time periods: era 1=1986-1999, era 2=2000-2002.

The analysis of projected bottom contact rates in Table 4-9 shows slightly lower bottom contact rate in the whiting fishery under the No Action Alternative compared to the action alternatives, which are projected to have the same bottom contact rate. This is because the whiting fishery primarily takes place over soft (sedimentary or offshore unconsolidated bottom) bottom habitat, as discussed above and displayed in Table 4-7. Soft bottom habitat has low potential for damage to the net should the net make contact with the ocean floor.

Based on bottom contact rate projections in Table 4-9, there is projected to be low potential for negative impact to offshore unconsolidated habitats stemming from whiting fishery trawling under all three action alternatives compared to the No Action Alternative (Table 4-4). For the pelagic rockfish complex fishery there is projected to be no difference among the action alternatives and the No Action Alternative with regard to potential impact of that fishery to offshore unconsolidated habitats because the fishery primarily takes place over or in close vicinity to rocky bottom habitat (Table 4-4).

Offshore Hard Bottom Habitat

Offshore hard bottom habitats are described in Section 3.1.3.1. There is much greater potential for contact with hard bottom habitats in the pelagic rockfish fishery compared to the whiting fishery because the rockfish fishery primarily takes place over or in the close vicinity of hard bottom habitats. These are areas where rockfish are most commonly found (see discussion above regarding Offshore Unconsolidated Habitat and Table 4-8). However, because the potential for substantial net damage is much greater when targeting rockfish near or above hard bottom habitats than it is for whiting targeting, rockfish fishermen are likely to be more careful than Pacific whiting fishermen about tending the gear to prevent the occasional contact events with the bottom. The low bottom contact rate used for the at-sea whiting fishery of 8 percent or less (see Section 4.1.3.1) is likely too high for the rockfish fishery. There are also considerable disincentives to making bottom contact with midwater trawl gear, regardless of amount of chafing gear coverage allowed on the codend. These considerations include increased cost and operational inefficiencies associated with bottom contact events, which are described in Section 4.3.1.2.

The Alaska EFH study reported at the beginning of this Section (NMFS 2005b) concluded that because pelagic trawls have unprotected footropes, their use on rough or hard surfaces is precluded, thus it is believed that they have no impact on the more complex habitats that occur on these substrates. The disincentive to make bottom contact in the whiting and rockfish fisheries is likely about the same with regard to operating efficiency. Midwater trawl gear in contact with ocean bottom or rocky structures does not operate at peak efficiency due to net fouling, added fuel cost, and wasted time, particularly if the net or codend is damaged. Vessels that have participated in the whiting fishery since 2007 used midwater trawl gear that was compliant with 2006 regulations (which had been in place since 1994 and were more restrictive than regulations in place prior to 1994). The 2006 regulations have been enforced up through the present (see Section 1.4).

The added chafing gear coverage to the codends of midwater trawl nets used to catch Pacific whiting and pelagic rockfish is likely to result in little or no difference in impact among the action alternatives and the No Action Alternative (Table 4-4 and Table 4-9). Midwater trawl nets are highly susceptible to damage when contacting hard bottom because they have unprotected footropes and sweeps as well as large mesh in the forward sections of the net that provide virtually no protection from the hard bottom, and doors are normally rigged so they do not make contact with the bottom and keep the net off bottom (NMFS 2005b).

Offshore Habitat Recovery Times

Offshore habitat recovery times by habitat type are described in Section 3.1.3.1. There is a small chance that the action alternatives including the FPA (Alternative 1) could potentially result in a minimal increase in habitat impacts relative to the No Action Alternative, for reasons summarized in Table 4-2, but only in the whiting fishery as it affects offshore biogenic and unconsolidated habitats (Table 4-4). The whiting fishery primarily takes place over soft (sedimentary) bottom habitat (page 103 and Table 4-7). Habitat recovery rates shown in Table 3-1 shows that bottom trawl gear impacts on soft bottom habitats have recovery times ranging from 0.5 to 1.5 yrs, which is a shorter recovery range than for other bottom habitat types (Table 3-1). All of these factors taken together indicate small or no measureable difference in bottom habitat recovery time impacts among the action alternatives and the No Action Alternative stemming from occasional bottom contacts in the Pacific whiting fishery. No difference in impact is projected with regard to hard bottom habitats in either the whiting fishery or the pelagic rockfish fishery for reasons explained in Table 4-2.

4.1.3.2 Habitat Areas of Particular Concern

Midwater trawling for groundfish occurs in all ocean waters north of 40º 10’ N. latitude, including HAPCs, by vessels participating in the primary whiting fishery and that have QP to cover their catches of IFQ species. The HAPCs in this area and that will be subject to incidental habitat contact by midwater trawl gear are described in Section 3.1.3.2. These areas include offshore rocky reefs and areas that are designated as Areas of Interest that occur in offshore waters. The locations of HAPCs are shown in Figure 3-2. South of 40º 10’ N. latitude, midwater trawling is only allowed seaward of the RCA, thus only offshore rocky reefs and offshore Areas of Interest will be subject to incidental contact by midwater trawl gear stemming from a possible increase in the amount of chafing gear allowed on the codends of midwater fishery trawl nets.

The map in Figure 4-3 shows likely at-sea whiting fishery bottom contact locations off the Washington and Oregon coasts relative to EFH Conservation Areas during pre- and post-EFH implementation years as follows: 1990-2006 and 2007-2011, respectively. Areas of Interest are briefly described in Section 3.1.3. This map displays locations of bottom contact based on the presence of benthic species in the tow. These species included crab, isopods, starfish, sea cucumber, sea urchins, sand dollars, ascidians, and nudibranchs. The data do not indicate any instances of whiting fishery gear contacts with the seafloor in specified EFH Conservation Areas during post-EFH implementation years of 2007-2011. They also do not indicate there were any instances of bottom contact in these same areas during pre-EFH implementation years of 1990-2006.

The analysis in Section 4.1.3.1 dealing with Offshore Hard Bottom habitats as affected by the whiting and pelagic species fisheries applies equally to potential impacts of the alternatives to offshore rocky reefs and Areas of Interest that mostly contain hard bottom habitat (Table 4-4). Offshore seamounts which have been designated Areas of Interest such as Daisy Bank/Nelson Island and Mendocino Ridge are likely to be fished heavily for pelagic rockfish complex species. Offshore seamounts with HAPC designation are closed to bottom trawling, but open to midwater trawling. Daisy Bank is a highly unique geological feature that occurs in Federal waters due west of Newport, Oregon and appears to play a unique and potentially rare ecological role for groundfish and large invertebrate sponge species. The bank was observed in 1990 to support more than 6,000 juvenile rockfish per hectare; an amount thirty times higher than those observed on adjacent banks during the same study period. The same study also indicated that Daisy Bank seems to support more and larger lingcod and large sponges than other nearby banks (PFMC 2011e).

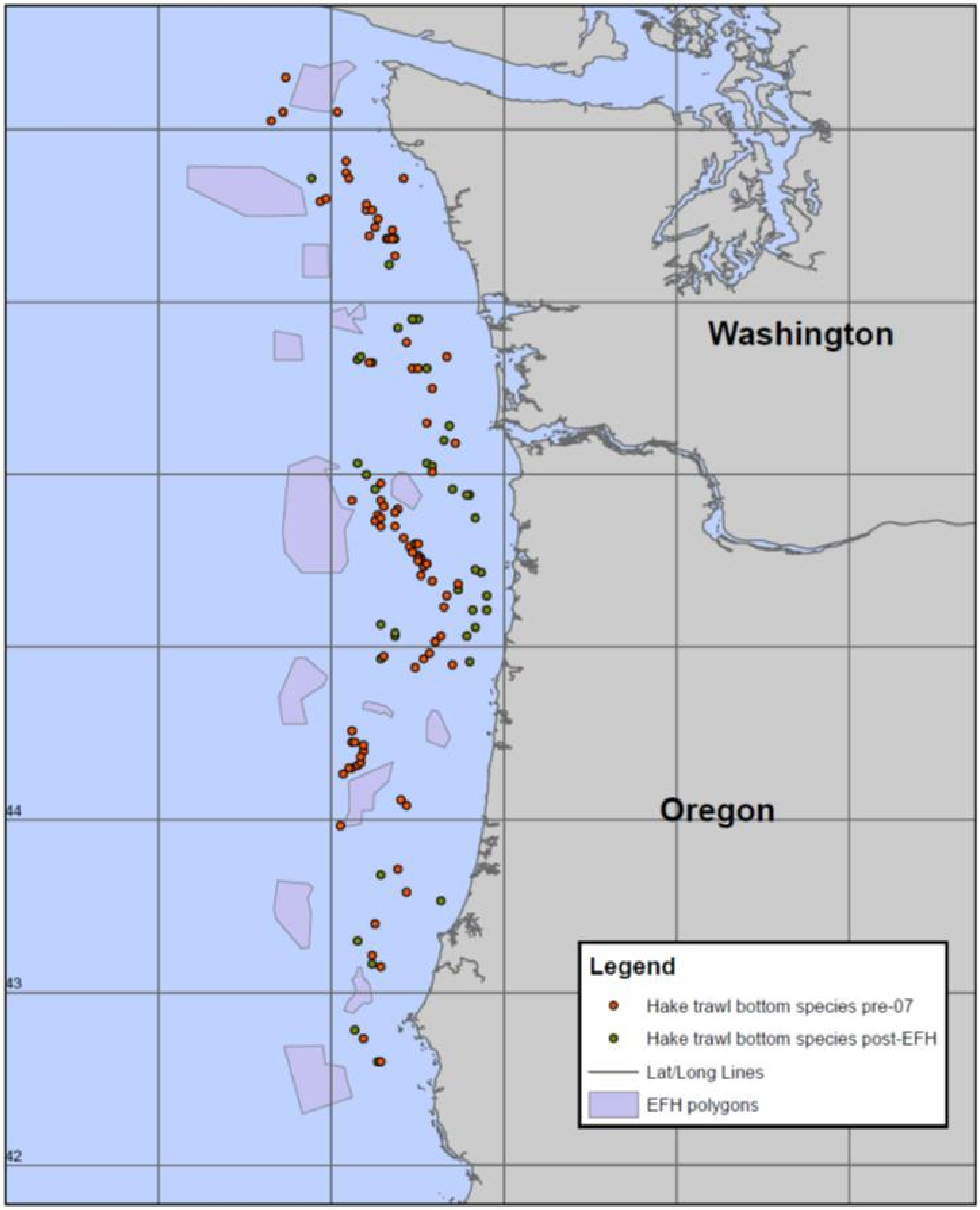

Figure 4-3: At-sea whiting fishery map of Washington and Oregon coasts showing locations of where species composition indicate likely bottom contacts relative to EFH Conservation Areas of Interest for pre- and post-EFH implementation years: 1990-2006 and 2007-2011, respectively.

There will likely be increased midwater trawling in HAPCs for demersal pelagic groundfish, widow rockfish in particular, as the ACLs have increased. This will occur regardless of amount of chafing gear coverage allowed on the codends of midwater nets. The increased impacts to the fish and their habitats as a result of ACL changes and other management restrictions would be addressed during the biennial specification process and in the cumulative effects section of this EA. Fishermen targeting Pacific whiting with midwater gear have been allowed access to HAPCs since they were established beginning in 2007. No change in fishing distribution is expected in this fishery stemming from future changes in whiting fishery ACLs. There are considerable disincentives to making bottom contact in the whiting fishery, independent of amount of codend chafing gear coverage that is allowed. Incentives and disincentives, summarized in the Introduction to Chapter 4 and further described in Section 4.3.1.2, relate to cost and operational issues associated with bottom contact events and continuation of MSC certification (which only applies to the whiting fishery).

The most important regulatory constraint in terms of hard bottom habitat protection is the bare footrope requirement on all midwater nets (Table 3-10). The Alaska EFH analysis reported above (NMFS 2005a) concluded that the vulnerability of pelagic trawls to damage precludes their operation on rough and hard substrates. Because pelagic trawls have unprotected footropes, the use of footropes directly on rough or hard surfaces is unlikely to happen. No amount of chafing gear coverage will protect a midwater net from damage or hang-up if contact is made with the net on rough or hard bottom habitat.

4.1.3.3 Rockfish Conservation Areas

The trawl RCAs, which were designed in 2002 during the trip limit management regime, were intended to minimize opportunities for trawl vessels to incidentally take overfished rockfish, which primarily prefer rocky bottom habitats as shown in Table 4-8. From 2002 to 2011, the RCAs were closed to bottom trawling coastwide and to midwater trawling except to target Pacific whiting during the primary whiting season. The boundaries of the RCAs have varied between years (Table 3-2). North of 40°10' N. latitude, midwater gear has been used to target any groundfish species in the RCA during the dates of the primary whiting season. Given the absence of bottom trawling within the RCAs since 2001, the seafloor habitats have likely recovered considerably changing the baseline environment considered in the 2005 EFH EIS.

Targeting opportunities for widow and yellowtail rockfish with midwater gear were eliminated in 2002 and retention was restricted to the whiting fishery (trip > 10,000 lb of whiting). Trip limits for widow and yellowtail rockfish (which is often caught with widow) were reduced to accommodate incidental catch and prevent targeting on widow during the whiting fishery. Targeting opportunities for chilipepper rockfish with midwater gear were eliminated in 2003, but larger limits (large enough to allow targeting) were reinstated seaward of the RCAs in 2005. Under the shorebased IFQ program, which makes fishermen individually responsible for their groundfish catch (including discards), the midwater trawl fishery started re-emerging in 2011. In 2011, most vessels that used midwater trawl gear to target non-whiting species were vessels that also targeted Pacific whiting. By 2012, additional vessels that did not target Pacific whiting used midwater trawl gear to target groundfish in the north. As the widow rockfish allocations increase, more midwater trawl effort targeting non-whiting species, including pelagic rockfish, is anticipated to occur, particularly in the shelf areas including within the trawl RCAs. However, the character of the emerging midwater trawl fishery may be different from the historical fishery. Because some marine organisms currently targeted with demersal gear have diurnal and/or seasonal vertical migrations, off-bottom target fishing techniques for these species may develop given the incentives created by the IFQ management structure combined with trawl RCA restrictions that allow the use of midwater trawl gear but prohibit bottom trawl. The use of off-bottom trawl gear to target species that have traditionally been harvested with on-bottom trawl gear may develop. These changes are primarily driven by allowable harvest levels. The effects of the broader actions have generally been addressed as part of the biennial specification process and are also discussed in the cumulative effects section of this EA.

For those vessels that use midwater trawl gear in the trawl RCAs to target Pacific whiting, the No Action Alternative could potentially decrease the incidence of bottom contacts relative to the recent past and impacts that would be expected under any of the alternatives, but the decrease would be hardly measurable because the seabed contact rate is likely in the range of 8 percent or less of tows in the whiting fishery (Table 4-7). The rate is likely lower in the rockfish fishery because of potential for contact with hard bottom habitats where the fishery takes place and high cost associated with net repair or replacement if hard bottom habitat is contacted. For reasons described in the introduction to Chapter 4, no differences among the alternatives are projected with respect to contact with hard bottom while targeting on rockfish.

The projected impacts on benthic habitats within RCAs when targeting of Pacific whiting in the shorebased IFQ fishery, the mothership and catcher/processor sectors, and the tribal fishery are expected to be relatively similar among the alternatives, including the No Action Alternative (Table 4-9). Midwater trawling targeting Pacific whiting has been allowed in the RCAs since they were implemented in 2002, and the amount of effort and bottom contact is expected to be similar to what has historically been seen in the fishery depending on future ACLs. Alternative 1 allows for greater coverage of the codend, compared to the other action alternatives and the No Action Alternative. This greater coverage would not seem to be much of an advantage over the other action alternatives in terms of bottom contact protection, but could be beneficial when the net is hauled aboard the vessel in terms of codend protection from onboard abrasion sources. No difference is projected among the alternatives with regard to benthic habitat protection in the trawl RCA from midwater trawl gear used in the Pacific whiting fishery as shown in Table 4-4 and for reasons described in Sections 4.1.3.1 and 4.1.3.2 and the introduction to Chapter 4. If there is a decline in bottom contact events under No Action, the change would primarily benefit bottom habitats composed of sedimentary materials; no difference in hard bottom impacts is projected among the alternatives including the No Action Alternative.

Relative to vessels using midwater trawl gear to target non-whiting species, including species in the pelagic rockfish complex, the impacts on habitat within the trawl RCAs has two facets: 1) the potential change in bottom contact frequency in the trawl RCAs stemming from amount of allowable chafing gear coverage, and 2) the change in bottom contact as a result of changes in midwater trawl effort occurring within the trawl RCA associated with changes in ACLs.

Regarding the first facet, when considering the proposed action within the context of the current fishery, the change in bottom contact incidence would be expected to increase in the trawl RCA if the action alternatives (1, 2a and 2b) result in fishers taking more risk to fish for a broader range of species by developing fishing practices to target species near the bottom (including widow when they are not in dense schools) as a result of the increased codend protection. Given that the trawl rationalization program provides quota for pelagic rockfish and other rockfish (e.g., bank rockfish) which are largely located in the RCAs where they cannot be accessed because of restrictions on bottom trawl gear, there may be substantial incentive to target these species with midwater gear. However, given the rocky shelf habitat that target species in the pelagic rockfish complex school above, increased chafing gear is not expected to provide much benefit in terms of codend protection from hard bottom contact. For these target species, the frequency of bottom contact is expected to be less than that observed in the Pacific whiting target fishery (8 percent or less of tows). The contact rate is expected to be even lower because of potential for substantial net damage and associated high repair or replacement cost if hard bottom habitat is contacted and the net tears or is lost. These projected habitat contact rate differences are shown in Table 4-9.

The disincentives to making bottom contact with midwater gear include, in part, potential for substantial net damage and associated high repair or replacement cost and reduced operating efficiency when midwater gear contacts the bottom (see Section 4.3.1.2). The Alaska EFH analysis reported at the start of this section (NMFS 2005a) concluded that the vulnerability of pelagic trawls to damage precludes their operation on rough and hard substrates. Because pelagic trawls have unprotected footropes, the use of footropes directly on rough or hard surfaces, such as those associated with most of rockfish populations, is unlikely to happen.

Regarding the second facet, the amount of midwater trawl effort that occurs within the trawl RCAs is primarily driven by the ACLs for target species and species that constrain access to target species (i.e., widow rockfish), not the proposed action to change the chafing gear regulation. Because widow rockfish is rebuilt and ACLs have increased, more non-whiting midwater trawl fishing for pelagic rockfish will likely occur within the RCAs. With increased ACL for widow rockfish midwater, effort for non-whiting species is expected to increase in the trawl RCA relative to the amounts which occurred in 2012, but with less bottom contact frequency than occurs in the whiting fishery. This increased effort will be considered as part of the biennial specifications process and is discussed in the Cumulative Impacts Section of this EA (Section 4.4).

4.2 Biological Resources

4.2.1 Groundfish Target Species

The primary target species of the midwater trawl fishery in the action area include Pacific whiting, widow rockfish, yellowtail rockfish, and chilipepper rockfish. The rockfish species are collectively referred to as pelagic rockfish because of their off-bottom schooling behavior (see NMFS 2005a Appendix H for groundfish behavioral information). However, there are unknowns with the emerging midwater trawl fishery for the shorebased IFQ fisheries. As the fishery develops, other target species may emerge, as much of our current understanding of target species is based on historical landings under a trip limit structure. As the fishery develops, it could change considerably from our historic understanding, with target species becoming less clearly defined. Table 4-11 below identifies other groundfish species that school near or above the bottom and may be harvested with midwater trawling gear.

Historical landings indicate that in the whiting-directed trawl fishery, the bycatch species that contributed most of the catch included dogfish shark, squid (unspecified), widow rockfish, and yellowtail rockfish, based on at-sea observer samples (Table 3-3). Based on state logbook data, the non-target species of greatest collective weight contribution to the directed whiting fishery catch included yellowtail rockfish, squid (unspecified), and widow rockfish (Table 3-4).

Incidental catches in the at-sea whiting sectors have been managed based on allocations and allowable catch limits based on historical catches. The shoreside whiting vessels have been managed since 2011 under species or species group IFQs or trip limits. Thus, there may be opportunity in the future for increased targeting by shoreside whiting vessels of non-whiting species on the same trips or tows that they target whiting as IFQ allocations are increased for widow rockfish.

The midwater fishery for pelagic rockfish species has documented non-target species catches based on WCGOP catches observed in pelagic rockfish trips during 2002-2011. Those samples showed a myriad of species or species groups; most of the retained non-target catch was comprised of a single species, bank rockfish (Table 3-5). These fish were caught south of 40º10' N. latitude where regulations required that fishing with midwater gear take place seaward of the

RCA. Data from state logbook entries during 2000-2002 on species other than pelagic rockfish complex species also showed a wide variety of species and species groups in the catch (Table 3-6). The total reported catch weight of species other than pelagic rockfish (primarily yellowtail, widow, and chilipepper rockfish) was 166.7 metric ton, with the dominant species being Pacific whiting, shortbelly rockfish, sablefish and English sole. Pacific whiting made up a large proportion (40 percent) of the non-target species groundfish catch at 67.5 metric ton. That species is already intensively managed and there does not appear to much opportunity for expanded whiting fishing by vessels targeting pelagic rockfish using midwater gear in future years, but the reverse is certainly true; i.e., there will likely be expanded opportunity for directed whiting fishery vessels to target pelagic rockfish species as widow rockfish allocation increase.

If the catch of species managed within complexes increases above the stocks' contribution to the complex ACL, some stocks may be more vulnerable to overfishing. However, impacts on stocks within complexes as a result of more midwater non-whiting fishing should be considered within the harvest specification and management measures FEIS documents. The 2013-2014 harvest specifications FEIS (PFMC 2012e) contains an analysis of groundfish species' risks of overfishing. The analysis of the relative vulnerability of stocks to overfishing indicated that a number of the component rockfish stocks have a medium to high vulnerability relative to overfishing (Table 4-25 of PFMC 2012e). It is noted that the RCAs implemented to reduce mortality on overfished species have greatly protected shelf rockfish, leading to few concerns regarding overfishing. However, as widow rockfish allocations increase beginning in 2013 targeting using midwater gear may increase for some species besides pelagic rockfish complex species, especially ones that exhibit off bottom schooling behavior (Table 4-11).

Table 4-11: Groundfish Target and non-Target Species with above bottom schooling behavior (Appendix B2 to NMFS 2005a).

Species	Management	Schooling behavior	Co-occurring species when schooling	Depth and latitude
Black rockfish	Trip limit - minor nearshore rockfish	In the central portion of their range from Oregon to southeast Alaska, they will often form schools of thousands of individuals Black rockfish form mixed-sex, midwater schools, especially in shallow water	Yellowtail, dusky, silvergray and blue rockfishes Black rockfish occur with blue and olive rockfishes in the water column	0-366 m 34° – 55° N. lat
Blue rockfish	Trip limit - minor nearshore rockfish	They form both loose and compact aggregations.	North of Point Conception, they will school with olive and black rockfish; south of Point Conception they are found schooling with kelp bass, olive rockfish, blacksmith, and halfmoon	0-550 m 31.5°-55° N lat.
Bocaccio	Overfished species - allocation to accommodate incidental catch	Some adults are semi-pelagic and some are non-schooling (benthic)	Bocaccio directly compete with chilipepper, widow, yellowtail, and shortbelly rockfishes for both food and habitat resources	50-475 m 29.8°-56° N. Lat

Species	Management	Schooling behavior	Co-occurring species when schooling	Depth and latitude
Canary	Overfished species - allocation to accommodate incidental catch	Some adults are semi-pelagic and some are non-schooling (benthic)	Near, but usually not on the bottom, often associating with yellowtail, widow, and silvergray rockfish	18-425 m 31°-56° N. lat.
Chilipepper	75% of the Fishery HG allocated to trawl fishery	Adults form schools Chilipepper also school by sex just prior to spawning	Off southern California, chilipepper are found with widow rockfish, greenspotted rockfish, and swordspine rockfish	0-425 m 24.5°-51° N. lat.
Dark and Dusky Rockfish	Minor shelf rockfish trawl allocation	Dark and dusky rockfish adults have been observed in common schools	Co-occur with blue rockfish and kelp bass in areas of reef and giant kelp	25-910 m 33.3°-60° N. lat.
Olive	Trip limit - minor nearshore rockfish	Adult olive rockfish are a midwater fish They often form single or multispecies aggregations of thousands of individuals	Often form schools in association with blue and yellowtail rockfish	0-174 m 28.3°-41.3°
POP	Overfished species - allocation to accommodate incidental catch	Adults form large schools 30 m wide, to 80 m deep, and as much as 1,300 m long They also form spawning schools	Darkblotched, redbanded, and splitnose rockfish, and shortspine thornyhead.	25-825 m 32.8°-55° N. lat.
Rougheye	Minor slope rockfish trawl allocation	sometimes found in small schools	Pacific ocean perch and shortraker rockfish	25-875 m 32.5°-55° N. lat.
Sharpshin	Minor slope rockfish trawl allocation	sometimes found in small schools identified as schooling species, although they also occurred singly	They occurred in dense patches on and within 2 m of the bottom, often mixed with pygmy rockfish	25-475 m 33°-60° N. lat.
Shortbelly	Unlimited trip limits	Adults commonly form very large schools	Shortbelly rockfish play a key role in the food chain, as they are preyed upon by Chinook and coho salmon, lingcod, black rockfish, hake, bocaccio, chilipepper, pigeon guillemots, western gull, marine mammals, and others	50-350 m 28.3°-48.5° N. lat.
Shortraker	Minor slope rockfish trawl allocation	Small schools may perform seasonal vertical migration; with the depth range expanding during the months of June through November and decreasing from spring to autumn		25-875 m 39.5°-55° N. lat.
Splitnose	Minor slope rockfish trawl allocation	Adults form schools	darkblotched and redbanded rockfish, shortspine thornyhead, and Pacific ocean perch.	80-800 m 28°-60.5° N. lat
Silvergray	Minor slope rockfish trawl allocation	Form loose aggregations	Pacific ocean perch, yellowtail rockfish, and canary rockfish	0-436 m 33.5°-55° N. lat

Species	Management	Schooling behavior	Co-occurring species when schooling	Depth and latitude
Squarespot	Minor slope rockfish trawl allocation	tend to form schools, often consisting of hundreds to thousands individuals 10m above bottom		18-224 m 28°-42° N. lat
Vermillion	Minor slope rockfish trawl allocation	Small aggregations		15-436 m 28°-60° N. lat.
Widow	Species specific trawl allocation	Adults are frequently found in large schools, but can also be solitary Adults form dense, irregular, midwater and semi-demersal schools deeper than 100 m at night and disperse in midwater during the day	co-occur with yellowtail rockfish, chilipepper, shortbelly rockfish, and bocaccio	24-549 m 31.8°-56.5° N. lat.
Yellowtail	Species specific trawl allocation north, Minor slope rockfish trawl allocation south	form large (sometimes greater than 1,000 fish) schools and can be found alone or in association with other rockfishes Form schools, commonly within 2 m of the bottom sometimes the schools were several meters off of the bottom		0-549 m 32.7°-55° N. lat.
Pacific whiting	Species specific trawl allocation	Extensive midwater aggregations		0-920 m 24.5°-54.5° N. lat
Sablefish	Species specific trawl allocation	Adults and large juveniles form schools		0-1900 m 28°-55° N. lat.
Leopard shark	Managed under other fish unlimited trip limit	May form large nomadic schools	May be mixed with gray or brown smoothhounds, sevengill shark, bat rays, or spiny dogfish	0-91 m 23°-43° N. lat.
Spiny dogfish shark	Managed with trip limits	Often migrate in large schools	Pelagic prey consisted of 80% of their diet and they consumed twice as much food in the summer as in the winter	0-1236 m 30°-55° N. lat.

The alternatives under consideration in this EA primarily relate to the placement and amount of chafing gear allowed on the codends of nets used in the midwater trawl fisheries, which are compared in Table 4-1. Given the current management constraints and level of fishery monitoring there are no projected differences among the alternatives relative to the biological risks considered in the 2013-2014 proposed harvest specifications and management measures FEIS, including the biological risk of overfishing the target stocks (PFMC 2012d). For target species managed with species specific trawl allocations (overfished and non-overfished groundfish target species) no differences are projected among the action alternatives and the baseline or No Action Alternative; i.e., no change in impacts with regard to the biological issues identified in Chapter 3 (Table 4-12).

Table 4-12: Summary of biological impact assessments for action alternatives compared to the No Action Alternative, relative to biological issues identified in Chapter 3.

	Alternative 1 (FPA)	Alternative 2a	Alternative 2b (status quo)
	Broader and longer chafing gear on codend; unlimited chafer panel size	**Longer chafing gear coverage; unlimited chafer panel size**	**Longer chafing gear coverage; SQ chafer panel size**
Specified biological issue, below	Whiting fishery		
Target Species	Total retention, no change	Total retention, no change	Total retention, no change
Non-Target Species, including forage fish	same as A-2b	same as A-2b	Minor increase compared to No Action assuming no codend plugging effect a/
Protected Species including ESA and considering eulachon	same as A-2b	same as A-2b	Minor increase compared to No Action assuming no codend plugging effect a/
Marine Mammals and Seabirds, Including MMPA and MBTA	Same as No Action	Same as No Action	Same as No Action
	Rockfish fishery		
Target Species	Total retention, no change	Total retention, no change	Total retention, no change
Non-Target Species	same as A-2b	same as A-2b	Minor increase (<10%) depending on codend mesh size used and length of codend b/
Protected Species including ESA (e.g., eulachon)	same as A-2b	same as A-2b	Minor increase (<10%) depending on codend mesh size used and length of codend b/
Marine Mammals and Seabirds, Including MMPA and MBTA	Same as No Action	Same as No Action	Same as No Action

4.2.2 Risk of Overfishing

Pacific whiting is managed based on allocations of fish to fishermen or processors in the shorebased sector and at-sea sector coops (catcher/processor and mothership) and the Washington coast treaty tribes. Pelagic Rockfish Complex species are managed based on allocations to fishermen in the shorebased sector and in the form of set-asides allocated to the catcher/processor and mothership coops and the tribal fishery. One hundred percent catch monitoring is required on all whiting and pelagic rockfish trips, whether shoreside or at sea, and individual vessel owners are accountable for their stock impacts, thus the risk of overfishing Pacific whiting and pelagic rockfish complex species is low. The same is true for non-target species with species specific trawl allocations. Non-target species catches in shorebased groundfish and at-sea whiting fisheries catches are displayed and discussed in Section 3.2.2. For non-target groundfish species managed within complexes, the risk of overfishing is similar to that considered in the 2013-2014 Proposed Harvest Specifications and Management Measures, EIS. Some species managed within species complexes may be more vulnerable to overfishing due to the current composition of the complexes; this is particularly true for species identified as "highly vulnerable" to overfishing within the minor rockfish complexes. Species managed on a per trip basis, are not expected to be more vulnerable to overfishing than what was already considered in the 2013-2014 Proposed Harvest Specifications and Management Measures, EIS.

4.2.3 Non-Target Fish Species

Non-target species with similar habitat preferences co-occur with the targeted groundfish species. Midwater trawls catch non-target species other than groundfish including prohibited and protected species. Non-target species catches for the directed whiting fisheries are shown in Table 3-3 for the at-sea fisheries based on observer data collected during 2006-2011 and Table 3-4 for the shoreside fishery based on logbooks filled out during 2008-2011. For the directed pelagic rockfish fishery non-target species catches are shown in Table 3-5 for WCGOP trips observed during 2002-2011 and in Table 3-6 based on state logbook entries for catches made during 2000-2002 when pelagic rockfish fishing using midwater gear was widespread (prior to widow rockfish being declared overfished). All four tables show a wide variety of fish in the catches and, except for the WCGOP data, show very small catches (less than 7 percent) of non-target species collectively compared to target species catches. The WCGOP observations of pelagic rockfish fishery catches showed 25 percent of the total catch was comprised of non-target species nearly all of which (over 99 percent) was bank rockfish, of which nearly all was retained and may have been the target species of those trips or of some tows.

Non-target species catch is expected to increase in the pelagic rockfish fishery and perhaps in the shoreside whiting fishery as the allowable harvest of widow rockfish increases, as occurred in 2013. The non-target species catches in the whiting and pelagic rockfish fisheries are discussed in Section 3.2.2. The non-target species catches (as shown in the at-sea data) include groundfish (overfished and other), prohibited and protected species, and non-groundfish (forage fish and other non-groundfish).

Chafing gear coverage of codend meshes potentially affects escape of fish through codend meshes. Two issues are discussed in following sections that pertain to this issue: (1) potential plugging effect of codend meshes in large tow sizes, which are common in the whiting fishery and (2) codend mesh size selection in the rockfish fishery as it affects retention of unmarketable size fish.

4.2.3.1 Escape of small size fish (groundfish and non-groundfish) from nets used in the whiting fishery

Fish can escape a trawl net by swimming or wriggling through the meshes. The proportion of small fish that can escape is related to the codend mesh size and whether the mesh openings are unblocked. Each species or species group has a different body shape, size, swimming speed, endurance and net avoidance habits. Thus, the size and shape of the meshes directly affects which fish are captured and which are more likely to escape. Most of the capture and a large portion of the escape occur in the codend, and codend minimum mesh size restrictions can be an effective method for controlling the harvest of both target and incidental species. The use of chafing gear may create a secondary barrier which may impede escape of small fish through the codend meshes where chafing gear panels are applied.

In high volume fisheries, the escape of small fish from the codend may diminish when vessels make large tows (>40 metric ton) (Erikson *et al*. 1995) because the net selectivity may be altered by plugging (the entanglement of fish in the mesh of the net). Studies of high volume trawl fisheries have shown that sorting effects in the codend of large tows can be reduced because of plugging of meshes by impinged fish (Pikitch *et al*. 1996). Also, He (2011) notes that once a fish enters the codend portion of a trawl net, the fish may be too exhausted to continue swimming and are therefore unable to escape.

A Bering Sea pollock fishery (pollock are similar in body shape to whiting) mesh selectivity study by Erickson *et al*. (1995) found that codend sorting effect was nil for tows in excess of 40 metric ton of fish. They found that the average size of pollock decreased as tow size increased because small fish were being retained. The treatment codends in the study had different mesh configurations (diamond mesh throughout or diamond mesh with square mesh top panel) and mesh size pairs (3.5 or 4.4 inch stretch and 3.7 and 4.3 inch stretch, respectively). Chafing gear (6.7 inch poly) was applied to the bottom half of each codend. Codend mesh sizes for midwater trawls in the Pacific Coast fishery have been in place since the early1990s.

To understand Pikitch *et al*. 1996 and Erickson *et al*. 1995 relative to the Pacific Coast fishery, Pacific whiting fishery haul data were examined. Two sources of data were examined for this EA to display tow size data for the Pacific Coast whiting fishery: at-sea fishery records for 2006-2011 for the mothership and catcher/processor fisheries, and 2008-2011 logbook data for the shoreside fishery. Statistical and tow size frequency data less than and equal to or greater than 40 metric ton for the at-sea sectors are shown in Table 4-13. Comparative logbook data for the shorebased whiting sector are shown in Table 4-14.

Catcher/processor tow frequency data for 2006-2011 show that most hauls in all years were greater than 40 metric ton with 78 percent of tows greater than 40 metric ton in 2008. Tows delivered to motherships tended to be slightly smaller with three of the six years having the majority of hauls greater than 40 metric ton (Table 4-13). Under the first year of the trawl rationalization program, 2011, the proportion of tows greater than 40 metric ton was at the lower end of the range (48 percent).

Table 4-13: At-sea whiting tow size frequency data for hauls >40 mt and ≤40 mt by sector, 2006-2011.

Sector	YEAR	Proportion 40 mt or less	Proportion more than 40 mt	Number of tows
Catcher/proc.	2006	30%	70%	1,492
Catcher/proc.	2007	40%	60%	1,571
Catcher/proc.	2008	22%	78%	1,885
Catcher/proc.	2009	43%	57%	867
Catcher/proc.	2010	47%	53%	1,401
Catcher/proc.	2011	41%	59%	1,654
Mothership	2006	37%	63%	1,454
Mothership	2007	42%	58%	1,305
Mothership	2008	37%	63%	1,732
Mothership	2009	46%	54%	1,007
Mothership	2010	53%	47%	1,096
Mothership	2011	52%	48%	1,363

Table 4-14: Shoreside whiting fishery haled tow size frequency data based on logbook data for hauls >40 mt and ≤40 mt by sector, 2008-2011.

YEAR	Proportion 40 mt or less	Proportion more than 40 mt	Number tows
2008	57.0%	43.0%	1,214
2009	53.4%	46.6%	760
2010	60.6%	39.4%	1,626
2011	39.4%	60.6%	1,639

The results from the Alaska pollock mesh size study reported above in combination with tow size data from the Pacific Coast whiting fisheries suggest that codend plugging in many whiting tows may be impeding or negating escape of unmarketable size and other smaller size fish, such as eulachon and other forage fish species, from the codend resulting in little measureable difference in escapement among the alternatives relative to the Pacific whiting at-sea fisheries. This is because over 39 percent of observed or recorded tows in the Pacific Coast whiting fishery, reported above, had over 40 metric ton of fish in the codend, which in the Alaska study showed small fish escapement to be nil. The codends used in the Alaska study had treatment mesh sizes in the range of 3.5-4.4 inches, stretch measure, which is larger than the 3-inch minimum stretch mesh size required in the Pacific Coast whiting fishery. What this means is that the amount of chafing gear coverage allowed on the codends of whiting nets in large tows may not affect the likelihood that small fish can escape the codend due to codend mesh plugging with impinged fish. Due to plugging effect in large tows, most fish that enter the codend never come in contact with the chafer panel or, for that matter, the other areas of the codend that have no chafer panel coverage.

Once the fish have entered a trawl, they usually stay clear of the netting panels unless the straight path is blocked (Glass *et al*. 1993; Glass and Wardle, 1995), so they travel towards the codend, where most escape attempts are made just in front of the catch build-up (O'Neil *et al*. 2003; Jones *et al*. 2008). Escapement behavior of small fish out of the codend may vary by species. Studies looking at whiting in the North Sea have shown that whiting exhibited a distinct preference for escaping upwards out of the codend (Frandsen *et al*. 2010). In a Baltic Sea herring study, the small herring that were able to escape did so through upper main net meshes (Suuronen, *et al*. 1997). All of the proposed alternatives allow for the escapement out the top of the codend. Because whiting show a preference for escaping out the top of codends, it is likely that there would be little difference among the alternatives relative to the ability of undersized whiting to escape. Any differences would diminish further after the first 40 metric ton of larger hauls. Little information is available on escapement behavior of small fish incidentally caught with Pacific whiting. If a species has a preference for escaping along the sides of the codend to the top panel added chafing coverage of the sides could result in increased catch.

The small fish species that may be most likely to be affected by amount of chafing gear coverage on codend meshes of whiting fishery codends are listed as forage fish species in Table 3-3 Humboldt squid is excluded from this table because it is a relatively large predatory animal (36-79 cm; 14-31 inches, mantel length) though some large animals may feed on them (Lisk *et al*. 2011). The catches shown in this table were recorded in at-sea tribal and non-tribal whiting fisheries during 2006-2011. Non-groundfish data for the shoreside whiting fishery based on state logbooks completed during 2008-2011 showed many of these same species in catches (Table 3-4).

4.2.3.2 Escape of unmarketable size and other small size fish through codend meshes

Gilling like impingement is the entanglement of fish in the mesh of the net. Gilling will always be a factor with any net fishery especially for the spiny-bodied rockfishes. It is mainly a function of fish size v. mesh size and will be influenced by the abundance and availability of small fish, towing time and species involved. Since "gillers" are nearly always pointed outward, a gilled fish represents a potential escapee. Studies have shown that gilling can be more of a problem in the rockfish strategy than in the flatfish strategy in the Pacific Coast Pacific Coast groundfish fishery (Pikitch *et al*.1990). The amount of gillers was 12 pounds per hour for both strategies with 3.0 inch codend mesh, but increased to 113 pounds per hour for rockfish and 22 pounds per hour for flatfish for 4.5 inch mesh. At first glance this appears to be a substantial difference, but the time required to clear the net of gilled fish ranged from 4 to 11 minutes for rockfish and 8 to 11 minutes for flatfish. On average, gilling did not appear to be a significant issue.

Rockfish species that are likely to be taken in midwater trawl catches with relatively large plugging (gilling) rates (rates greater than 5 percent of total catch weight) include Pacific ocean perch, yellowtail rockfish, widow rockfish, and sharpchin rockfish (Pikitch *et al*. 1990). In a 1988 Pacific Coast trawl fishery mesh study (Pikitch *et al*. 1990) sharpchin rockfish and Pacific ocean perch showed an increase in plugging rate from codends with 3-inch mesh to codends with 4.5-inch mesh, but a decrease from the 4.5-inch to 5-inch mesh codends due to small size adults of these species. The rate of plugging and how it affects the escapement of fish will likely be related to the actual mesh size fishermen choose to use above the current 3-inch limit.

The species that are likely to be affected by chafer coverage on the codends of pelagic rockfish nets are the ones identified as forage fish in Table 3-3 because of their generally small sizes. Those data were collected from at-sea whiting fishery catches during 2006-2011. The forage fish species encountered in pelagic rockfish fishery non-target species catches are shown in Table 3-5, for WCGOP samples collected during 2002-2011, and Table 3-6, for state logbook for

2000-2002 fishing seasons. Those data show encounters for many, but not all of the forage fish listed in the at-sea whiting fishery observations. The pelagic rockfish fishery observations collected during 2002-2011 seasons by WCGOP samplers are small (367 metric ton; Table 3-5) in comparison to the at-sea fishery observations (about 236 million metric ton; Table 3-4), which represents virtually 100 percent observer coverage for those fishery sectors. The pelagic rockfish fishery logbook data shown in Table 3-6 represent a fairly large total fish catch (about 7.6 thousand metric ton) but those data cannot be verified for their completeness; many smaller fish species such as forage fish may have been overlooked. For this analysis it is assumed that the forage fish species that have been documented in at-sea whiting fishery catches in Table 3-3 will be similar to the ones likely to occur in the non-whiting midwater trawl fisheries and likely affected by the chafing gear alternatives under considerations in this EA (compared in Table 4-1).

4.2.3.3 Projected Impacts of Alternatives on Non-Target Species

A conservative approach was taken in this analysis of impacts of the action alternatives compared to the No Action Alternative due to potential impacts to forage fish species, which are being considered for PFMC management, and protected species including eulachon, a threatened species that has been documented in trawl fishery catches during 2002-2010 (Table 3-). This analysis assumes small fish are able to escape codend meshes but that chafing gear potentially impedes small fish escape and survival once inside the chafer panel. However studies of high volume fisheries, discussed above, have shown that nets themselves may become impinged with fish and so small fish have few escape routes regardless of chafer panel coverage. Also, codend mesh size selection affects size of fish retained in the codend. The approach used here ignores the likely plugging effect of codend meshes due to impinged fish and the reduced escapement chances for fish through codend meshes in the whiting fishery because of large tow sizes. Rather, it assumes that the likelihood of escape of small fish is inversely related to the amount of chafer panel coverage allowed under each alternative, with one exception as explained below. All three action alternatives are projected to potentially have a slightly greater biological impact for any non-target species for which some individuals are small enough to escape through the codend mesh, compared to the No Action Alternative (Table 4-12). This is because of greater chafing gear coverage provided under all three action alternatives compared to the No Action Alternative. The greater chafer coverage provided in Alternative 1 compared to the other action alternatives may not be an importance difference to species that escape out of the top codend panel. In a codend escapement study by Frandsen *et al*. 2010, it was shown that codend escapement by a roundfish species of the same family as Pacific whiting (gadidae) tended to escape through upper codend meshes. In a Baltic Sea herring midwater trawl escapement study the smaller herring that escaped did so through the upper rear panels of the trawl body (Suuronen, *et al*. 1997). All three action alternative in this EA provide for fish escape through upper panel codend meshes.

A single chafer panel with a single terminal opening for small fish such as forage fish to escape could be used under Alternatives 1 and 2a, would be the worst case scenario making it most difficult for small fish to escape. Alternative 2b limits chafer panel length to 50 codend meshes, which reflects the codend regulations that were in effect in 2006. The actual impact of unlimited chafer panel length will depend on the escape rate of fish through codend meshes, which in the whiting fishery may be very low due to plugging effect of impinged fish stemming from large tow sizes (>40 metric ton), discussed below. There may be no need for greater chafing gear coverage in the pelagic rockfish fishery if much smaller codends are used in that fishery compared to the whiting fishery. The No Action Alternative could have a positive impact to the escape of small fish from codend meshes in the whiting fishery stemming from limitation on chafer panel coverage to the 50 terminal net meshes, which leaves all forward codend meshes unobstructed. No Action would be a reduction over the current fishery which is believed to be most consistent with Alternative 2b. Catch of small forage fish has been relatively minor. The data for 2006-2011 show modest swings in forage fish bycatch in the at-sea fishery from about 44.3 metric ton to 91.9 metric ton. The 2007-2011 average was 70.3 metric ton (Table 3-3). Since 2011, trawl rationalization had provided a is strong disincentive to catch unmarketable size groundfish under all of the alternatives as they would be counted towards the total allowable catch limits for the fishery.

It is assumed that the escape of unmarketable and other small size fish would be greatest for the whiting fishery because much larger and longer codends are needed in that fishery. For the pelagic rockfish fishery it is assumed that they will use smaller codends which may not exceed 50 mesh rows in length. However, as noted above under trawl rationalization, there is strong disincentive to catch unmarketable size groundfish. Escape of small fish will likely be attained through selection of codend mesh size that minimizes catch of unmarketable size fish, which will likely be larger than the fishery three inch minimum mesh size regulation. Fishers will also adjust their chafing gear configurations within the maximum chafing gear regulation allowance to minimize capture of unmarketable size fish. Enhanced escapement of unmarketable size fish through codend meshes will benefit escape of other smaller sized fish including forage fish.

4.2.4 Protected Fish Species Including ESA Species

Protected species discussed in Section 3.2.3 include listed salmon and steelhead, green sturgeon and eulachon. Escape of salmon, steelhead, and green sturgeon from midwater fishery tows is not expected to be an issue relative to the chafing gear coverage alternatives because near 100 percent of these fish, when encountered, will be caught due to their relatively large body sizes (i.e., too large to fit through codend meshes). Targeting of pelagic rockfish using midwater gear has the potential to increase the catch of salmonid species over annual catches seen in recent years. The amount of increase, if any, will depend on a variety of factors. These include, but are not limited to: the amount of pelagic rockfish that are allowed to be harvested, any offset in salmonids harvested in other fisheries due to effort shift to the pelagic rockfish fishery, availability of salmonids to pelagic fishery intercept, and the year(s) used for comparison. The catch of salmon by full observer coverage (all vessels currently carry observers on all trips) on all trawl vessels would continue to be monitored and managed to stay within reinitiation thresholds identified in the current ESA Section 7 biological opinion for the groundfish fishery.

The main species of concern with regard to amount of chafing gear coverage is eulachon, a relatively small fish, weighing only a few ounces each (BRT 2008) that has been listed as threatened under the ESA. Escape of these fish through the meshes of trawl nets is an important consideration, and any modification of the restrictions that affect their chance of escape and survival is important to be evaluated. The increased coverage and variable attachment of chafing gear could reduce the effective mesh size over a greater area of the trawl net, which could change the chance of successful eulachon escape from trawl nets, but on the other hand, it may not matter. This analysis, applies the same precautionary approached for non-target species was used for protected species. Therefore for eulachon, there could be small increased catch under all three action alternatives compared to the No Action Alternative because of allowance for greater chafing gear coverage, which may decrease escapement of fish, forage fish in particular, through codend meshes (Table 4-12). The different among the action alternatives cannot be determined because whiting fishery impacts are very small, with only one pound of eulachon captured in the at-sea whiting fishery on average for every 5.1 million pounds of whiting during 2006-2011 (Table 3-3). Other gadid species related to whiting tend to escape through codend top panel meshes (Frandsen *et al*. 2010). In a study of Baltic herring by Suuronen *et al*. (1997), the authors found that herring that escaped midwater trawl nets did so through upper net meshes. The amount of chafer coverage on codend side panels and the bottom panel may not be critical if eulachon also swim upward in the net. Like salmon, eulachon are managed under an ESA Section 7 biological opinion for the groundfish fishery. If large changes were to be observed in the observer data (all vessels currently carry observers on all trips - full coverage) it would trigger reinitiation of the biological opinion and catch reduction measures would be required.

Codend mesh plugging from impinged fish in large tows likely reduces, to a substantial extent, the escape rate of small fish including eulachon, through codend meshes of whiting nets. The pelagic rockfish fishery logbook data shown in Table 3-6 did not report any eulachon intercepts, but those data cannot be verified for their completeness. With all vessels being monitored by observers, data could be available inseason under all of the alternatives to monitor take. The Biological Review Team that analyzed the status of the eulachon southern DPS ranked climate change and associated ocean warming as the principal cause of species decline. As recent as 2003 over 1 million pounds (11.7 million-13.3 million fish) were taken commercially in the Columbia River. The last commercial landing shown for the fishery was in 2008 when about 17 thousand pounds (163 thousand to 208 thousand fish) were landed (BRT 2008). The impact of the Groundfish Fishery to eulachon population growth based on data collected through 2009 has been assessed by NWFSC 2011 as follows: due to a lack of data on population abundance and reproductive rates of eulachon, combined with the rarity of observing eulachon in the groundfish fishery fisheries, it is not possible to quantify an estimated impact of groundfish fishery on population growth rate of eulachon. However, the level of mortality in the groundfish fishery (less than 1,000 individuals annually) is very low compared to the probable total numerical abundance of the species, likely in the millions (Estimated at 19,472,739 in Table 23 of the BO). It is therefore likely that the groundfish fishery has at most a negligible effect on the southern DPS of eulachon (Nass River, British Columbia to Mad River, northern California). The impact of the groundfish fishery is also very low compared to other fishery impacts, particularly the ocean shrimp trawl fisheries.

The impact of the groundfish fishery on the green sturgeon population growth based on data collected in 2002-2009 has been assessed by NWFSC 2011. The data show annual catches ranging from 51 to 793 animals with most of the impacts (except in 2002) occurring in the California halibut trawl and hook and line fisheries. Data for non-California halibut fisheries show an annual range of 0-42 sturgeon with an annual average of 13.6. The assessment indicated that it is currently not possible to assess the impact of groundfish fishery on the population growth rate of green sturgeon from available data. The most likely impacts would occur through discard-related mortality of green sturgeon captured in bottom trawl fisheries, yet survival rate of discarded green sturgeon is unknown (although possibly high given their armor, relatively shallow distribution, and open swim bladder). These uncertainties, combined with unknown green sturgeon population size, make it difficult to assess the current impact of the groundfish fishery on the population growth. However, mortality of any green sturgeon too large to escape through a 3” mesh codend would likely be unaffected by the additional barrier created by chafing gear placed on the outside of the codend under any of the alternatives.

NMFS prepared a biological opinion in 2012 that concluded that the continued existence of humpback whales and Steller sea lions would not be jeopardized by the 2012 groundfish fishery. NMFS (2012b) further concluded that the Pacific Coast groundfish fishery is not likely to adversely affect sei whales, North Pacific right whales, blue whales, fin whales, sperm whales, Southern resident killer whales, or Guadalupe fur seals. The incidental take limit for Steller sea lions is a 5-year average of 14 Steller sea lion injuries or mortalities per year, and up to 45 Steller sea lion injuries or mortalities in a single year. There is no indication that fishing under the PCGFMP causes disturbance to rookeries or haul outs. Further, food web modeling indicates that food web interactions and prey reductions in critical habitat (i.e., aquatic zone) are unlikely to strongly impact marine mammals, including pinnipeds because of the resilience of the forage species. Fishing-induced reduction in prey is anticipated to have an insignificant effect on the conservation value of Steller sea lion critical habitat.

NMFS West Coast Region Sustainable Fisheries Division consulted with the Protected Resources Division to determine if fishing authorized under the Groundfish FMP is likely to jeopardize the continued existence of any non-salmonid species listed under the ESA in 2012 (NMFS 2012b). This consultation concluded that operation of the groundfish fishery is not likely to jeopardize the continued existence of ESA-listed species found in the action area or result in the destruction or adverse modification of designated critical habitat.

4.2.5 Marine Mammals and Seabirds

Marine mammal and seabird impacts in Pacific Coast groundfish fisheries are discussed in Section 3.2.3. No change in impacts to these animals is projected for any of the alternatives compared to the baseline No Action Alternative (Table 4-12). This is because placement of chafing gear on the codends of midwater trawl nets primarily affects escape of organisms through codend meshes. The issue of concern for marine mammals and seabirds has little or nothing to do with escape of these animals through codend meshes. Once these animals enter a midwater trawl net (which is very rare), the damage to these animals has already been done by the time they reach the codend of the net.

4.3 Socio-Economic Impacts

The primary socio-economic effect of the chafing gear regulations is the reduction in operating costs expected for vessel operations under any of the action alternatives relative to status quo. Other impact areas are also assessed and found to have no or little impact (e.g., impacts on processors, communities, and managers). Additionally, this section provides an assessment of the expected behavioral incentives created by alternative chafing gear regulations. These behavioral incentives affect the manner in which the gear is likely to be fished and configured—factors which in turn affect impacts on the physical and biological environment discussed in Sections 4.1 and 4.2.

4.3.1 Pacific Whiting Fishery

4.3.1.1 Change in Costs to Participants

Need for Greater Codend Chafing Gear Protection

At-sea and shoreside whiting fishery tow size data were analyzed to assess the need in those fishery sectors for greater codend chafer coverage to protect nets from damage. The abrasive contact against which chafing gear protects, occurs primarily along those portions of the codend filled with fish. Catcher/process sector data for 2006-2011 show an average tow size ranging from 45 to 59 metric ton with maximum tow size per year ranging from 123 metric ton to 168 metric ton (Table 4-15). The mothership sector delivery data show average tow size per year during 2006-2011 ranging from 38 metric ton to 43 metric ton with maximum tow size during the same period ranging from 87 metric ton to 101 metric ton (Table 4-15).

Table 4-15: Minimum, maximum and average tow weights (mt) in the at-sea whiting fishery by sector and year, 2006-2011.

Sector	YEAR	Min	Max	Avg
Catcher/proc.	2006	0.37	139.22	53.65
Catcher/proc.	2007	0.13	167.72	47.33
Catcher/proc.	2008	0.16	153.01	58.99
Catcher/proc.	2009	0.42	122.82	44.61
Catcher/proc.	2010	0.09	123.66	46.69
Catcher/proc.	2011	0.25	133.45	46.21
Mothership	2006	1.64	99.42	42.56
Mothership	2007	3.71	90.24	40.91
Mothership	2008	3.18	96.05	42.56
Mothership	2009	3.24	87.46	38.25
Mothership	2010	1.66	101.46	38.51
Mothership	2011	0.45	92.83	39.17

Shoreside whiting fishery logbook data for 2008-2011 show an average annual tow size ranging from 40 metric ton to 53 metric ton with maximum tow size per year ranging from 153 metric ton to 273 m (Table 4-16). Tow frequency data for the shoreside fishery show 39 percent to 61 percent of tows were greater than 40 metric ton, depending on year during 2008-2011 (Table 4-14).

Table 4-16: Minimum, maximum, median and average haled tow weights (mt) in the shoreside whiting fishery based on logbook data by year, 2008-2011.

Year	Min	Max	Median	Average	Number tows
2008	0.10	183.89	32.90	40.55	1,214
2009	0.03	208.74	36.41	43.36	760
2010	0.01	272.95	30.63	40.47	1,626
2011	0.00	152.66	49.90	52.55	1,639

Based on net size information in Table 4-17, a codend built to handle the maximum tow size of 168 metric ton shown in Table 4-15 for the at-sea whiting fisheries would be about or over 98 feet (30m) long and 30 feet (9.1 m) in circumference to accommodate a catch of that size. A 98 feet codend would have over 420 mesh rows, assuming the codend was constructed of 3 inch stretch measure diamond bar mesh and assuming a stretch measure between each mesh plus one knot of 2.76 inches (inferred from information from Sara Skamser, Oregon net builder).[11] Tow size data for the shoreside whiting fishery based on logbook entries show a maximum tow size in that fishery during 2008-2011of 273 metric ton (Table 4-16). The net size information shown in Table 4-17 indicates that a codend of over 131 feet (40 m) in length and 30 feet (9.1 m) in circumference would be required to contain a whiting catch of that size. Such a codend would likely have over 570 mesh rows. At this time, it has not been determined why logbook data show maximum tow sizes consistently larger than in the at-sea fisheries and such a large maximum tow size in 2010 (about 273 metric ton (601,751 lbs)). Such a large two size would require a codend larger in dimension than any codend advertised by Net Systems, Bainbridge Wasgington, shown in Table 4-17. Therefore, for the purpose of this EA, the at-sea tow size data are believed to be the best available data on maximum tow sizes for the at-sea and shoreside fisheries.

[11] Sara Skamser, Oregon net builder, reports that a100 feet codend that she builds made of 4 inch between the knot (BK) diamond bar webbing would have 326 meshes. This says that each codend mesh of 4-inch diamond bar webbing equates to 3.68 inches of overall codend length, which is 92% of the stretch measure of each 4-inch codend mesh section. In this EA we assume that codend length can be reasonably computed assuming that the length of each codend mesh opening amounts to 92% of the stretch measure of the webbing used to build the codend.

Table 4-17: Codend fish capacity dimensions in metric tons based on length and circumference measurements (Table provided by Net Systems, Bainbridge Island, WA).

Circumference (ft/m)	Length (ft/m)							
	16/5	33/10	49/15	66/20	82/25	98/30	115/35	131/40
30/9.1	28	56	85	113	141	169	197	226
28/8.5	25	49	74	98	123	147	172	197
26/7.9	21	42	64	85	106	127	148	169
24/7.3	18	36	54	72	90	108	126	144
22/6.7	15	30	45	61	76	91	106	121
20/6.1	13	25	38	50	63	75	88	100
18/5.5	10	20	30	41	51	61	71	81
16/4.9	8	16	24	32	40	48	56	64
14/4.3	6	12	18	25	31	37	43	49
12/3.7	5	9	14	18	23	27	32	36
10/3.1	3	6	9	13	16	19	22	25

Under the current regulations (No Action) chafing gear would only be allowed on about 12 percent of a 98 feet codend, which would accommodate the largest catch observed in the at-sea whiting fisheries and about 21-35 percent of a codend based on average tow size (about 36-54 metric ton) . Under Alternatives 1 and 2 (a and b), the full length of the codend could be covered. The information above supports the benefits of much longer chafing gear coverage on whiting fishery codends than current regulations (no action) provide, which limit chafing gear coverage to 50 percent of the codend circumference and the 50 terminal codend meshes. The chafer coverage is reportedly needed based on net builder survey to protect the codends, which are very expensive to build and repair, from onboard abrasion sources, which are issues discussed in following sections.

Cost Associated with Compliance with the Alternatives

Three trawl net builders were surveyed with regard to various trawl net construction and modification costs. Table 4-18 summarizes their responses. The estimated minimum cost to remove and reapply chafer panels to the codend ranged from $5,000 to $10,000. Two builders estimated the cost to build a midwater net with codend to be as high as $400,000. Estimates for building a codend ranged from $10,000 to $200,000 with a midpoint of about $95,000.

Table 4-18: Trawl net builder responses to various questions regarding trawl gear construction and modification costs.

	Net Builder [a/]			
Question	1	2	3	4
Cost to build a midwater trawl net for use in the Alaska pollock and Pacific Coast whiting fisheries	$40,000-$80,000	$20,000-$200,000	$40,000-$200,000	NR [1/]
Cost to build a midwater trawl codend for use in the Alaska pollock and Pacific Coast whiting fisheries	$30,000-$100,000	$10,000-$200,000	$40,000-$200,000	NR
Cost to remove and replace chafing gear on the codend of a net used in the Alaska pollock and Pacific Coast whiting fisheries	$5,000-$10,000	$5,000-$50,000	$10,000-$15,000	NR
Codend useful life questions: 1) What is life of a codend with chafer coverage on bottom and sides? 2) Life without chafer? 3) Can chafer be replaced to extend codend life?	1) 5-8 yrs 2), 2-4 yrs, 3) yes, usually after 4 yrs. Chafer replacement adds 3-4 yrs. Much of wear is from weight of fish in net. With catch consolidation, codends are wearing out fast.	NR	1) 5-15 yrs, 2) 2-5 yrs, 3) yes, after 2-5 yrs. Most of codend on midwater nets do not show much wear outside of that caused by dragging up stern and on deck.	NR

a/ NR means no response to net builder email questionnaire.

Codend useful life information provided for this EA includes estimates of useful life of a midwater fishery codend with chafer coverage on the side and bottom panels to be in the range of 5-15 years, which is over double what it would be if protective chafing gear were not used (Table 4-18). Codend life can be extended another 3-4 years if the chafer panels are replaced after 4 years of use. Net builders report that codend useful chronological life is highly dependent on the amount of fish caught. Big year class years with associated large catches cause codends to rapidly wear out. Using the codends in both Alaska and the Pacific Coast fisheries would increase the hours in use in any given year, which could shorten the number of years a codend is in use. Although, added chafing gear can increase the life of a codend excess chafing gear may increase net drag and reduce fuel efficiency.

Under the trawl rationalization program implemented in 2011, quota consolidation and reduced time pressures to fish may change fisher behavior in ways that change wear rates on the nets. Quota consolidation on to fewer vessels may mean that gear on remaining vessels is used more intensely (more tows) increasing the rate of wear for a given net as measured on a calendar basis. The number of catcher vessels in the shorebased fishery dropped from 36 in 2010 to 26 in 2011 and while in the mothership fishery the number dropped from 22 to 18 during the same period (Table 3-). Depending on cost structure, product quality issues, and bycatch risks, greater or lesser size tows may occur. Data on tow sizes for 2011 based on logbook data for shoreside vessels shows a substantial increase in the number of greater than 40 metric ton tows (60.6 percent compared to amounts less than 46.6 percent from 2008 through 2010 (Table 4-14)). Thus, there is the potential that wear and tear on codends due to increased intensity in the use of gear and greater haul sizes will increase, regardless of the alternative selected, though the degree of increase would still be expected to vary among the alternatives.

Table 4-19 compares harvesting vessel compliance costs under each action alternative compared to the No Action Alternative. This table is based on information and codend replacement estimates discussed above and shown in Table 4-18. Most Pacific Coast whiting fishery vessel owners have midwater gear that is non-compliant with chafing gear restrictions as recently reinterpreted, which is why Alternative 2b is labled the status quo alternative (the alternative with which vessels are currently in compliance). That alternative is the same as regulations that were in place in 2006. In that regard implementation of the No Action alternatives would result in added cost to current vessel owners to participate in the Pacific Coast whiting fishery. These added costs stem from (1) chafer panel modification cost to limit chafer coverage to the terminal 50 codend meshes and (2) increased codend replacement cost due to accelerated wear from onboard abrasion sources. The gear currently used in the fishery (compliant with Alternative 2b) would also be compliant with the other action alternatives. Thus, the other action alternatives would not necessarily require additional expenditures on gear.

Fishers that only participate in the Pacific Coast whiting fishery would have a one-time cost of $5,000 to $10,000 to bring their codends into compliance. For fishers that fish in Alaska and the Pacific Coast fishery they would likely either obtain an additional codend for use in the Pacific Coast fishery or incur an annual chafer replacement cost of between $5,000 and $10,000 to limit their coverage to the terminal 50 net meshes. Data in Table 3- show that 62 percent of Pacific Coast whiting vessels also fished off Alaska during 2004-2010. These along with most other whiting vessels likely have codend chafing gear on their codends that is noncompliant with Pacific Coast whiting fishery regulations, as they were recently reinterpreted. The increased codend replacement cost under the PFMC Preferred Alternative (Alternative 1) could be as high at $9,500 per year with no chafer replacement after about 10 years to extend codend useful life or $7,321 per year with chaffing replacement after about 10 years of use. The replacement cost under the other two action alternatives would be expected to be higher, but very close to Alternative 1. This is because of lower amount of chafer coverage provided under those alternatives (50 percent of codend circumference) compared to Alternative 1 (up to 75 percent of codend circumference).

Table 4-19: Cost savings to individual harvesters under action alternatives compared to No Action Alternative.

	For vessels participating only on the Pacific Coast : **One time cost** for removal of chafing gear not in compliance.	Vessels participating on the Pacific Coast and Alaska: **Annual costs** for altering chafing gear.	Midrange codend life expectancy and associated **annual cost**: No chafer replacement to extend useful life	**Annual cost** associated with codend life expectancy: With one-time chafer replacement to extend useful life
Alternative 1 (Council preferred)	$5k-$10k savings	Cost savings of not owning an additional codend OR not spending $5k-$10k to switch chafing gear each year.	10 years $9.5 k/year savings	14 years $7.32 k/year savings
Alternative 2a	$5k-$10k savings	Cost savings of not owning an additional codend OR not spending $5k-$10k to switch chafing gear each year.	Cost savings would be close to Alternative 1 ($9.5 k or $7.32 k/yr) because codends would have much greater protection from onboard abrasion sources compared to No Action but not as much coverage as under Alternative 1 (see Table 4-1).	
Alternative 2b (Status Quo)	$5-$10k savings	Cost savings of not owning an additional codend OR not spending $5k-$10k to switch chafing gear each year.	Cost savings would be close to Alternative 1 ($9.5 k or $7.32 k/yr) because codends would have much greater protection from onboard abrasion sources compared to No Action but not as much coverage as under Alternative 1 (see Table 4-1).	

Adoption of any of the action alternatives would result in increased codend useful life, relative to no action, due to greater codend protection from onboard abrasion sources and some wear reduction on those occasions when seafloor contact occurs. Net manufacturers indicate that most of the wear on the net is the result of stern ramp abrasion (see

Table 4-18). For midwater gear used to target whiting, the No Action Alternative, which allows coverage of 50 terminal meshes, would result in the most stern ramp abrasion.

Whiting Harvester Profitability

Harvester profitability are affected by changes in Operation Costs

- Exvessel Revenue
- Quota Costs and Revenue

As described in the previous section, relative to No Action, operation costs are expected to decline under any of the action alternatives and are expected to decline the most under the Alternative 1 (FPA). The net effects of these changes in operation costs on profits depend on gross revenue and other costs (quota costs). The most recent information available on net revenue is for the 2008 shoreside whiting fishery. However, this information is of limited relevance to this action because of the rationalization program that was implemented in 2011. Under that program substantial consolidation occurred and average gross revenues per vessel doubled. Therefore we can only provide a qualitative assessment of the operational costs on profit, informed by quantitative information on costs as a percentage of gross revenue. For

Alternative 1, the cost reduction relative to no action is expected to be $11,679, or about 2 percent of the 2011 average exvessel value per vessel in the shoreside fishery, about 1 percent of that value for the mothership sector catcher vessels and about 1 percent of the that value for catcher processors (Table 4-20). For vessels that participate in both the shoreside and mothership whiting fisheries, the codend costs as a total percent of revenues may be lower than reflected here, depending on the degree to which wear rates increase proportionally with increased volume of fish handled. Relative to No Action, declines in operation costs are also expected under Alternative 2a and Alternative 2b (status quo) but to a lesser extent than under Alternative 1. The size of the decline under Alternatives 2a and 2b is uncertain, but for vessels in the shoreside fishery that also participate in Alaska, the cost of changing chaffing gear is expected to be about 1 percent of ex vessel value.

The effect of the chafing gear alternative on exvessel revenue will depend primarily on the changes on the proportion of small groundfish caught. Any whiting or other groundfish species caught counts against the quota whether they are marketable or not (provided the species is one for which quota is required under the trawl rationalization program). If additional chafing gear coverage increases the catch of small unmarketable whiting, that catch not only brings no revenue but it also reduces revenue because the vessel must use quota to cover the catch, forcing it to forgo the opportunity to catch that amount of marketable size fish. While current regulations would allow fishermen to use chafer gear with mesh sizes down to three inches, it is reported that most fishermen use chafer mesh sizes of 4 inches and above (Agenda Item I.5.c, Supplemental Public Comment 5, November 2011 and discussions with knowledgeable GAP members[12]). The use of larger than minimum sized mesh for chafer panels is likely at least partially intended to reduce small fish bycatch. To the degree that increased chafing gear coverage results in the retention of more small fish, fishermen's exvessel revenue would decline. The No Action Alternative would likely result in the least retention of small fish, followed in order by the Alternatives 2b, 2a, and 1. As is discussed in Section 4.2.2.1, net clogging that occurs as the amount of fish in the codend builds to more than 40 metric ton would be expected to reduce the difference among the alternatives.

Also affecting vessel profits is the impact of the regulations on the cost of quota. Any action that increases net revenue will increase the price at which quota trades (quota cost), offsetting the total benefits that accrue to fishermen as a result of reductions in operational costs. This buffering effect (e.g., operation cost reductions being offset by quota cost increases) positively affects those initial quota recipients who sell their quota.

[12] The Groundfish Advisory Subpanel (GAP) represents the commercial and recreational fishing industry, tribes, the public, and conservation interests. They advise the Council on fishery management issues. The current membership and their affiliations are available at http://www.pcouncil.org/wp-content/uploads/gap.pdf.

Table 4-20: Estimated gross revenue impact of the alternatives on shoreside and at-sea whiting harvesters and catcher processors.

				Estimates based on 2011 fishery data		
		Life (yrs)	Dollars	Shoreside	Mothership	Catcher Processor
Average Per Vessel Gross Whiting Revenues:				$750,000	$1,300,000	$1,850,000
Codend cost			$95,000			
Codend cost (extended)			$102,500			
Annual cost to change chafing gear($5,000-$10,000)			$7,500			
Annual codend cost	No Action	5	$19,000			
	A-1	10	$9,500			
	A-2a	Uncertain, < A-1	a/			
	A-2b	Uncertain, < A-1	a/			
Annual codend cost (extended life)	No Action	5	$19,000			
	A-1	14	$7,321			
	A-2a	Uncertain, < A-1	a/			
	A-2b	Uncertain, < A-1	a/			
				Change in cost as a percent of gross revenue		
Change relative to no action	A-1	9	-$11,679	-2%	-1%	-1%
	A-2a	Uncertain, < A-1	a/			
	A-2b	Uncertain, < A-1	a/			
Annual codend cost (extended life) + cost to change chafer gear						
	No Action	5	$26,500			
	A-1	14	$7,321			
	A-2a	Uncertain, < A-1	a/ + cost of changing gear			
	A-2b	Uncertain, < A-1	a/ + cost of changing gear			
Change relative to no action	A-1	9	-$19,179	-3%	-1%	-1%
	A-2a	Uncertain, < A-1	a/ + cost of changing gear			
	A-2b	Uncertain, < A-1	a/ + cost of changing gear			

a/ The value is expected to be somewhat higher than for Alternative 1, to the degree that additional abrasion occurs as a result of covering only 50% of the circumference of the net, rather than the 75% allowed under Alternative 1.

Relative to the No Action Alternative, the projected change in cost of the action alternatives on the harvester sector were positive under Alternatives 2a and 2b and most positive (P+) under Alternative 1, the Final Preferred Alternative (Table 4-21). Alternative 1 is expected to save the industry about 1-3% of the annual exvessel value of the catch because fewer codend would need to be replaced over No Action. Alternatives 2a and 2b would result in less of a savings if the vessels incurred the cost of removing chafing gear from Alaskan codends rather than owning separate codends for each region and from added wear on the codends from somewhat less coverage. Overall, Alternative 1 is less prescriptive than the other action alternatives; the wording only says chafer panels may be attached to the side and bottom panel and does not specify a specific maximum amount of coverage (though we have used 75 percent for analytical purposes because the codends are constructed with square cross section; the sides are comprised of 4 equal width panels). Alternative 2b would cost less than the No Action Alternative at the start because fishers already have chafing gear on their codends that is consistent with Alternative 2b and would not require the added cost to remove.

Alaska regulations allow for virtually unlimited chafing gear coverage as shown in Table 3-10. Vessel owners with excess chafing gear coverage would be required, to modify their nets or obtain a separate codend in order to fish in the Pacific Coast whiting fishery. Cost for a separate codend could run up to $200,000 (Table 4-18). The action alternatives (Alternatives 1, 2a, and 2b) would not require vessel owners to modify their existing codends because their current gear is understood to be compliant with the restrictions specified in either alternative. Under Alternative 1, it is most certain that the nets used in Alaska could be used on the Pacific Coast . Under Alternatives 2a and 2b, there is more possibility that the nets most commonly used in Alaska would not meet Pacific Coast standards. However, this would not seem to be a severe problem for vessel owners because the 50 percent net circumference restriction has been in place for many years and there was not a strong push to change that regulation at that time.

Table 4-21: Potential impacts of action alternatives compared to the No Action Alternative: Socio-Economic Environment. (P=positive, P+ = most positive, nc=no change)

	Alternative 1 (FPA)	Alternative 2a:	Alternative 2b (Status Quo)
	Broader and longer chafing gear on codend; unlimited chafer panel size	Longer chafing gear coverage; unlimited chafer panel size	Longer chafing gear coverage; SQ chafer panel size
Pacific whiting harvesting sector (CV, CP)	P+	P	P
Pelagic rockfish harvesting sector	P or nc /	P or nc /	P or nc /
Processing sector (SS, MS)	nc	nc	nc
Enforcement and Management	nc	nc	nc

National Net Economic Value Related to Whiting Harvester Activity

While benefits to fishermen in terms of increases in net revenue are offset by increases in quota prices, the net value to the nation is determined by the total labor and capital used in the fishery with and without a particular set of regulations in place. Prices paid for quota are wealth transfers and do not reflect an actual change in the cost of producing fish. Thus, a reduction in the cost of harvesting fish likely reflects a benefit to the nation, the size of which is not affected by a change in the prices of quota.

4.3.1.2 Fishing Behavior Considerations: Disincentives

Cost and Operational Issues Associated with Bottom Contact Events

The question of the relation between midwater gear impacts on habitat and degrees of coverage of chafing gear on the codend depends on fishermen incentive or disincentives to avoid bottom contact. The data shows that vessels using midwater gear make some occasional bottom contact with their gear (see Section 4.1.3.1); however, fishermen report that there is a substantial disincentive to fish close to the bottom and rocky habitats that will not be meaningfully changed by chafing gear coverage on the codend, offshore hard bottom, rocky and boulder habitats in particular (based on discussions with Mr. David Jinks, knowledgeable GAP members, and Captain Bob Farrell, California Department of Fish and Game Enforcement Consultant representative and former groundfish vessel operator; also see discussion in section on Offshore Hard Bottom Habitat, page 106). Purposefully fishing midwater gear close to the bottom or otherwise increasing the probability of bottom contact would increase the financial risks associated with potential gear damage or loss and poor fishing performance. Trawl gear regulations (see Section 3.3.5.1) "make the gear impractical or ineffective for fishing on the bottom" (PFMC 1994). The chafing gear covers only the codend and so would not offer bottom contact protection to the unprotected footrope and net of midwater gear nor affect the gear disabling effects of the ropes and 16 inch mesh at the front of the gear.

The potential cost of net damage, increased wear, and loss is substantial. In Table 4-18 it is reported by net builders that the cost of a midwater net, including the codend, is in the range of $50,000 to $400,000. There would also be need for and potential cost to obtain a large work area in which to transport and place the net for inspection and to make the necessary repairs.

In addition to gear damage issues, whiting operators and vessel owners comment that there is significant disincentive for vessels to allow their trawl gear (e.g., fishing net and codend) to come into contact with the seafloor because when bottom contact is made the net stops fishing properly, reducing CPUE and increasing drag on the gear which increases fuel costs (based on discussions with Mr. David Jincks of Midwater Trawlers Cooperative and knowledgeable GAP members).

Light (unprotected) footrope required on midwater trawls in combination with the 16" minimum mesh requirement on the front of the net will likely raise a fishermen concern about the hazards and wear on the front of the net rather than on the codend (Captain Bob Farrell, California Department of Fish and Wildlife representative to the PFMC Enforcement Consultants and former groundfish vessel operator e-mail, March 19, 2013). Wear on the codend is not a major concern when fishing close to the bottom. The codend may drag on the bottom when full of fish, but the wear would be more toward the end of the codend, the part that is covered with chafing gear under all options. There is the issue of chains dragging from the front corners of the net and impacting habitat, but the depth of fishing would not change substantially among the options.

Overall, chafing gear coverage on the codend would have minimal if any effect on fishermen's aversion to fishing close to the bottom.

Another factor affecting how gear is fished will be the recent transition from a derby fishery to a catch share fishery. Most of the data on bottom contact reviewed here for the United States (US) whiting fishery during 2009-2010 represented derby fishery conditions while the Canadian fishery in those same years was managed under Individual Vessel Quotas (see Section on Offshore Biogenic Habitat Impacts, page 98). Although the reasons are unclear, the bottom contact rates in the Canadian fishery were much lower than in the US fishery as shown in Table 4-7, page 100. The US data show a wide range in bottom contact rates by individual vessels. The median contact rate was 13 percent and 32 percent of the maximum contact rate reported during 2010 and 2009, respectively. This shows a positive skew in distribution of contact rates.

Based on testimony that bottom contact in the midwater whiting fishery results in increased operating cost, the fishers with high contact rates likely had higher operating costs per unit of fish landed than fishers with contact rates below the fishery median contact rates. Thus it can be projected that catch share implementation in the US fishery is likely to result in reduced bottom contact rate in the fishery overall stemming from consolidation of catch with the more efficient vessels. The Canadian data may reflect what we can expect in the US whiting fishery in the future now that the catch share program has been implemented with a median contact rate closer to 1 percent rather than up to 8 percent. If this occurs as expected, it will reduce the difference among the alternatives with respect to expected bottom contact rates.

Gear Configuration Considerations Related to Catch of Unmarketable and Other Small Size Fish

As discussed above, under the trawl catch share program, vessels have substantial incentive to avoid the catch of small, unmarketable groundfish for which quota is required. For each pound of these fish caught, fishermen must use a pound of quota, forgoing their opportunity to use that quota to cover catch for which they can get paid. The effect of catching small fish which must be covered with quota is the reduction of vessel revenue. On this basis, regardless of the amount and continuity of chafing gear allowed on a codend, the incentive of fishermen is to configure the gear to avoid the catch of target fish of small size. Thus, they may not use the maximum amount of chafing gear, minimum mesh size, etc. to the degree allowed under any particular alternative. Liberalizing the chafing gear regulations increases the flexibility fishermen have in configuring their gear and may allow fishermen to develop other means for avoiding small fish while maintaining the catch performance of the gear.

Continuation of Marine Stewardship Council (MSC) Certification
As explained in Section 4.1.2, the United States and Canada midwater trawl fisheries targeting Pacific whiting have received certification that the two fisheries meet the MSC standard as well managed and sustainable fisheries with minimal ocean habitat impacts (MSC 2009; also see http://www.msc.org/about-us/standards/standards/msc-environmental-standard#what-does-it-assess). Certification is valid for five years with fishery review at least once a year to check that the fishery continues to meet the MSC standard. The catch monitoring coverage required for all IFQ groundfish and at sea whiting fisheries will likely provide data on bottom contact rates in the various fisheries based on catches of bottom dwelling species such as corals, sponges, crabs, nudibrachs, etc. MSC certification provides an additional incentive for fisheries to stay off bottom when midwater fishing for Pacific whiting.

4.3.1.3 Difference in Costs to Vessels that Participate in Pacific Coast and Alaska Fisheries

Implementation of any of the action alternatives may reduce the costs for vessel owners and operators to move between the Pacific Coast whiting fishery and the Alaska pollock fishery. There is also a Gulf of Alaska pelagic rockfish complex fishery in which some Pacific Coast fishers may participate. Under the FPA, fishers will not have the expense of removing and reapplying chafer panels to their codends (or of purchasing a separate codend for use in the Pacific Coast fishery) when they move between Alaska and Pacific Coast fisheries. In addition, under any of the action alternatives, their codend(s) will last longer, as shown in Table 4-19, because of increased codend protection with chafing gear compared to the No Action Alternative. There will likely be less down time to repair or replace codends due to greater chafer protection provided under any of the action alternatives, the FPA in particular because up to 75 percent of the codend can be protected compared to 50 percent under the other action alternatives. These benefits are analyzed in Section 4.3.1.1. Reduction in cost barriers may encourage some increase in dual participation in Pacific Coast and Alaska pollock fisheries and, possibly, pelagic rockfish complex fisheries in the two areas. This is because the same midwater gear will be legal for use in both areas. Data in Table 3- show that 65 percent of vessels that have fished in the Pacific Coast whiting fishery in recent years also fished in Alaska. The additional consolidation resulting from such cross participation could have negative or positive impacts on local communities, depending on the home port of the vessels participating. If more vessels home ported on the Pacific Coast start participating in Alaska the effects would be positive for Pacific Coast communities, increasing the benefits to Pacific Coast communities from those fisheries. On the other hand, increased Pacific Coast participation by vessels home ported in Alaska may reduce Pacific Coast fishing community benefits. Dual participation could also redistribute income among the fleet if dual participants are able to outbid Pacific Coast -only participants for QS in the future. The degree of the change in vessel costs as a percent of total revenue is expected to be relatively small (less than two or three percent, not taking into account total revenue for vessels that fish in more than one whiting fishery). On that basis the influence on dual participation rates may be small.

4.3.1.4 Tribal Fisheries

Pacific Coast treaty Indian tribal allocations, set-asides, and regulations are specified during the biennial harvest specifications process. Tribal allocations and regulations are developed in consultation with the affected tribe(s). Fishing regulations such as fishing seasons and gear restrictions apply equally to tribal and nontribal fishers except that tribal fishers are not subject to groundfish plan limited entry provisions (50 CFR § 660.50 Pacific Coast treaty Indian fisheries). The Final Preferred Alternative is less restrictive than current trawl gear restrictions as they apply to codend coverage of midwater trawl nets used in Pacific Coast fisheries, thus there should be no adverse impact to the tribal fisheries both for whiting and other groundfish species. There are currently two tribal fisheries, both by Makah members, using midwater trawl gear that could be affected by this action, the Pacific whiting fishery and the midwater yellowtail fishery. Although the tribal fisheries are managed by each individual tribe's gear regulations, the tribal gear regulations are consistent with the current groundfish regulations.

Since 1996, a portion of the U.S. Total Allowable Catch (TAC or Optimum Yield) of Pacific whiting to has been allocated to the tribal fishery. The tribal allocation is subtracted from the U.S. Pacific whiting TAC before allocation to the non-tribal sectors. To date, only the Makah Tribe has prosecuted a tribal fishery for Pacific whiting. Catch data for the tribal whiting fishery has been included in the at-sea values presented in Table 3-9. The Makah Tribe has annually harvested a whiting allocation every year since 1996 using midwater trawl gear. The Quileute Tribes and Quinault Indian Nation have expressed an interest in commencing participation in the whiting fishery and allocation has been made available. To date approximately 4-5 tribal vessels have fished in the whiting fisheries. Of these vessels 2-3 per year also fish in the Alaska groundfish fisheries.

It is assumed that tribal fishermen in the Pacific whiting fishery are using gear consistent with Alternative 2b (Status Quo). Therefore the costs to change the gear to be compliant with the No Action Alternative would result in costs to fishermen that are similar to the non-tribal fisheries as shown in Table 4-19. However, the individual tribal fisheries could choose to develop new management measures to allow tribal fishermen to continue using their status quo chafing gear configurations. Under Alternative 1 (FPA), the tribal whiting fishermen who also fish in Alaska could choose to use the same gear that they use in Alaska. Because Alternative 1 liberalizes the chafing gear restrictions, fishermen who chose to continue using their status quo gear, would incur no additional costs.

4.3.2 Pelagic Rockfish Complex Fishery

4.3.2.1 Change in Pelagic Rockfish Harvester Cost and Net Economic Value

Need for Greater Codend Chafing Gear Protection

The average tow size of pelagic rockfish from logbook data during 2000-2002 indicates that the no action chafing gear allowance of 50 meshes might be enough for a codend that would cover most tows (particularly if the net mesh size is anything greater than 3 inches) (Table 4-22). For example, based on net builder information in Table 4-17, a 16 foot codend would accommodate the largest pelagic rockfish tow (55,150 lbs or 25 metric ton) observed in state logbook data during 2000-2002 (Table 4-22). A 16 foot codend made of 4-inch diamond mesh would be about 52 meshes in length. However, these data may not be indicative of the tow sizes to be expected under current regulations because trip limits were highly constraining in those years: from 500 lbs up to 30,000 lbs per 2-month period each for widow and yellowtail rockfish and

25,000 lbs per 2-month period for chilipepper rockfish were allowed to be taken on a single trip during 2000-2002.

Several net makers were contacted and asked how pelagic nets used to catch widow rockfish, a pelagic rockfish complex species, differ from whiting nets. The general response was that pelagic rockfish nets tend to be smaller because they need to be maneuverable in order to avoid bottom contact while fishing near hard bottom structure. The use of unprotected footrope and ropes or 16 inch mesh encircling the front of the net required of midwater trawls in Pacific Coast fishing regulations (Table 3-10) "make the gear impractical or ineffective for fishing on the bottom" (PFMC 1994).

Table 4-22: Tow Size Statistic (pounds of pelagic rockfish) for the 2000-2002 Pacific Coast Pelagic Rockfish Fishery, Based on Trawl Logbook Entries. (Metric ton weights are shown in parentheses.) [a/]

Statistic by year	2000	2001	2002
AVERAGE	8,735 (4.0)	6,415 (2.9)	4,203 (1.9)
MINIMUM	0	0	0
MAXIMUM	55,150 (25.0)	42,483 (19.3)	33,000 (15.0)
MEDIAN	5,854 (2.7)	4,084 (1.9)	1,495 (0.7)
Tow size bin frequencies by year [b/]			
0-500 (0-0.23)	101	138	87
1,000 (0.45)	82	60	33
2,000 (0.91)	106	106	43
4,000 (1.81)	150	112	40
6,000 (2.72)	117	98	33
10,000 (4.54)	160	137	19
20,000 (9.07)	237	150	36
30,000 (13.61)	118	40	7
40,000 (18.14)	15	5	2
60,000 (27.21)	5	1	0
Total	1,091	847	300

a/ These data may not be indicative of tow sizes that may occur in the future because of change from trip limit management to IFQ management. Up to 30,000 lbs per 2-month period each of widow and yellowtail rockfish and 25,000 lbs per 2-month period of chilipepper rockfish were allowed to be taken on a single trip during 2000-2002. The current and future fishery will not have such constraints.
b/Each tow size bin is exclusive of the previous bin(s).

Costs Associated with Compliance with the Alternatives

The costs of codends and costs of changing chafing gear are described above for the Pacific whiting fishery. Codends used for the pelagic rockfish fishery may be the same size or smaller, but are unlikely to be larger than the codends used for whiting. Additionally, the useful life of a net used just for pelagic rockfish may be longer because the volume of fish handled by a single codend will likely be smaller, on average. Because opportunities in the pelagic rockfish fishery opened up again very recently, to some degree in 2011-2012 and on a more substantial scale in 2013, information on codends used and their likely life is limited at this time. For this reason, the costs of whiting codends are used as a proxy, but should be considered an upper bound on the cost differences that might be expected for the midwater pelagic rockfish fishery.

The relative impacts of the action alternatives compared to the No Action Alternative are assessed in Table 4-21. That table shows ranges in impacts as follows: (1) no change (nc) to reflect a scenario in which all fishers have and use codends of 50 meshes or smaller, and (2) a scenario in which all fishers use their whiting fishery codends, which yields assessments ranging from positive (P) under the FPA to no change under the baseline No Action Alternative. The No Action Alternative would require fishers to remove most of their chafing gear and the useful life of their codends would be shortened due to increased wear. A positive impact is projected under alternatives 2a and 2b compared to the No Action Alternative because most fishers already have gear compliant with these alternatives.

Pelagic Rockfish Harvester Profitability

As with whiting harvesters, pelagic harvester profitability will be affected relative to:

- Operation Costs
- Exvessel Revenue
- Quota Costs and Net Revenue

Vessels targeting on midwater pelagic species may experience changes in a variety of operating costs depending on the alternative. These costs relate to

- initial compliance costs (costs of modifying gear to comply with regulations),
- net wear, and
- the potential need to change chafing gear by vessels that use the same codends to fish pelagic rockfish that they use in Alaska fisheries and who chose to use nets with the greater chafing gear coverage allowed in Alaska fisheries.

With respect to initial compliance costs, assuming that vessels are in compliance with Alternative 2b (status quo circumstances – the regulations that were in place through 2006 and as they continued to be interpreted through 2011), only under the No Action Alternative would a vessel be required to make any changes to its chafing gear. Alternatives 1 and 2a are both more liberal than 2b. Only the No Action Alternative is more restrictive. Under No Action a vessel would have to incur the cost of removing chafing gear to come into compliance.

With respect to codend wear, the greatest wear rates are expected under the No Action Alternative (which provides for the least chafing gear coverage) and the least under Alternative 1 (which provides the most). Alternatives 2a and 2b allow similar amounts of coverage but one-third less protected area than Alternative 1 (50 percent of the circumference in comparison to 75 percent). The effect of the difference on net wear will depend largely on the degree to which a net being pulled up the ramp is not sitting symmetrically on its belly. If perfectly symmetrical, the additional 25 percent of the net covered would not come into contact with the sides of the stern ramp and there would be no benefit from the additional coverage allowed under Alternative 1. Because the additional codend coverage potentially generates a number of disadvantages for fishermen (increased drag, potential for increased retention of smaller less valuable fish that must be covered with vessel QP, increased material and maintenance costs) it seems reasonable to assume fishermen’ support for this provision implies that enough contact with the sides of the stern ramp occurs such that the savings on wear offset these costs. The top of the codend is not expected to come into contact with the vessel or habitat.

For vessels that use the same size codends to fish for whiting that they do for pelagic rockfish and which fish in Alaska fisheries with greater chafing gear coverage, the costs of changing chafing gear (or maintaining a separate net) to fish in Alaska fisheries would be the same as described for whiting harvesters. Vessels using smaller codends would likely have a different set of codends to use on the Pacific Coast and so would be less likely to need to pay for changing chafing gear when moving between regions. With respect to the change in revenue, as for vessels harvesting whiting, if increased chafing gear coverage results in greater retention of smaller less valuable fish, which must be covered with quota, a vessel's potential exvessel revenue will be reduced. It is assumed that if the added chafing gear were to result in a vessel t losing valuable quota pounds to cover unmarketable fish, the vessel would reduce chafing gear before a substantial change in revenue were to occur.

The effects on quota costs and net revenue would be the same as described for the whiting harvesters. If the No Action Alternative is selected, decreases in quota costs will buffer the effects of decreases in net revenue, for those who have yet to buy the quota they will need to harvest (quota shares or quota pounds), but compound the negative effect for those already holding quota shares at the time new regulations go into place (imposing both an increase in operating cost and a reduction in the value of the quota they hold as an asset).

National Net Economic Value Related to Harvester Activity
These are the same as reported for the whiting fishery in Section 4.3.1.1.

4.3.2.2 Changes in Fishing Behavior

The discussion in Section 4.3.1.2 with regard to the disincentives to vessel operators to fish close to or contact benthic habitats also applies to vessels when target fishing for pelagic rockfish complex species, although the disincentive with respect to gear damage may be greater because pelagic rockfish are generally associated with bottom which may be more damaging to nets. These factors include high cost of net replacement or repair if the net is damaged; large work area required to make net and codend repairs; and reduced net operating efficiency when benthic habitats are contacted with midwater trawl gear. Disincentive with respect to gear damage may be greater because pelagic rockfish are generally associated with bottom which may be more damaging to nets.

4.3.2.3 Difference in Costs to Vessels that Participate in Pacific Coast and Alaska Fisheries

The potential for vessels to increase participation in Alaska and Pacific Coast fisheries for pelagic rockfish complex species stemming from adoption of one of the action alternatives is likely related to the size of codends that they have on their nets currently or in the future. The smaller the codends being used the less difference between the No Action and Action Alternatives. Adoption of any of the action alternatives would not seem to affect the potential for increased participation by Pacific Coast vessels in Alaska fisheries (for pelagic rockfish or other species). The increase in allocations of widow rockfish beginning in 2013 is likely to be a more important factor with regard to the potential for increased movement of Alaska vessels to the Pacific Coast fishery. When the widow rockfish allocations are increased, the price for pelagic rockfish complex species quota shares and quota pounds may increase.

4.3.2.4 Tribal Fisheries

The Tribal fishery management process is reported in Section 4.3.1.4. The Makah Tribe prosecutes a midwater yellowtail rockfish fishery under a tribal catch limit. In 2011 that limit was 507 metric ton (1,117,732 lbs). In 2011, the Makah yellowtail rockfish fishery harvested 328 metric ton (722,915 lbs) of yellowtail rockfish. Figure 4-4 shows the general catch composition of the yellowtail rockfish midwater catches in 2011. There are 5 trawl vessels that participate in this fishery. The vessels in this fishery do not participate in the Alaska groundfish fishery.

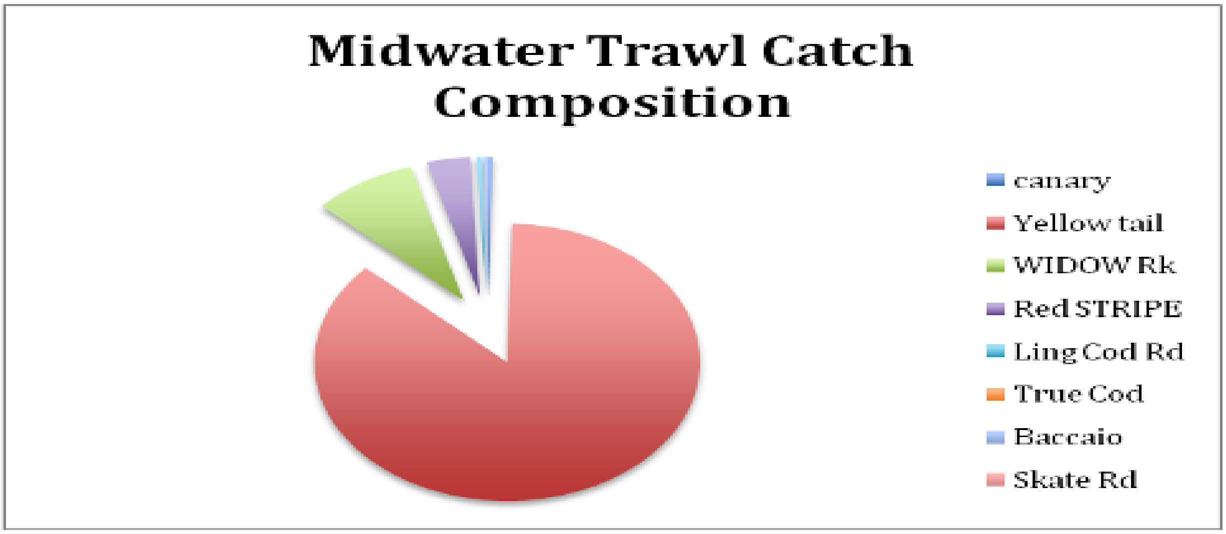

Figure 4-4: This figure shows the catch composition for 2011 of the midwater trawl fishery. The main species that were harvested during the 2011 season were yellowtail rockfish, widow rockfish and red stripe rockfish. (*Makah Fisheries management, 2011 Annual Report - makahwater.com/uploads/2011_Makah_Fisheries_Annual_Report).*

It is assumed that tribal fishermen in the Makah yellowtail rockfish fishery are using gear consistent with Alternative 2b (Status Quo). Therefore the costs to change the gear to be complaint with the No Action Alternative would result in costs to fishermen that are similar to the non-tribal fisheries (Table 4-19). However, the individual tribal fisheries could choose to develop new management measures to allow tribal fishermen to continue using their status quo chafing gear configurations. Under Alternative 1 (FPA), the tribal whiting fishermen who also fish in Alaska could choose to use the same gear that they use in Alaska. Because Alternative 1 liberalizes the chafing gear restrictions, fishermen who chose to continue using their status quo gear would incur no additional costs.

4.3.3 Processor Sector

Whiting fishery and pelagic rockfish fishery landings by port area or general area are presented and discussed in sections 3.3.4 and 3.3.2, respectively. The impacts to the processing sector are projected to be low negative or neutral (negligible/no change) under all of the alternatives (Table 4-21). IFQ management makes every holder of quota pounds accountable for their overfished species catch, and the at-sea sectors (catcher/processor and mothership) have allowable catch levels that cover their overfished species needs based on their historical maximum catches. With increased chafing gear coverage, a low negative result may occur if there is an increase in the retention of nonmarketable or lower value small fish which must be covered with IFQ, displacing the opportunity to catch larger more valuable fish with that same quota. It is assumed that if the added chafing gear were to result in a vessel having to use valuable quota pounds to cover unmarketable groundfish, the vessel would reduce chafing gear before the change in revenue were substantial.

The impacts analyzed in this EA pertain to the use of chafing gear on midwater trawl nets in addition to the potential for gear interaction with the ocean floor. None of the alternatives would be expected to affect the catch and landing of target species as no change is proposed in minimum trawl gear net mesh size, which is the primary tool for affecting escape of unmarketable size fish and other smaller size organisms from codend meshes (see Pikitch *et al*. 1990 for analysis of various Pacific Coast groundfish mesh size alternatives). It is possible the catch and retention of non-target species including unmarketable target species, forage fish, and eulachon would increase under any of the action alternative because of their allowance for greater chafing gear coverage compared to the No Action Alternative, assuming chafing gear impedes small fish escapement through codend meshes. The overall impact to processors would be expected to be negligible due to the very small contribution of these fish (less than 2 percent) to the landings as shown in at-sea whiting fishery catches in Table 3-3. Net plugging effect in the whiting fishery due to impingement of fish in codend meshes in large fishery tows blocks escape routes and thereby reduces the number of fish that are able to escape through codend meshes. In that regard in the whiting fishery there is likely to be less difference among the alternatives for retention of unmarketable size fish and other smaller fish due to plugging of codend meshes. The study cited in this EA by Erickson *et al*. (1990) showed that average fish size declined as tow size increased and that no fish size selectivity was indicated in tow sizes over 40 metric ton. Data presented in this EA show that 43 percent or more of tow sizes in the at-sea whiting fishery in recent years were >40 metric ton depending on fishery sector and time period (Table 4-13). The pelagic rockfish fishery is managed with IFQ and trip limits for non-IFQ species. The catch of unmarketable rockfish will depend on the size of codend mesh midwater fishermen choose to use (above the current 3-inch minimum mesh size limit). This issue is discussed in Section 4.2.2.2. Processors will decide on the size of fish they choose to purchase but all IFQ species catches count against allocations and catch must be monitored on every IFQ trip to document the catch by species and weight of fish impacted.

4.3.4 Communities

Community information is provided in Section 3.3.4. The proposed action items relate to the escape and survival of small fish from midwater trawl nets and the potential for trawl gear contact with the ocean bottom. These fishing issues are not expected to significantly affect the catch and landing of target species. In that regard, there are minimal or no expected impacts to communities that depend on Pacific whiting and pelagic rockfish landings from the adoption of any of the alternatives, except through the potential impacts on members of those communities, discussed above (Table 4-21) and described in the preceding section on processors. More important to communities is the status of target and bycatch species stocks and the impact periodic stock assessments have on landed catch. The performance with respect to escapement of smaller sized fish under the alternatives is not expected to vary substantially enough to affect stock productivity. Whiting abundance and allowable catch can vary substantially between years and can have a much greater impact on communities than the chafing gear alternatives under consideration in this EA. Resumption of midwater trawl fishing for widow rockfish due to the improved stock status of that species may help to offset somewhat the reduced catch of Pacific whiting.

4.3.5 Enforcement and Management

The impacts under any of the alternatives to the enforcement and management entities are relatively similar because the number, scope and complexity of regulations that need to be enforced and monitored are relatively similar under all alternatives (Table 4-21). However, enforcement personnel will need further training to enforce the FPA. The FPA may facilitate enforcement somewhat because it is less prescriptive than the other alternatives. It does not limit chafing gear coverage to a specific percent of the codend surface; it just states chafing gear can cover the sides and bottom of the codend, which in the current Pacific Coast midwater fishery are of four panel design with distinct areas of demarcation (ropes or cables) between codend panels.

Adoption of any of the action alternatives would address the regulation change in 2007 that limited chafer gear coverage to the terminal 50 meshes while continuing to allow an unlimited number of panels of up to 50 meshes in length. This would allow enforcement agencies to move forward with enforcement of all trawl gear restrictions, including chafer coverage on the codends of midwater trawl nets, which would be a positive development for both the harvesting sector and enforcement agencies. Since the regulations were re-interpreted in 2011 there have been numerous PFMC discussions regarding the chafing gear regulations and the intent to re-establish the pre-2007 regulations. As a result, PFMC has asked agencies to make enforcement of the chafing gear coverage provisions a low priority while the regulations are being reconsidered.

The enforcement agencies affected by the action include the United States Coast Guard, Federal Agents of the National Marine Fisheries Service and the enforcement units of the three coastal states (Washington, Oregon, and California). Regulations are expected to be implemented by the National Marine Fisheries Service, Silver Spring, Maryland, with EA documentation provided by NMFS West Coast Region after the required public notice and comment period. The coastal states, which have regulatory authority over territorial waters (0-3 miles offshore), are expected to conform their regulations for territorial waters to those in place for the EEZ (3-200 miles offshore). The resolution of this issue will enable enforcement agencies to enforce the rules once they are in effect by the coastal states.

The management entities that undertake fishery monitoring in the action area include the marine fisheries divisions of the state wildlife agencies for Washington, Oregon and California, the Pacific States Marine Fisheries Commission, the At-Sea Hake Monitoring Program and the West Coast Groundfish Observer Program. Adoption of any of the alternatives is not expected to affect marine fishery sampling, data collection programs, or other fishery management tasks, whether shoreside or at-sea, because all of the alternatives, including the No Action Alternative and the action alternatives, relate to gear used in the fishery and will not affect how these tasks are carried out.

Specific measures restricting how midwater trawl gear is fished is not part of the proposed action alternatives. Alaska uses a performance based approach to trawl fishery management. This form of management links regulatory measures (e.g., number of crab in pollock hauls) with gear restrictions (e.g., bare footrope requirement in pelagic trawls) to achieve desired environmental objectives for forage fish and EFH. Performance standards are not being proposed under the FPA, thus there is an added risk that fishermen may fish in unpredicted ways. Increased access to fishing habitat within RCAs, where there may be bigger fish and higher CPUEs, is of particular concern because those habitats have likely substantially recovered to pre-fishing conditions due to prohibition on bottom trawling for many years. Without performance measures to mitigate the potential for more bottom contact it may require further management action in both the near-term and long-term. Catch data will continue to be monitored to determine total catch and habitat impacts based on indicator species occurrences (e.g., corals and sponges) in catches.

4.4 Cumulative Impacts

A cumulative effects analysis is required by the Council on Environmental Quality (CEQ) (40 CFR part 1508.7). The purpose of a cumulative effects analysis is to consider the combined effects of many actions on the human environment over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful. A formal cumulative impact assessment is not necessarily required as part of an EA under NEPA as long as the significance of cumulative impacts have been considered (U.S. EPA 1999). The following addresses the significance of the expected cumulative impacts as they relate to the federally managed groundfish fishery.

4.4.1 Consideration of the Affected Resources

In Chapter 3 (Description of the Affected Environment), the affected resources that exist within the Pacific whiting fishery environment are identified. Therefore, the significance of the cumulative effects will be discussed in relation to these affected resources listed below.

1. Physical Environment, including Essential Fish Habitat and Ecosystems
2. Biological Resources, including:
    - Groundfish Target Species
    - Non-target Fish Species
    - Protected Fish Species, including ESA
    - Marine Mammals and Seabirds
3. Socioeconomic Environment, including fishermen, processors, communities, management and enforcement.

4.4.2 Geographic Boundaries

The analysis of impacts focuses on actions related to the harvest of Pacific whiting and pelagic rockfish complex species. The core geographic scope for each of the affected resources listed above is focused on the Eastern Pacific Ocean (Chapter 3). The coastal stock of Pacific whiting is highly migratory in nature, spawning off southern California and northern Baja California during winter months and migrating north as adult fish during spring and summer months to feeding grounds primarily off Oregon, Washington, and Vancouver Island, Canada. The fish return to their spawning grounds primarily during fall and winter months. For habitat, the core geographic scope is focused on EFH within the EEZ, but includes all habitat utilized by Pacific whiting and other non-target species in the Eastern Pacific Ocean. Pelagic rockfish complex species tend to be more localized than Pacific whiting although their young may distribute widely within the large California current system. For non-target species, those ranges may be expanded and would depend on the biological range of each individual non-target species in the Eastern Pacific Ocean. The core geographic scope for endangered and protected resources can be considered the overall range of these resources in the Eastern Pacific Ocean. For human communities, the core geographic boundaries are defined as those U.S. fishing communities directly involved in the harvest or processing of the managed resources, which were found to occur in coastal states most notably from Westport, Washington to Eureka, California.

4.4.3 Temporal Boundaries

The temporal scope of past and present actions for the affected resources is primarily focused on actions that have occurred after FMP implementation (1982) and more importantly, since implementation of the trawl rationalization program in 2011. For endangered species and other protected resources, the scope of past and present actions is on a species-by-species basis (Section 3.2.5) and is largely focused on the 1980s and 1990s through the present, when NMFS began generating stock assessments for marine mammals and sea turtles that inhabit waters of the U.S. EEZ. The temporal scope of future actions for all affected resources extends about three years into the future. This period was chosen because the dynamic nature of resource management for this species and lack of information on projects that may occur in the future make it very difficult to predict impacts beyond this timeframe with any certainty.

4.4.4 Actions Other than the Proposed Action

4.4.4.1 Past, Present, and Reasonably Foreseeable Future Actions

Fishery-related Actions
The historical management practices of PFMC have resulted in positive impacts on the health of the Pacific whiting stock and pelagic rockfish complex species. Numerous actions have been taken to manage the fisheries for these species through amendment and specifications actions. In addition, the nature of the fishery management process is intended to provide the opportunity for PFMC and NMFS to regularly assess the status of the fisheries and to make necessary adjustments to ensure that there is a reasonable expectation of meeting the objectives of the FMP and the targets associated with any rebuilding programs under the FMP. The statutory basis for Federal fisheries management is the Magnuson-Stevens Act. To the degree with which this

regulatory regime is complied, the cumulative impacts of past, present, and reasonably foreseeable future Federal fishery management actions on the affected resources should generally be associated with positive long-term outcomes. Constraining fishing effort through regulatory actions can often have negative short-term socioeconomic impacts. These impacts are usually necessary to bring about long-term sustainability of a given resource, which should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon the Pacific whiting stock and pelagic rockfish complex species.

In addition, PFMC has developed harvest specifications for 2013 and 2014 for groundfish stocks, which were implemented in January 2013 by NMFS. It is noted that the levels of whiting harvest will be declining in the near future for the short term (see 2013-2014 harvest specifications), but ACLs for some pelagic rockfish species, widow rockfish in particular, will be increased because widow rockfish has been declared recovered from overfishing. In the long term, it is important to evaluate the impacts on shares of total harvest allocated to entities rather than the allocation poundage.

PFMC is in the process of evaluating a change in the allocation of widow rockfish QS. Like whiting, the directed widow rockfish fishery is conducted primarily with midwater gear. The reallocation is being considered because of the newly rebuilt status of widow rockfish. Up through recent years including the years on which allocation was based in in the Amendment 20 widow QS allocation, widow rockfish has been used primarily to cover bycatch. If widow rockfish is reallocated to provide quota to permits for vessels that targeted it historically, there is likely to be an overlap with the permits and vessels that target whiting, and a potential benefit to those permits from the reallocation of widow rockfish.

There are also habitat implications associated with the increased ACL for widow rockfish. These are discussed in Section 4.1, beginning on page 94. There has likely been substantial habitat recovery within RCAs stemming from prohibition on bottom trawling and low ACLs for pelagic rockfish complex species since 2002. Increased midwater trawling for pelagic rockfish species within RCAs is likely to result in occasional (but increased) gear contacts with bottom habitats, hard bottom habitat in particular, which is where pelagic rockfish are typically found. However, the rate of contact is expected to be very low (likely 7 percent or less of tows) and lower yet than has been observed in the whiting fishery (8 percent or less of tows). There are important disincentives associated with gear contact with demersal habitats, which are discussed in Section 4.3.1.2, beginning on page 134. These include the high cost of net repair or replacement if the net is damaged and the reduced fishing efficiency and increased operating cost that occurs when the net makes contact with the ocean bottom. Gear restrictions have been implemented that further reduce the incentive to make bottom contact with midwater gear including the bare footrope requirement on all midwater nets and the requirement for large mesh webbing between the net opening and the main fishing net (see Section 3.3.5.1, beginning on page 83 for a comparison of Pacific Coast and Alaska midwater gear regulations). Catch share implementation is likely to consolidate fishing with fewer boats than in the past. This may result in further reduction in midwater gear contacts with demersal habitats because the more efficient vessels will likely be doing most of the fishing and it is likely that the most efficient vessels substantially avoid bottom contact due to the deleterious impacts of such contact.

PFMC and NMFS continue to work together on the trawl rationalization trailing actions. All of these actions are expected to increase benefits from the fishery and are not expected to appreciably interact with the action considered here, except as noted in the following list. Details on each action are available on the PFMC website (http://www.pcouncil.org/groundfish/fishery-management-plan/trailing-actions/). The main trailing actions are as follows:

*Trawl/Fixed gear permit stacking (*final PFMC action taken, not yet implemented) — This action allows fixed gear and trawl permits to be registered to the same vessel at the same time.

Widow rockfish reallocation (under PFMC consideration, deliberations delayed) — This action would reallocate widow rockfish QS among initial recipients and is being considered because widow rockfish has recently become rebuilt. Widow rockfish reallocation might change the individuals who are most affected by the chafing gear regulations for midwater gear but would not alter the effects on the environment or socio-economic effects at the fleet, community, or governmental agency management levels.

Gear Issues (under PFMC consideration, deliberations delayed) -- Gear issues include multiple gears on a trip, gear modifications to increase efficiency, and restrictions on areas in which gears may be used. Consideration on this issue has been delayed until September 2013. Potential changes that most likely interact with the chafing gear decision pertain to the time and areas in which gears are used. When those decisions are made, impacts may vary depending on which chafing gear alternative has been selected. Environmental assessments conducted in conjunction with those decisions will take into account the PFMC/NMFS decisions on chafing gear.

Cost Recovery (PFMC action completed, not yet implemented) – Cost recovery will be implemented mid-year in 2013 resulting in the collection of additional fees in amounts of 3 percent of exvessel value for the shoreside fishery and lesser amounts for the at-sea fisheries. For details see: http://www.pcouncil.org/wp-content/uploads/H2a_ATT1_COSTRECOV_FNL_SEP2012BB.pdf. In the context of this additional cost, alternatives which alleviate production costs may be more beneficial to stability in the industry than would be the case if costs were otherwise expected to remain stable.

Risk Pools (PFMC action completed, not yet implemented) —PFMC has recommended a number of provisions to facilitate fishers working together in risk pools. These actions include providing a safe harbor from limits on the accumulation of control over QS.

Lender Safe Harbor from Control Rules (PFMC action completed, not yet implemented) --- This action clarified who qualifies for the lender safe harbor exception and the activities for which an exception is provided.

Whiting Season and Southern Allocation (PFMC action complete, not yet implemented) – This action will set a common start date for all shoreside fisheries which matches the start date for the at-sea fishery (May 15) and eliminate the cap on early season harvest in the south. While not changing the total amount of trawling with midwater gear and total amount of the target species caught, it may alter the timing of that harvest, advancing some of the harvest by one month. To the degree that whiting are somewhat smaller one month earlier, and chafing gear increases the retention of smaller fish on tows less than 40 metric ton, the portion of the trawl harvest that might be taken by the shoreside fleet one month earlier may retain somewhat more small fish. The preliminary EA for the whiting season start change estimated that roughly 5 or 6 percent of the shoreside trawl allocation is taken each week at the start of the season. The shoreside fishery is allocated 42 percent of the harvest nontribal harvest. Thus, four weeks of harvest might amount to roughly 10 percent of the total harvest. The smaller individual in that 10 percent may be affected by not having the additional growth (an average of 15 days). To the degree that whiting do not escape from the top of the net, to the degree that increased chafing gear inhibits small fish escapement, and to the degree that fish are caught while there is less than 40 metric ton in the net, then with an earlier season opening smaller individual whiting may be impacted by the combined effect of less time for growth and increased chafing gear coverage. With a constant harvest rate starting earlier, on average the difference would be 15 days of growth for about 5 percent of the fish. The expected change in impact of the trawl season date movement as a result of the chafing gear regulations would be minimal.

Pacific Whiting Surplus Carryover Implementation (PFMC action completed) - This provision, which would allow up to 10 percent of unused whiting QP to be carried from one year to the next, has not been implemented due to legal criteria related to treaty issues with Canada. PFMC's SSC has determined that from a scientific perspective, the surplus carryover provision does not have a biological impact. On that basis, the chafing gear provision would not have an interaction with this provision that would have any appreciable impact.

Electronic Monitoring as a Replacement for the 100 percent Observer Coverage Requirement (under PFMC consideration) **—** This proposal is under preliminary study, and options have yet to be developed. Interaction with this chafing gear action will depend on the nature of the alternative monitoring system developed. If full retention is required with electronic monitoring, the combination of that requirement with the chafing gear provision could affect the amount of small fish and nonmarketable fish brought to shore but will not alter estimated total mortality.

Furthermore, PFMC is considering the adoption of a Fishery Ecosystem Plan (FEP) which would broaden its current authority to species and issues not currently addressed in existing FMPs, including the groundfish plan. The scope of the plan is still under consideration. The guidance provided to the plan development team thus far has included:

- Development of an FEP that would primarily be advisory in nature with the potential to expand in the future.
- Amend existing FMPs to include management measures for forage fish as the Council deems appropriate.
- Develop a list of species not included in any FMP and that are not being managed to define their trophic associations and ecological roles.
- Complete an analysis of unmanaged species and potential processes for their management.

Implementation of an FEP could have positive environmental and biological impacts associated with forage fish and unmanaged fish protection. Such protections could accrue benefits to managed species such as groundfish which depend on forage fish and some unmanaged fish for their survival and reproduction. While adverse impacts on forage fish and unmanaged fish under any of the alternatives are expected to be minimal, actions taken under the FEP are expected to further benefit these resources, helping to offset any negative impacts. It could potentially have negative short-term socioeconomic impacts if actions taken to protect forage species and unmanaged species resulted in reduced harvest opportunity for managed species. In the context of regulations that may impose further restrictions on harvest, alternatives which alleviate production costs may be more beneficial to stability in the industry than would be the case if harvest conditions were expected to remain stable.

4.4.5 Non-fishing Actions

Non-fishing activities that introduce chemical pollutants, sewage, changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment pose a risk to all of the identified affected resources. Human-induced non-fishing activities tend to be localized in nearshore areas and marine project areas where they occur. Examples of these activities include, but are not limited to, agriculture, port maintenance, coastal development, marine transportation, marine mining, dredging, and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources. Decreased habitat suitability would tend to reduce the tolerance of these species to the impacts of fishing effort. Mitigation of this outcome through regulations that would reduce fishing effort could then negatively impact human communities. The overall impact to the affected species and their habitats on a population level is unknown, but likely neutral to low negative, since a large portion of these species have a limited or minor exposure to these local non-fishing perturbations.

For many of the proposed non-fishing activities to be permitted under other Federal agencies (such as offshore energy facilities, etc.), those agencies would conduct examinations of potential impacts on the affected resources. The Magnuson-Stevens Act (50 CFR 600.930) imposes an obligation on other Federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH. The eight fishery management councils are engaged in this review process by making comments and recommendations on any Federal or state action that may affect habitat, including EFH, for their managed species and by commenting on actions likely to substantially affect habitat, including EFH.

In addition, under the Fish and Wildlife Coordination Act (Section 662), "whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the U.S., or by any public or private agency under Federal permit or license, such department or agency first shall consult with the U.S. Fish and Wildlife Service (USFWS), Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular state wherein the" activity is taking place. This act provides another avenue for review of actions by other Federal and state agencies that may impact resources that NMFS manages in the reasonably foreseeable future. In addition, NMFS and the USFWS share responsibility for implementing the ESA. ESA requires NMFS to designate "critical habitat" for any species it lists under the ESA (i.e., areas that contain physical or biological features essential to conservation, which may require special management considerations or protection) and to develop and implement recovery plans for threatened and endangered species. The ESA provides another avenue for NMFS to review actions by other entities that may impact endangered and protected resources whose management units are under NMFS' jurisdiction.

The effects of climate on the biota of the California Current ecosystem have been recognized for some time. The El Niño/Southern Oscillation (ENSO) is widely recognized to be the dominant mode of inter-annual variability in the equatorial Pacific, with impacts throughout the rest of the Pacific basin and the globe. During the negative (El Niño) phase of the ENSO cycle, jet stream winds are typically diverted northward, often resulting in increased exposure of the Pacific Coast of the U.S. to subtropical weather systems. The impacts of these events to the coastal ocean generally include reduced upwelling winds, deepening of the thermocline, intrusion of offshore (subtropical) waters, dramatic declines in primary and secondary production, poor recruitment, reduced growth and survival of many resident species (such as salmon and groundfish), and northward extensions in the range of many tropical species. Concurrently, top predators such as seabirds and pinnipeds often exhibit reproductive failure. In addition to inter-annual variability in ocean conditions, the North Pacific seems to exhibit substantial inter-decadal variability, which is referred to as the Pacific (inter) Decadal Oscillation (PDO).

Within the California Current itself, Mendelssohn, *et al*. (2003) described long-term warming trends in the upper 50 to 75 m of the water column. Recent paleoecological studies from marine sediments have indicated that 20th century warming trends in the California Current have exceeded natural variability in ocean temperatures over the last 1,400 years. Statistical analyses of past climate data have improved our understanding of how climate has affected North Pacific ecosystems and associated marine species productivities. Our ability to predict future impacts on the ecosystem stemming from climate forcing events remains poor at best.

4.4.6 Magnitude and Significance of Cumulative Effects

In determining the magnitude and significance of the cumulative effects, the additive and synergistic effects of the proposed action, as well as past, present, and future actions, must be taken into account. The following section first presents the effects of past, present, and reasonably foreseeable future actions on each of the managed resources (Section 4.4.6.1 to 4.4.6.3). This is followed by a discussion on the synergistic effects of the proposed action, as well as past, present, and reasonably foreseeable future actions (Section 4.4.7.)

4.4.6.1 Physical Environment, including Habitat and Ecosystem

Those past, present, and reasonably foreseeable future actions, whose effects may impact habitat (including EFH) and the direction of those potential impacts, are listed in Table 4-23, below. The direct and indirect negative impacts described in Table 4-23 are localized in nearshore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on habitat is expected to be limited due to a lack of exposure to habitat at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on habitat and EFH is unquantifiable. As described above (Section 4.4.5), NMFS has several means under which it can review non-fishing actions of other Federal or state agencies that may impact NMFS' managed resources and the habitat on which they rely prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of direct and indirect negative impacts those actions could have on habitat utilized by resources under NMFS' jurisdiction.

Past fishery management actions taken through the FMP process have had a positive cumulative effect on habitat and EFH. It is anticipated that the future management actions will result in additional direct or indirect positive effects on habitat through actions which protect EFH for federally-managed species and protect ecosystem services on which these species' productivity depends. These impacts could be broad in scope. All of the affected resources are interrelated; therefore, the linkages among habitat quality and EFH, managed resources and non-target species productivity, and associated fishery yields should be considered. For habitat and EFH, there are direct and indirect negative effects from actions which may be localized or broad in scope; however, positive actions that have broad implications have been, and it is anticipated will continue to be, taken to improve the condition of habitat. There are some actions, which are beyond the scope of NMFS and PFMC management such as coastal population growth and climate change, which may indirectly impact habitat and ecosystem productivity. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to habitat have had a neutral to positive cumulative effect.

Table 4-23: Summary of the effects of past, present, and reasonably foreseeable future actions on habitat.

Action	**Past to the Present**	**Reasonably Foreseeable Future**
Original FMP and subsequent Amendments to the FMP	**Indirect Positive**	
Agricultural runoff	**Direct Negative - nearshore areas**	
Port maintenance	**Uncertain – Likely Direct Negative - nearshore areas**	
Offshore disposal of dredged materials	**Direct Negative - project area**	
Marine transportation	**Direct Negative - primarily in marine traffic corridors**	
Installation of pipelines, utility lines and cables	**Uncertain – Likely Direct Negative - project area**	
Offshore Energy Facilities (wind, tidal, etc.)		**Potentially Direct Negative - project area**
2013-2014 Biennial Harvest Specifications		**Positive**
Trawl Rationalization Trailing Actions		**Uncertain – Likely Direct and Positive**
Summary of past, present, and future actions excluding those proposed in this document	**Overall, actions have had, or will have, neutral to positive impacts on habitat, including EFH**	

4.4.6.2 Biological Environment

Those past, present, and reasonably foreseeable future actions, and the direction of those potential impacts, are summarized in Table 4-24, below. The indirectly negative actions described in Table 4-24 are localized in nearshore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on the managed resources is expected to be limited due to a lack of exposure to the population at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on productivity of the managed resources is unquantifiable. As described above (Section 4.4.4), NMFS has several means under which it can review non-fishing actions of other Federal or state agencies that may impact NMFS' managed resources prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on resources under NMFS' jurisdiction.

Past fishery management actions taken through the FMP have had a positive cumulative effect on the managed resources. It is anticipated that the future management actions, described in Table 4-24, will result in additional indirect positive effects on the managed resources through actions which reduce and monitor bycatch, protect habitat, and protect ecosystem services on which Pacific whiting and pelagic rockfish complex species productivities depend. In addition, past fishery management actions taken through the FMP process have had a positive cumulative effect on ESA-listed and MMPA-protected species through the reduction of fishing effort (potential interactions) and implementation of gear requirements. It is anticipated that the future management actions will continue to result in additional indirect positive effects on protected resources. The impacts of these future actions could be broad in scope, and it should be noted the biological resources are often coupled in that they utilize similar habitat areas and ecosystem resources on which they depend. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to the biological resources have had a positive cumulative effect.

Table 4-24: Summary of the effects of past, present, and reasonably foreseeable future actions on biological resources.

Action	Past to the Present		Reasonably Foreseeable Future
Original FMP and subsequent Amendments to the FMP	**Indirect Positive**		
Agricultural runoff	**Indirect Negative - nearshore areas**		
Port maintenance	**Uncertain – Likely Indirect Negative - nearshore areas**		
Offshore disposal of dredged materials	**Indirect Negative - project area**		
Marine transportation	**Indirect Negative - primarily in marine traffic corridors**		
Installation of pipelines, utility lines and cables	**Uncertain – Likely Negative - project area**		
Offshore Energy Facilities (wind, tidal, etc.)			**Uncertain – Likely Indirect Negative - project area**
2013-2014 Biennial Harvest Specifications			**Indirect Positive**
Trawl Rationalization Trailing Actions			**Uncertain – mixed but most Indirect Positive**
Summary of past, present, and future actions excluding those proposed in this document	**Overall, actions have had, or will have, positive impacts on the biological resources**		

4.4.6.3 Socio-Economic Environment

Those past, present, and reasonably foreseeable future actions, whose effects may impact the socio-economic environment and the direction of those potential impacts, are summarized in Table 4-25 below. The indirectly negative actions described in Table 4-25 are localized where they occur. Therefore, the magnitude of those impacts on the managed resources is expected to be limited due to a lack of exposure to the population at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on productivity of the managed resources is unquantifiable. As described above (Section 4.4.4), NMFS has several means under which it can review non-fishing actions of other Federal or state agencies that may impact NMFS' managed resources prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on resources under NMFS' jurisdiction.

Past fishery management actions taken through the FMP have had a positive cumulative effect on the managed resources. It is anticipated that the future management actions, described in Table 4-25, will result in additional indirect positive effects on the managed resources through actions which reduce and monitor bycatch, protect habitat, and protect ecosystem services on which Pacific whiting and pelagic rockfish complex species productivities depend. In addition, past fishery management actions taken through the FMP process have had a positive cumulative effect on ESA-listed and MMPA-protected species through the reduction of fishing effort (potential interactions) and implementation of gear requirements. It is anticipated that the future management actions will continue to result in additional indirect positive effects on protected resources. The impacts of these future actions could be broad in scope, and it should be noted the biological resources are often coupled in that they utilize similar habitat areas and ecosystem resources on which they depend. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to the biological resources have had a positive cumulative effect.

Table 4-25: Summary of the effects of past, present, and reasonably foreseeable future actions on human communities

<table>
<tr><th>Action</th><th colspan="2">Past to the Present</th><th>Reasonably Foreseeable Future</th></tr>
<tr><td>Original FMP and subsequent Amendments to the FMP</td><td colspan="2">Indirect Positive</td><td></td></tr>
<tr><td>Agricultural runoff</td><td colspan="3">Indirect Negative - nearshore areas</td></tr>
<tr><td>Port maintenance</td><td colspan="3">Uncertain – Likely Mixed - nearshore areas</td></tr>
<tr><td>Offshore disposal of dredged materials</td><td colspan="3">Indirect Negative - project area</td></tr>
<tr><td>Marine transportation</td><td colspan="3">Mixed - primarily in marine traffic corridors</td></tr>
<tr><td>Installation of pipelines, utility lines and cables</td><td colspan="3">Uncertain – Likely Mixed - project area</td></tr>
<tr><td>Offshore Energy Facilities (wind, tidal, etc.)</td><td></td><td></td><td>Uncertain – Likely Mixed project area</td></tr>
<tr><td>2013-2014 Biennial Harvest Specifications</td><td></td><td></td><td>Indirect Positive</td></tr>
<tr><td>Trawl Rationalization Trailing Actions</td><td></td><td></td><td>Uncertain – Likely Positive</td></tr>
<tr><td>Summary of past, present, and future actions excluding those proposed in this document</td><td colspan="3">Overall, actions have had, or will have, positive impacts on human communities</td></tr>
</table>

4.4.7 Preferred Action on all of the Affected Resources

Alternative 1 is the preferred action alternative (Section 2.1.2). The magnitude and significance of the cumulative effects, which include the additive and synergistic effects of the proposed action, as well as past, present, and reasonably foreseeable future actions, are discussed throughout this section.

Impacts to the physical environment are between low negative to neutral compared to the No Action Alternative (Table 4-26). There is potential for greater bottom contact in the whiting fishery compared to the No Action Alternative. More chafing gear coverage may result in the vessel operator to being slightly less cautious about making contact with the bottom. Under No Action, the codend bottom would be exposed and habitat contact could more easily damage the net. Most of the increased bottom contact compared to the No Action Alternative will be to offshore biogenic and unconsolidated bottom habitat; no difference in impacts is projected among the alternatives with regard to impact to hard bottom habitats. However, the bottom contact rate is already understood to be very low (8 percent or less) in the whiting fishery and lower still in the pelagic rockfish fishery (7 percent or less). Under the Status Quo (Alternative 2b), there is already a high disincentive to allow midwater trawl gear to come into contact with benthic habitats such that the additional disincentive from reduced chafing gear coverage may not have a substantial impact on behavior. Further, under catch share management bottom contact rate in the whiting fishery is expected to decline as catch is consolidated with the more efficient harvesters. We might expect the future bottom contact rate to be more like that observed in the Canadian fishery and presented in Section 4.1.3.1 with a median rate of one percent of tows. Additionally, under Alternative 2b there is virtually no contact with hard bottom and very low levels of contact with soft bottom. These levels set an upper bound on the gains that could be made in selecting the No Action Alternative.

Table 4-26: Magnitude and significance of the cumulative effects; the additive and synergistic effects of the proposed action, as well as past, present, and reasonably foreseeable future actions.

Affected Resources Affected Resources	**Status in 2012**	**Magnitude of Net Impact of P, Pr, and RFF Actions**	**Magnitude of the Impact of the Proposed Action**	**Significant Cumulative Effects**
Habitat	Complex and variable (Section 3.1)	Positive Section 4.4.6.1	Low Negative to Neutral (Section 4.1)	**None**
Biological Resources	Complex and variable (Section 3.2)	Positive Section 4.4.6.2	Low Negative to Neutral (Section 4.2)	**None**
Socio-economic/ Human Communities	Complex and variable (Section 3.3)	Positive Section 4.4.6.3	Low Positive to Neutral (Section 4.3)	**None**

Impacts on the biological resources are primarily a function of the areas fished, gear types used, and level of effort; and of these; area fished is the only factor that might be affected. The levels of whiting harvests vary in the between years but have been relatively stable over time (see 2013-2014 biennial specifications for the groundfish fishery (PFMC 2012d), discussed in Section

3.2.1.1 of this EA). With a reduced population size there is reduced harvest opportunity for whiting by all fishers and may shift effort to other fisheries to the degree that fishery or individual fisher quotas allow. Processors and communities will also have reduced product and fishery income, respectively, from the whiting resource and they too will have to depend on other fisheries or income sources to make up for the reduced landings. In the context of this downturn, alternatives which alleviate production costs may be more beneficial to stability in the industry than would be the case if harvest levels were expected to remain stable. When the whiting population increase the effects are reversed.
In addition, the assumption is that small fish (i.e., non-target species) are able to escape codend meshes and that chafing gear impedes small fish escapement and survival once inside the chafer panel. While it is possible that under the No Action Alternative there could be a decreased impact relative to the action alternatives, that reduction would be small. In addition, minimally increased impacts to eulachon due to increased chafer coverage compared to No Action conditions may occur. There is no difference in impacts to listed species or to eulachon in particular because fishery impacts on eulachon have been very small or negligible. In addition, the eulachon biological opinion concludes that Pacific Coast groundfish fisheries have minimal impact to the eulachon population growth rate. No changes in impacts to target species, marine mammals, and seabirds compared to No Action are expected among the action alternatives. Overall, the impacts on biological resources are neutral when compared to the No Action Alternative (Table 4-26).

In addition, Pacific Coast trawl vessels engage in other fisheries and derive substantial revenues from those fisheries. Notable ones include shrimp and albacore. The income that trawlers receive from these other fisheries is far from stable and as a result can be expected to fluctuate in future years depending on the abundance or availability of these other resources to harvest. The availability of these other fishing opportunities somewhat diminishes the importance of any gain in economic efficiencies under the action alternative, as compared to a situation in which vessels relied only on the whiting or pelagic rockfish fisheries.

For impacts to human communities, assuming the shortest estimated codend life with chafing gear protection (5 years) and the highest codend price ($200 thousand), as much as $40 thousand per year might be saved under the PFMC Final Preferred Alternative compared to the No Action Alternative. The other action alternatives (1 and 2a) have minimal impacts compared to the No Action Alternative. Thus, expected impacts are neutral in comparison to the baseline (Table 4-26).

Therefore, when this action is considered in conjunction with all the other pressures placed on fisheries by past, present, and reasonably foreseeable future actions, it is not expected to result in any significant impacts, positive or negative. Based on the information and analyses presented in these past FMP documents and this document, there are no significant cumulative effects associated with the action proposed in this document.

4.4.8 Physical Environment

- Bottom contact with whiting midwater gear is minimal (likely 8 percent or less) and negligible on hard bottom habitat because footrope must be bare and meshes must be a minimum of 16" for the first 20 feet of the net, making the gear very light and subject to damage (see Offshore Hard Bottom Habitat, page 106) (also see NMFS 2005a for Alaska EFH analysis). Under trawl rationalization, the whiting fishery bottom contact rate is likely to decline as the more efficient harvesters take a greater share of the catch (Section 4.3.1.2, page 134).
- Bottom contact rate is likely to be lower for vessels targeting pelagic rockfish because of greater risk of gear damage or gear loss if hard bottom habitat is contacted, which is where the fishery primarily takes place; no amount of chafing gear coverage can prevent this from happening or will it afford sufficient protection from damage to the net or fishing lines (see Table 4-9: Summary of projected seabed contact rates for the action alternatives by habitat type and fishery, compared to No Action., page 103) .
- While operating under the status quo alternative (Alternative 2b), the United States and Canada whiting fisheries have received Marine Stewardship Council certification as being well managed and sustainable fisheries, which takes into account marine habitat impacts (MSC 2009). See Pacific Coast Marine Ecosystems, page 95. The status quo alternative does not vary from the Final Preferred Alternative with respect to the likely impacts on bottom habitat.

4.4.9 Biological Environment

- Escape of small gadids similar to whiting primarily occurs out of the codend top panel (Frandsen *et al*. 2010). In a Baltic sea herring study, the small herring that were able to escape did so through upper main net meshes (Suuronen, *et al*. 1997). All alternatives provide for codend top panel escapement (Table 4-1: Relative amounts of chafing gear coverage allowed under no action and action alternatives).
- Codend plugging effect may reduce differences in the alternatives with respect to fish escape through codend meshes in whiting tows, which frequently exceed 40 metric ton. Difference in the alternatives with regard to the chance for escape of fish through codend meshes of whiting nets decreases as the amount of fish in the net reaches and exceeds 40 metric ton, due to plugging effect (see Escape of small size fish (groundfish and non-groundfish) from nets used in the whiting fishery, page 117).
- Codend mesh size selection affects size of fish retained in hauls. (See Escape of unmarketable size and other small size fish through codend meshes, page 120.) Fishers will adjust mesh size and gear configuration (within regulatory limits) to optimize the catch rates and the mix of marketable and unmarketable size fish. There is disincentive under trawl rationalization to harvest unmarketable size fish and the avoidance of unmarketable size fish may benefit escape of other small fish including forage fish and eulachon (Fishing Behavior Considerations: , page 134).
- At sea monitoring is required for all groundfish IFQ trips to document catch; trawl rationalization makes fishers accountable for their own allocated groundfish species (Fishing Behavior Considerations: , page 134).
- Groundfish fisheries have minimal impact to eulachon, an endangered species (1,000 fish from a population of nearly 20,000,000) (see Protected Species Including ESA Species, page 122)

- The final preferred alternative does allows for more gear coverage and greater continuity of chafing gear than the status quo alternative. Because of net plugging effects when tows exceed 40 metric ton and the frequent use of chafing gear with mesh size substantially greater than the minimum mesh size in the codend the greater flexibility provided by Alternative 1 is not expected to have greater biological impacts than Alternative 2b (status quo).

4.4.10 Socio-economic Environment

- Chafing gear is primarily needed in the whiting fishery to protect the net from stern ramp abrasion (Need for Greater Codend Chafing Gear Protection, page 125).
- Codends are expensive to build ($20,000) and chafer is expensive to remove and replace ($5,000-$10,000)(Table 4-18, page 129).
- Increased chafing gear can double a codend useful years (from 5 yrs to 10 yrs) (Table 4-18, page 129) but may increase drag and reduce fuel efficiency.
- The provision for net protection under or over codend constraining or lifting straps (skirts) is not expected to have measureable biological implications, provided skirt attachment procedures are followed (Table 4-1, page 88).
- Adoption of the FPA (or any of the action alternatives) would reconcile the regulation change in 2007 and recent reinterpretation of the regulation that limited chafer gear coverage to the terminal 50 meshes (see Impacts on Enforcement and Management, page 143).
- No added cost to fishery management is expected under any of the alternatives ((see Impacts on Enforcement and Management, page 143).
- There would positive impact under the FPA (or any of the action alternatives) to vessel owners and operators in terms of potential for net economic gain from midwater fishery revenues compared to the No Action Alternative (see Impacts on Pelagic Rockfish Harvester Profitability, page 139).
- The status of other fisheries and the revenues that communities and fishers receive from them will have greater impact than the economic consequences associated with the selection of one or the other of the alternatives under consideration in this EA [see Table 3-17: Pacific Coast non-tribal commercial fishery landed weights (round, metric tons) and revenues (dollars) by PacFIN port group and species management group: 2009-2011 combined.
- The final preferred alternative will provide fishers with the greatest gear flexibility.

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CHAPTER 6 WEST COAST GROUNDFISH FMP AND MSA NATIONAL STANDARDS AND ADDITIONAL REQUIREMENTS[13]

6.1 CONSISTENCY WITH THE FMP AND OTHER APPLICABLE LAWS

6.1.1 Pacific Coast Groundfish FMP

Chapter 2 of the FMP identifies the goals and objectives for managing the Pacific Coast groundfish fishery. The goals in order of priority include 1) Conservation, 2) Economics, and 3) Utilization. The FMP includes 17 objectives to implement these goals. When proposing new management measures these goals are to be considered in combination with the MSA National Standards. The following discussion considers the proposed action relative to the relevant FMP goals and the applicable objectives.

<u>Conservation</u> *Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.*

> <u>Objective 4</u>. *Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.*
>
> The proposed action applies to all midwater trawl gear, which is currently allowed north of 40°10’ N. latitude 3-200 miles during the dates of the primary whiting season; and seaward of the RCAs south of 40°10’ N. latitude. In 2012, widow rockfish was declared rebuilt. In 2013 the allocation of widow rockfish increased substantially and will likely result in more targeting of pelagic species other than Pacific whiting with midwater trawl gear, particularly yellowtail, widow and chilipepper rockfish. The incidental catch of other non-groundfish species will continue to be monitored (all trawl vessels are required to carry at least one groundfish observer) and catch evaluated on an annual basis.

[13] Please note that consistency with NEPA for this action is addressed in Chapter 7.

Concern for non-groundfish species for which incidental catch could increase primarily include Pacific halibut, salmon, and forage fish, including ESA-listed eulachon. Midwater trawling for non-whiting groundfish species in shelf areas could result in increased catch of Pacific halibut. Because the fishery is heavily monitored and halibut are managed with hard allocations, any potential increases would not affect the sustainability of the stock.

The most common forage fish observed in the at-sea whiting and tribal sectors of the midwater trawl fishery for Pacific whiting from 2005-2010, include squid, American shad, jack mackerel, shortbelly rockfish, Pacific herring, Pacific mackerel, lanternfish, Pacific sardine, and a variety of smelts including eulachon (Section 3.2.2.1). Relative to the midwater trawl gear used to target Pacific whiting, these forage fish species make up a small proportion of the overall catch and are expected to continue at levels similar to those observed in recent years and considered in previous NEPA documents, including the 2013-2014 Proposed Harvest Specifications and Management Measures EIS. The analysis in Section 4.2.2.3 considered whether changes relative to the targeting of non-whiting species with midwater trawl gear with increased chafing gear coverage of the circumference of the codend (the preferred Alternative - Alternative 1) may result in less escapement of small fish. The catch of small fish in the non-whiting target fisheries is difficult to project given the fishery may be substantially different from historical fisheries. The fishery will continue to be monitored by observers, and data will be available post season.

<u>Objective 5</u>. *Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.*

Section 4.1.3 considered the impacts on EFH as a result of the proposed action. Midwater trawls, also called pelagic or off-bottom trawls, are trawls where the doors may be in contact with the seabed (although they usually are not), while the footrope generally remains suspended above the seafloor, but may contact the bottom on occasion. Midwater trawls are generally towed above the ocean floor, although they may be used near the bottom. They are also towed faster than bottom trawls to stay with the schooling fish they target. Towing time varies from a few minutes to several hours. When fishing close to the bottom, the footropes of pelagic trawls can cause benthic animals to be separated from the bottom. Because of the large mesh in the forward sections of the net, most bottom animals would be likely to fall through the mesh and be returned to the seafloor immediately. The unprotected footrope on midwater trawls effectively precludes the use of these nets on rough or hard substrates, meaning that they are not expected to affect the more complex habitats that occur on those substrates. Sessile organisms that create structural habitat may be uprooted or pass under pelagic trawl footropes, while those that are more mobile or attached to light substrates may pass over the footrope, with less resulting damage. Non-living structures may be more affected by pelagic trawl footropes than by bottom trawl footropes if the footrope makes continuous contact with the smaller, more concentrated, surfaces over which weight and towing force are applied. Because of

their smaller mesh sizes, bottom trawl nets, unlike midwater trawl, may capture and remove more of the large organisms that provide structural habitat.

Although the trawl RCAs, which have been in place since 2002 during the trip limit management regime for the trawl fishery, were intended to minimize opportunities for trawl vessels to incidentally take overfished rockfish, the trawl RCAs have effectively removed all bottom trawling from a large portion of the EEZ. Since 2002 the RCAs have been closed to bottom trawling, although the boundaries of the RCAs have varied between years (Table 3-2). North of 40°10’ N. latitude, the RCAs have continuously restricted much of the bottom trawling in waters between 75 and 200 fm. Given the absence of bottom trawling within the RCAs since 2002, the seafloor habitats have likely recovered considerably from pre-RCA years. In other words, this analysis considers the effects of the action on a recovered habitat.

Midwater trawl gear used by vessels participating in the whiting fishery has been exempted from RCA restrictions in the area north of 40°10’ N. latitude during the dates of the primary whiting season. However, beginning in 2011 north of 40°10’ N. latitude, midwater gear has been used to target other groundfish species in the RCA during the dates of the primary whiting season. In addition, it is expected that more vessels (vessels targeting whiting plus non-whiting vessels) will be making “occasional” contact with the benthic organisms and habitat than has been seen with the midwater fishery targeting Pacific whiting. Similarly, effort may increase in EFH conservation areas where only midwater gear is allowed, and where bottom trawling has been prohibited since 2005.

Utilization

Objective 11. *Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.*

No change in regulatory discard of groundfish are expected. Section 4.2.1 presented data regarding the change in the catch of small fish, such as eulachon. Because a greater circumference of the codend would be covered by chafing gear, the preferred alternative may result in slightly higher bycatch and bycatch mortality than No Action and Alternative 2a or 2b. However, the expected increase in bycatch of small fish is expected to be negligible for vessels using midwater gear to target Pacific whiting. For vessels using midwater trawl gear to target non-whiting species, is not expected to dramatically increase over historical data presented in this EA (Section 4.2.2.3). However, because the non-whiting midwater trawl fishery for the shorebased IFQ may develop into a fishery that is very different from the historical fisheries. If more small hauls (<40mt) are used for the non-whiting targets, a greater proportion of small fish may be able to escape from the codend relative to the whiting fishery. The fishery will continue to be monitored with full observer coverage (at least one observer on every IFQ vessels and mothership catcher vessels, and at least 2 observers on every at-sea processing vessel

Objective 14. *When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.*

Because Alternative 2b is considered the baseline (No Action is currently not being enforced), both the Alternative 1 (the preferred alternative) and alternative 2b would be the least disruptive alternatives to the current fishing practices. This is because many vessels currently use codends with chafing gear along the full length of the codend and are therefore not in compliance with the regulatory requirements under No Action. Vessels that also fish in Alaska can easily comply with the preferred alternative.

6.1.2 Magnuson-Stevens Conservation and Management Act

6.1.2.1 National Standards

An FMP or plan amendment and any pursuant regulations must be consistent with ten national standards contained in the MSA (§301). These are:

National Standard 1 *states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the United States fishing industry.*

This action does not substantially change the risk of exceeding an OFL for groundfish species. The trawl fishery is a catch share management fishery with a high level of individual accountability intended to keep harvest within the trawl allocations. High levels of monitoring have been effective in keeping harvest within the trawl allocations and preventing overfishing.

For groundfish species managed with species specific trawl allocations (including all overfished species), there is individual vessel catch accountability and the risk of overfishing those stocks is low. For groundfish species managed within complexes, the risk of overfishing is similar to that considered in the 2013-2014 Proposed Harvest Specifications and Management Measures, EIS. Some species managed within species complexes may be more vulnerable to overfishing due to the current composition of the complexes; this is particularly true for species identified as "highly vulnerable" to overfishing within the minor rockfish complexes. Species managed on a per trip basis, are not expected to be more vulnerable to overfishing than what was already considered in the 2013-2014 Proposed Harvest Specifications and Management Measures, EIS.

National Standard 2 *states that conservation and management measures shall be based on the best scientific information available*.

Information to understand the baseline conditions and potential impacts were gathered from peer-reviewed literature, unpublished scientific reports, observer data bases, Pacfin landing reports, as well as business and members of the fishing industry. Where quantitative data were not available on to the Pacific Coast groundfish fishery, data from other fisheries were used to identify potential environmental effects. The analysis was reviewed by EFH, biological and economic experts.

The preferred alternative would occur within areas described as EFH in the following Fishery Management Plans: Pacific Coast Groundfish, Pacific Coast Salmon (Salmon), Coastal Pelagic Species (CPS), and Highly Migratory Species (HMS). EFH for Salmon, CPS, and HMS within the affected area is pelagic and not subject to adverse impacts by fishing gear. The impacts of the alternatives on groundfish EFH are considered in the EA and are within the scope of fishery management actions analyzed in the EIS for groundfish EFH (NMFS 2005). The EA concludes that all of the action alternatives would be expected to result in, at most, minimal increases in bottom contact relative to the status quo.

All of the alternatives include continuance of Amendment 19 to the Pacific Coast Groundfish FMP which established a comprehensive strategy to conserve EFH, including its identification, designation of Habitat Areas of Particular Concern, and the implementation of measures to minimize, to the extent practicable, adverse impacts to EFH from fishing. NMFS published the final rule to implement Amendment 19 on May 11, 2006 (71 FR 27408). The rule remains in effect under the proposed action and preferred alternative. In addition, the status quo includes mandatory review of the EFH provisions of the groundfish FMP every 5 years. That review is currently underway. Should NMFS determine through the 5-year review that new conservation measures are necessary to minimize adverse impacts to EFH, conservation recommendations will be made to the Pacific Fishery Management Council and considered through an FMP Amendment process (50 CFR 600.815). Because the impacts associated with the proposed action and preferred alternative to groundfish EFH are anticipated to be minimal, no conservation recommendations pursuant to MSA Section 305(b)(4)(A) are included at this time.

<u>National Standard 3</u> *states that, to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.*

This standard is not affected by the alternative actions.

<u>National Standard 4</u> *states that conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishers, such allocation shall be (A) fair and equitable to all such fishers; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.*

The proposed measures will not discriminate between residents of different states.

<u>National Standard 5</u> *states that conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.*

This standard is not affected by the alternative actions.

National Standard 6 *states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.*

This standard is not affected by the alternative actions.

National Standard 7 *states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.*

The preferred Alternative is less restrictive than No Action or Alternatives 2a and 2b and would allow gear typically used in Alaska to also be used by fishermen in the Pacific Coast groundfish fishery. For vessels that also fish in Alaska (approximately 62 percent of the current fleet). This is expected to reduce the cost by allowing the same codend to be used in both regions.

National Standard 8 *states that conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), … take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities*.

This EA evaluates the effects of the alternatives on fishing communities (Section 4.3). The alternative actions are consistent with this standard.

National Standard 9 *states that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.*

No change in regulatory discard of groundfish is expected. Section 4.2.1 presented data regarding the change in the catch of small fish, such as eulachon. Because a greater circumference of the codend would be covered by chafing gear, the preferred alternative may result in slightly higher bycatch and bycatch mortality than No Action and Alternative 2a or 2b. However, the expected increase in bycatch of small fish is expected to be negligible for vessels using midwater gear to target Pacific whiting. Vessels using midwater trawl gear to target non-whiting species, is not expected to increase substantially over historical data presented in this EA (Section 4.2.2.3). However, the non-whiting midwater trawl fishery for the shorebased IFQ may develop into a fishery that is very different from the historical fisheries. If more small hauls (<40mt) are used for the non-whiting targets, a greater proportion of small fish may be able to escape from the codend relative to the whiting fishery. The fishery will continue to be monitored with full observer coverage (at least one observer on every IFQ vessels and mothership catcher vessels, and at least 2 observers on every at-sea processing vessel).

National Standard 10 *states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.*

The proposed action is not expected to have an effect on the safety of human life at sea.

6.1.3 Endangered Species Act

The Endangered Species Act of 1973 (ESA) was signed on December 28, 1973, and provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. The ESA replaced the Endangered Species Conservation Act of 1969; it has been amended several times.

A "species" is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become an endangered species within the foreseeable future.

Federal agencies are directed, under section 7(a)(1) of the ESA, to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Federal agencies must also consult with NMFS or USFWS, under section 7(a)(2) of the ESA, on activities that may affect a listed species. These interagency consultations, or section 7 consultations, are designed to assist Federal agencies in fulfilling their duty to ensure Federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat. Should an action be determined to jeopardize a species or result in the destruction or adverse modification of critical habitat, NMFS or USFWS will suggest Reasonable and Prudent Alternatives (RPAs) that would not violate section 7(a)(2).

Biological opinions document whether the Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of critical habitat. Where appropriate, biological opinions provide an exemption for the "take" of listed species while specifying the extent of take anticipated, the Reasonable and Prudent Measures (RPMs) necessary to minimize impacts from the take, and the Terms and Conditions with which the action agency must comply.

NMFS issued biological opinions under the Endangered Species Act (ESA) on August 10, 1990, November 26, 1991, August 28, 1992, September 27, 1993, May 14, 1996, and December 15, 1999 pertaining to the effects of the PCGFMP fisheries on Chinook salmon (Puget Sound, Snake River spring/summer, Snake River fall, upper Columbia River spring, lower Columbia River, upper Willamette River, Sacramento River winter, Central Valley spring, California coastal), coho salmon (Central California coastal, southern Oregon/northern California coastal), chum salmon (Hood Canal summer, Columbia River), sockeye salmon (Snake River, Ozette Lake), and steelhead (upper, middle and lower Columbia River, Snake River Basin, upper Willamette River, central California coast, California Central Valley, south/central California, northern California, southern California). These biological opinions concluded that implementation of the PCGFMP is not expected to jeopardize the continued existence of any endangered or threatened salmonids species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat.

NMFS issued a supplemental biological opinion on March 11, 2006 concluding that neither the higher observed bycatch of Chinook in the 2005 whiting fishery nor new data regarding salmon bycatch in the groundfish bottom trawl fishery required a reconsideration of its prior ‘‘no jeopardy’’ conclusion. NMFS also reaffirmed its prior determination that implementation of the PCGFMP is not likely to jeopardize the continued existence of any of the affected ESUs. Lower

Columbia River coho (70 FR 37160, June 28, 2005) and Oregon Coastal coho (73 FR 7816, February 11, 2008) were recently relisted as threatened under the ESA. The 1999 biological opinion concluded that the bycatch of salmonids in the Pacific whiting fishery were almost entirely Chinook salmon, with little or no bycatch of coho, chum, sockeye, and steelhead.

On January 22, 2013, NMFS requested the reinitiation of the biological opinion for listed salmonids to address changes in the fishery, including the trawl rationalization program and the emerging midwater trawl fishery. The consultation will not be completed prior to publication of the proposed rule to modify chafing gear regulations for the Pacific whiting fishery. NMFS has considered the likely impacts on listed salmonids for the period of time between the proposed rule and, if appropriate, final rule and the completion of the reinitiated consultation relative to sections 7(a)(2) and 7(d) of the ESA. On December 18, 2013, NMFS determined that ongoing fishing under the Pacific Coast FMP, assuming that the proposed chafing gear modifications are implemented in 2014, prior to the completion of the consultation would not be likely to jeopardize listed salmonids or result in any irreversible or irretrievable commitment of resources that would have the effect of foreclosing the formulation or implementation of any necessary reasonable and prudent alternatives.

On November 21, 2012, the U.S. Fish and Wildlife Service (FWS) issued a biological opinion concluding that the groundfish fishery will not jeopardize the continued existence of the short-tailed albatross. The (FWS) also concurred that the fishery is not likely to adversely affect the marbled murrelet, California least tern, southern sea otter, bull trout, nor bull trout critical habitat.

On December 7, 2012, NMFS completed a biological opinion concluding that the groundfish fishery is not likely to jeopardize non-salmonid marine species including listed eulachon, green sturgeon, humpback whales, Steller sea lions, and leatherback sea turtles. The opinion also concludes that the fishery is not likely to adversely modify critical habitat for green sturgeon and leatherback sea turtles. An analysis included in the same document as the opinion concludes that the fishery is not likely to adversely affect green sea turtles, olive ridley sea turtles, loggerhead sea turtles, sei whales, North Pacific right whales, blue whales, fin whales, sperm whales, Southern Resident killer whales, Guadalupe fur seals, or the critical habitat for Steller sea lions. NMFS considered whether the 2012 opinion should be reconsidered for eulachon in light of new information from the 2011 fishery and the proposed chafing gear modifications and determined that information about the eulachon bycatch in 2011 and chafing gear regulations does not change the extent of effects of the action, or any other basis to require reinitiation of the December 7, 2012 biological opinion. Therefore, the December 7, 2012 biological opinion meets the requirements of section 7(a)(2) of the ESA and implementing regulations at 50 CFR 402 and no further consultation is required.

As Steller sea lions and humpback whales are also protected under the Marine Mammal Protection Act, incidental take of these species from the groundfish fishery must be addressed under MMPA section 101(a)(5)(E). On February 27, 2012, NMFS published notice that the incidental taking of Steller sea lions in the West Coast groundfish fisheries is addressed in NMFS' December 29, 2010 Negligible Impact Determination (NID) and this fishery has been added to the list of fisheries authorized to take Steller sea lions (77 FR 11493, Feb. 27, 2012).

NMFS is currently developing MMPA authorization for the incidental take of humpback whales in the fishery.

6.1.4 Marine Mammal Protection Act

The MMPA of 1972 is the principal Federal legislation that guides marine mammal species protection and conservation policy in the United States. Under the MMPA, NMFS is responsible for the management and conservation of 153 stocks of whales, dolphins, porpoise, as well as seals, sea lions, and fur seals; while the USFWS is responsible for walrus, sea otters, and the West Indian manatee.

Off the west coast, the Steller sea lion (Eumetopias jubatus) eastern stock, Guadalupe fur seal (Arctocephalus townsendi), and Southern sea otter (Enhydra lutris) California stock are listed as threatened under the ESA. The sperm whale (Physeter macrocephalus) Washington, Oregon, and California stock, humpback whale (Megaptera novaeangliae) Washington, Oregon, and California - Mexico Stock, blue whale (Balaenoptera musculus) eastern north Pacific stock, and Fin whale (Balaenoptera physalus) Washington, Oregon, and California stock are listed as depleted under the MMPA. Any species listed as endangered or threatened under the ESA is automatically considered depleted under the MMPA.

Pursuant to the MMPA, the List of Fisheries (LOF) classifies U.S. commercial fisheries into one of three Categories according to the level of incidental mortality or serious injury of marine mammals:

I. Frequent incidental mortality or serious injury of marine mammals
II. Occasional incidental mortality or serious injury of marine mammals
III. Remote likelihood of/no known incidental mortality or serious injury of marine mammals

The Marine Mammal Protection Act (MMPA) mandates that each fishery be classified by the level of serious injury and mortality of marine mammals that occurs incidental to each fishery, as reported in the annual Marine Mammal Stock Assessment Reports for each stock. On the 2012 List of Fisheries, the WA/OR/CA sablefish pot fishery is listed as a category II fishery due to interactions with humpback whales. All other west coast groundfish fisheries are listed as category III fisheries. (See http://www.nmfs.noaa.gov/pr/interactions/lof/final2012.htm.) Commercial fishing vessels participating in Category I or II fisheries must be covered by a Federal permit under the MMPA. For most fisheries, including all west coast fisheries, a blanket permit is issued for all Federal or state permits authorizing participation in the fishery.

Section 3.2.3.4 describes the incidental take of marine mammals and Section 4.2.3 assesses the effects of the proposed action on marine mammals. Steller sea lions and humpback whales are protected under the ESA and the MMPA. Incidental take of these species from the groundfish fishery must be addressed under MMPA section 101(a)(5)(E). On February 27, 2012, NMFS published notice that the incidental taking of Steller sea lions in the West Coast groundfish fisheries is addressed in NMFS' December 29, 2010 Negligible Impact Determination (NID) and this fishery has been added to the list of fisheries authorized to take Steller sea lions. 77 FR

11493 (Feb. 27, 2012). NMFS is currently developing MMPA authorization for the incidental take of humpback whales in the fishery. There is no projected change in the trawl fishery impacts over what was previously considered in the recently completed 2013-2014 Proposed Harvest Specifications and Management Measures, EIS. The fishery will continue to be monitored with full observer coverage (at least one observer on every IFQ vessels and mothership catcher vessels, and at least 2 observers on every at-sea processing vessel.

6.1.5 Migratory Bird Treaty Act and Executive Order 13186

The MBTA of 1918 was designed to end the commercial trade of migratory birds and their feathers that, by the early years of the 20th century, had diminished the populations of many native bird species. The MBTA states that it is unlawful to take, kill, or possess migratory birds and their parts (including eggs, nests, and feathers) and is a shared agreement between the United States, Canada, Japan, Mexico, and Russia to protect a common migratory bird resource. The MBTA prohibits the directed take of seabirds, but the incidental take of seabirds does occur.

EO 13186 supplements the MBTA (above) by requiring Federal agencies to work with the USFWS to develop memoranda of understanding to conserve migratory birds. NMFS is in the process of implementing a memorandum of understanding. The protocols developed by this consultation will guide agency regulatory actions and policy decisions in order to address this conservation goal. The EO also directs agencies to evaluate the effects of their actions on migratory birds in environmental documents prepared pursuant to the NEPA.

The proposed action is unlikely to cause the incidental take of seabirds protected by the Migratory Bird Treaty Act to differ substantially from levels previously considered in the 2013-2014 Proposed Harevest Specifications and Management Measures EIS. (Section 4.2.3 evaluated impacts of the proposed action on protected species, including seasbirds).

6.1.6 Coastal Zone Management Act

Section 307(c)(1) of the Federal Coastal Zone Management Act (CZMA) of 1972 requires all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. A determination as to whether the proposed action is would be implemented in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved coastal zone management programs of Washington, Oregon, and California will be submitted to the responsible state agencies for review under Section 307(c)(1) of the CZMA. The relationship of the groundfish FMP with the CZMA is discussed in Section 11.7.3 of the Groundfish FMP. The Groundfish FMP has been found to be consistent with the Washington, Oregon, and California coastal zone management programs.

6.1.7 Paperwork Reduction Act

The Paperwork Reduction Act requires that agency information collections minimize duplication and burden on the public, have practical utility, and support the proper performance of the agency's mission. There is no Paperwork Reduction Act collection associated with this action.

6.2 Executive Order 12866

This action is not significant under E.O. 12866. This action will not have a cumulative effect on the economy of $100 million or more, nor will it result in a major increase in costs to consumers, industries, government agencies, or geographical regions. No significant adverse impacts are anticipated on competition, employment, investments, productivity, innovation, or competitiveness of U.S.-based enterprises.

6.3 Executive Order 12898 (*Environmental Justice*)

EO 12898 obligates Federal agencies to identify and address "disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States" as part of any overall environmental impact analysis associated with an action. NOAA guidance, NAO 216-6, at Section 7.02, states that "consideration of EO 12898 should be specifically included in the NEPA documentation for decision-making purposes." Agencies should also encourage public participation, especially by affected communities during scoping, as part of a broader strategy to address environmental justice issues. The proposed action will not result in disproportionate adverse impacts to low income and minority communities.

6.4 Executive Order 13175 (*Tribal government)*

Executive Order 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.
The proposed action was developed after meaningful consultation and collaboration with Tribal officials from the area covered by the FMP. Under the Magnuson-Stevens Act at 16 U.S.C. 1852(b)(5), one of the voting members of the PFMC must be a representative of an Indian Tribe with Federally recognized fishing rights from the area of PFMC's jurisdiction.

Midwater trawl codends used by the tribes are affected by the action. Because the action liberalizes the current requirements, it is not expected to affect the prosecution of the tribal fishery.

6.5 Executive Order 13132 (Federalism)

EO 13132, which revoked EO 12612, an earlier federalism EO, enumerates eight "fundamental federalism principles." The first of these principles states "Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people." In this spirit, the EO directs agencies to consider the implications of policies that may limit the scope of or preempt states' legal authority. Preemptive action having such "federalism implications" is subject to a consultation process with the states; such actions should not create unfunded mandates for the states; and any final rule published must be accompanied by a “federalism summary impact statement.” The proposed action does not have federalism implications subject to EO 13132.

6.6 Administrative Procedure Act

The Administrative Procedure Act, or APA, governs the Federal regulatory process and establishes standards for judicial review of Federal regulatory activities. Most Federal rulemaking, including regulations promulgated pursuant to the MSA, are considered “informal,” which is determined by the controlling legislation. Provisions at 5 U.S.C. 553 establish rulemaking procedures applicable to the proposed action. the FMP requires a ‘full notice-and-comment rulemaking’ to implement the regulations necessary to implement the Council recommendation. The rulemaking associated with this proposed action will be conducted in accordance with the APA and procedures identified in section 304 of the MSA.

6.7 Regulatory Flexibility Act

The Regulatory Flexibility Act requires government agencies to assess the effects that regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those effects. A fish-harvesting business is considered a “small” business by the Small Business Administration if it has annual receipts not in excess of $4.0 million. For related fish-processing businesses, a small business is one that employs 500 or fewer persons. For wholesale businesses, a small business is one that employs not more than 100 people. For marinas and charter/party boats, a small business is one with annual receipts not in excess of $6.5 million. If the projected impact of the regulation exceeds $100 million, it may be subject to additional scrutiny by the Office of Management and Budget

Regulatory Impact Review (Executive Order 12866) - EO 12866, Regulatory Planning and Review, covers a variety of regulatory policy considerations and establishes procedural requirements for analysis of the benefits and costs of regulatory actions. It directs agencies to choose those approaches that maximize net benefits to society, unless a statute requires another regulatory approach. The agency must assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only after reasoned determination the benefits of the intended regulation justify the costs. In reaching its decision, the agency must use the best reasonably obtainable information, including scientific, technical and economic data, about the need for and consequences of the intended regulation. NMFS requires the preparation of a regulatory impact review (RIR) for all regulatory actions of public interest. The purpose of the analysis is to ensure the regulatory agency systematically and comprehensively considers all available alternatives, so the public welfare can be enhanced in the most efficient and cost-effective way. The RIR addresses many of the items in the regulatory philosophy and principles of EO 12866.

Regulatory Impact Review and the Regulatory Flexibility Act Analysis- NMFS develops the necessary analysis and documentation needed to address these mandates as part of the Federal rulemaking process implementing groundfish harvest specifications and management measures. These analyses rely substantially on the contents of this EA and the socioeconomic impact evaluation in Chapter 4 and baseline information in Chapter 3, which have been developed in conjunction with NMFS West Coast Region staff to provide information needed for the Regulatory Impact Review and Regulatory Flexibility Act analyses. A separate Regulatory Impact Review and regulatory Flexibility Act Analyses will be prepared for the rulemaking to implement the FPA.

CHAPTER 7 CONSISTENCY WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

7.1 National Environmental Policy Act

The CEQ has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), and NOAA's agency policy and procedures for NEPA can be found in NOAA Administrative Order 216-6 (NAO 216-6). The following are core elements of an EA (40 CFR § 1508.9):

1. The need for the proposal,
2. Alternatives as required by NEPA § 102(2)(E),
3. The environmental impacts of the proposed action and the alternatives, and
4. The agencies and persons consulted.

7.2 Related NEPAdocuments

The following NEPA documents provide information and analyses related to the effects of this proposed action:

- Proposed Harvest Specifications and Management Measures for the 2013-2014 Pacific Coast Groundfish Fishery and Amendment 21-2 to the Pacific Coast Groundfish Fishery Management Plan; Final Environmental Impact Statement. Published by PFMC and NMFS in October 2012. (http://www.pcouncil.org/wp-content/uploads/September_2012_Main_Document_13-14_FEIS_SPEX.pdf)
- Proposed Harvest Specifications and Management Measures for the 2011-2012 Pacific Coast Groundfish Fishery and Amendment 16-5 to the Pacific Coast Groundfish Fishery Management Plan to Update Existing Rebuilding Plans and Adopt a Rebuilding Plan for Petrale Sole; Final Environmental Impact Statement. Published by PFMC and NMFS in February 2011. (http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/#16-5)
- Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery (Amendment 20 to the Groundfish FMP); Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Published by the Pacific Fishery Management Council and NMFS in June 2010. (http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-20/#EIS)

Information may be incorporated by reference from these documents into this EIS. Council on Environmental Quality (CEQ) regulations (40 CFR 1502.21) state "Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described." When information from the above documents is incorporated, these procedures are followed within the body of this EIS.

7.3 Finding of No Significant Impact (FONSI)

TRAWL RATIONALIZATION TRAILING ACTIONS: Chafing Gear

Finding of No Significant Impact (FONSI)

National Marine Fisheries Service
November 2014

National Oceanic and Atmospheric Administration Administrative Order 216-6 (NAO 216-6) (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity". Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria.

These include:

(1) Can the proposed action be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action?

The potential biological effects on groundfish species (including overfished species) are projected to be neutral because groundfish species are managed to stay within trawl fishery allocations and to prevent overfishing. The trawl allocation is divided between the shorebased IFQ program and the at-sea Pacific whiting fishery. The use of MS and CP Coop allocations, IFQs, trip limits and set-asides are effective in keeping the total catch within harvest specifications for the trawl fishery. The proposed action is not expected to result in increased catch of target species. Given the level of catch monitoring and inseason catch accounting, there is a low risk of exceeding a groundfish ACL and an even lower risk of exceeding an OFL as a result of the proposed action. Therefore, the proposed action is not expected to jeopardize the sustainability of any target species.

(2) Can the proposed action be reasonably expected to jeopardize the sustainability of any non-target species?

Changes in the impacts on non-groundfish species are primarily related to changes in fishing season, fishing locations, and intensity. The proposed action does not modify which target fisheries can use midwater trawl gear or when or where it may be used. The intensity of fishing is primarily related to harvest specifications and allocations occurring under other related actions.

The catch of non-target species by vessels targeting Pacific whiting is generally very low. The proposed action may result in increased catch of small species that could escape from the net with less chafing gear, including CPS, and small forage fish. If chafing gear is used to reduce the effective mesh size on the codend or if longer chafing gear sections result in small non-groundfish being trapped between the codend and the chafing gear, increased catch may occur. To reduce the likelihood of increased catch of small fish, the proposed action includes regulatory text to clarify that chafing gear may not be used to reduce the codend mesh and clarifies that chafing gear may not be used to create a double-walled codend. Vessels targeting Pacific whiting have less market opportunity for small fish and tend to take measures to reduce the catch of small Pacific whiting because it is an IFQ species that must be covered with IFQ quota pounds. Like Pacific whiting trips, all trips by vessels targeting non-whiting species will be monitored and data collected for catch by species estimates. The proposed action is expected to have a low negative impact on small non-target species that would have otherwise successfully escape from the codends under No Action. The proposed action is not expected to jeopardize the sustainability of any non-target species.

(3) Can the proposed action be reasonably expected to allow substantial damage to the ocean and coastal habitats and/or EFH as defined under the Magnuson-Stevens Fishery Conservation and Management Act and identified in FMPs?

The proposed action reduces restrictions on chafing gear and allows for greater coverage of the codend. The changes may result in midwater trawl gear being used to fish in a manner that results in more contact with benthic habitat than is currently occurring. Consequently, there may be greater effects to benthic species than would occur under the No Action.

Historical data under Status Quo (Alternative 2B) indicates that the midwater trawl gear used to target Pacific whiting does occasionally make contact with the ocean floor. Because midwater trawls nets must have unprotected meshes of at least a 16 inches for the first 20 feet, they are subject to damage from bottom contact. Catch data indicate that approximately 8 percent of the Pacific whiting hauls make contact with the ocean floor with most contact occurring on offshore unconsolidated bottom composed of small particles (i.e., gravel, sand, mud, silt, and various mixtures of these particles) and offshore biogenic habitat (associated with structure-forming invertebrates such as corals, basketstars, brittlestars, demosponges, gooseneck barnacles, sea anemones, sea lilies, sea urchins, sea whips, tube worms, and vase sponges). Greater protection of the codend allowed under the proposed action may result in some increased contact. However, the vulnerability of the net to damage from bottom contact means that increases in chafing gear are not likely to result in substantial increases in bottom contact. The expected impact to EFH and bottom habitat in the offshore unconsolidated and biogenic bottom habitat is low negative. Contact with hard bottom habitat is thought to be negligible under No Action as well as under the proposed action resulting in a neutral impact to hard bottom habitat.

The targeting of non-whiting species particularly pelagic rockfish species has increased each year since implementation of the shorebased IFQ program. More fishing is expected to occur over hard bottom than occurs relative to the targeting of Pacific whiting. Similar to Pacific whiting, midwater trawl nets used to target non-whiting must have unprotected meshes of at least 16 inches for the first 20 feet of the net making the net subject to damage from bottom contact. Bottom contact rate is likely to be lower for vessels targeting pelagic rockfish because of greater risk of net damage or loss if hard bottom habitat is contacted. Preliminary evaluations of the type of midwater gear used to target chilipepper, widow rockfish, and yellowtail rockfish indicate that fishers may not make chafing gear changes (the codends for these gears are believed to be generally less than 50 meshes and therefore in compliance with the new interpretation of the existing regulations). The expected impact to EFH and bottom habitat is expected to be low negative to neutral. Substantial damage to EFH, the ocean or coastal habitats is not expected to result from the proposed action.

(4) Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?

The proposed action is not expected to have an effect on the safety of human life at sea because it does not change fishing practices such that it changes the safety risks over No Action.

(5) Can the proposed action be reasonably expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

The main species of concern with regard to amount of chafing gear coverage is eulachon, a relatively small fish listed as threatened under the ESA. The increased coverage and variable attachment of chafing gear could reduce the effective mesh size over a greater area of the trawl net, which could change the success of eulachon escapement from trawl nets. Species specific data are not available to project impacts. To maintain the current mesh size restrictions and prohibition on double-walled codends, the proposed action includes clarifying regulatory language. Because vessels targeting Pacific whiting have less market opportunity for small fish, they are expected to take measures to reduce the catch of small unmarketable Pacific whiting which must be covered with quota pounds. The catch of small non-target species, including eulachon is not expected to increase substantially. Eulachon will continue to be monitored on all trawl trips and managed to stay within thresholds identified in the current ESA Section 7 biological opinion for the groundfish fishery. The impact on eulachon is expected to be low negative over No Action.

Changes in impacts to seabird and marine mammals are expected to be neutral over No Action. The placement of chafing gear on the codends of midwater trawl nets primarily affects escape of organisms through codend meshes. The issue of concern for marine mammals and seabirds has little or nothing to do with escape of these animals through codend meshes. Once these animals enter a midwater trawl net (which is very rare), the damage to these animals has already been done by the time they reach the codend of the net.

(6) Can the proposed action be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships)?

The trophic interactions in the California Current ecosystem are extremely complex, with large fluctuations over years and decades. Food webs are heavily structured around CPS, which exhibit boom and bust cycles over decadal time scales in response to climate variability. The potential for reduced escapement of small fish has the potential for a low negative impact to the population status and sustainability of the affected species or species groups. However, when considered within the context of the ecosystem, the expected impact is neutral.

(7) Are significant social or economic impacts interrelated with significant natural or physical environmental effects?

The proposed action is expected to provide fishers with the greater gear flexibility. Those fishers that also participate in the Alaska pollock fishery are expected to benefit the most. Chafing gear is primarily needed in the whiting fishery to protect the net from stern ramp abrasion. Codends are expensive to replace ($20,000) and chafing gear is expensive to remove and replace ($5,000-$10,000). Increased chafing gear can double a codend's useful years (from 5 yrs to 10 yrs) but may increase drag and reduce fuel efficiency. The expected economic benefits to vessels targeting Pacific whiting are projected to be between 1 and 3 percent of the exvessel revenue or low positive. The proposed action is not expected to result in significant social or economic impacts interrelated with significant natural or physical environmental effects.

(8) To what degree are the effects on the quality of human environment expected to be highly controversial?

The effects on the quality of human environment are not expected to be highly controversial because there is no scientific controversy associated with the use of the chafing gear which is already in use in Alaska.

(9) Can the proposed action reasonably be expected to result in substantial impacts on unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

No alterations on unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas to by the proposed action are expected from the proposed action.

(10) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

The effects on the human environment are not likely to be highly uncertain or involve unique or unknown risks. Relative to the developing non-whiting midwater trawl fishery, there is some uncertainty relative to how the gear may be modified and the associated effects. However, given the level of catch monitoring and accounting, issues would likely be identified early reducing the risks on the human environment.

(11) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Impacts to the physical environment are between low negative to neutral compared to the No Action Alternative. The biological impacts relative to groundfish species are expected to be neutral. Relative to non-groundfish, the projected impacts are low negative. Relative to protected species, the projected impacts are low negative. Relative to the ecosystem, the projected impacts are neutral. The expected economic benefits to vessels targeting Pacific whiting are low positive. In combination the cumulative effects relative to other past, present, or foreseeable actions is not expected to be significant.

(12) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

There would be no alterations to terrestrial resources by the proposed action.

(13) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

The action is for fishing gear modifications. Although codends used in Alaska pollock would be used on the West Coast no introduction or spread of a non-indigenous species is expected over No Action because these same vessels are already using fishing gear that has been used in the Alaska Pollock fishery. In addition, the species found in the two ecosystems are similar or the same.

(14) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Each future action related to trawl gear will require consideration relative to the effect on the human environment. Therefore, the proposed action is not likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.

(15) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

The proposed action has been reviewed for consistency with other Federal laws and Executive Orders and has been determined to be consistent. NMFS determined that this action is consistent to the maximum extent practicable with the enforceable policies of the approved coastal management program of Washington, Oregon, and California. This determination was submitted on January 15, 2014, for review by the responsible state agencies under section 307 of the Coastal Zone Management Act.

(16) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Impacts on the biological resources are primarily a function of the areas fished, gear types used, and level of effort; and of these; area fished is the only factor that might be affected. The levels of Pacific whiting harvests vary between years, but have been relatively stable over time. The expected biological impacts relative to groundfish species are expected to be neutral; relative to non-groundfish, the projected impacts are low negative; relative to protected species, the projected impacts are low negative; and relative to the ecosystem, the projected impacts are neutral. In combination the cumulative effects are not expected to be significant.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment, it is hereby determined that the proposed action will not significantly impact the quality of the human environment as described above and in the Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary.

11/4/14

Deputy Regional Administrator, Date
West Coast Region, NMFS

7.4 List of Persons and Agencies Consulted

This action is a Council-recommended action that includes all interested and potential cooperating agencies, such as the United States Fish and Wildlife Service, tribal government representatives, and state representatives for Washington, Oregon and California.

Main authors:

LB Boydstun, Contracting Fishery Biologist
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Other contributers:

Kit Dahl – Geographic Analysis and Document Review
Kim Merydith – Proofing and Editing

The following people were also consulted or were involved in reviewing Council drafts of the document:

Laurie Beale, NOAA GC, Attorney
Sarah Biegel, NMFS West Coast Region, NEPA Coordinator
Becky Renko, NMFS West Coast Region, Fishery Management Specialist

Copies of this Environmental Assessment and Magnuson-Stevens Act Analysis and other supporting documents for this document are available from Jim Seger, Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220 and Becky Renko, National Marine Fisheries Service, 7600 Sand Point Way NE, BIN C15700, Seattle, WA 98115-0070

List of agencies and persons consulted.

Alison Agnes and Mitch Denny – Protected resources
Susan Bishop and Peter Dygert – ESA listed Salmonids
Steve Copps and John Sadler - EFH